

International Journal of Scientific Research and Reviews

Diabetes and Oral Health The Bitter Sweet Problem!!!!

Bhandary Shruti *¹, Bhandary Nithish ², Dandakeri Shilpa³ and M.K. Sowmya³

¹Department of conservative dentistry & Endodontics, A.B Shetty Memorial Institute of Dental Sciences, Derlakatte, Mangalore, India.

²Department of General medicine, A.J.Shetty Institute of Medical Sciences, Kuntikana, Mangalore, India.

³Department of Prosthodontics, A.B Shetty Memorial Institute of Dental Sciences, Derlakatte, Mangalore, India.

ABSTRACT:

Diabetes, also known as diabetes mellitus, is a general term for a variety of different metabolic disorders that affect the ability of the body to process and use sugar properly. Medically, this is referred to as an inability of the body to metabolize glucose effectively. This results in an abnormally high level of glucose in the blood, called hyperglycemia. Left untreated, hyperglycemia can lead to serious long-term complications. Complications of diabetes can be minimized or possibly eliminated by prompt diagnosis and effective ongoing treatment. This article summarizes the types, symptoms, diagnosis, complications, treatment of diabetes as well as dental treatment considerations for the patients with diabetes.

KEYWORDS: Diabetes mellitus, Metabolic disorder, Hyperglycemia, Glucose, Insulin, Oral health.

Corresponding Author:

Dr Shruti Bhandary

Reader, Department of conservative dentistry & Endodontics

A.B Shetty Memorial Institute of Dental Sciences, Derlakatte, Mangalore .575160

Email: drshrutis@yahoo.co.in

Ph No. 7760012870.

INTRODUCTION

Diabetes Mellitus, commonly referred to as "Diabetes," means "sweet urine." Diabetes mellitus means "to flow, honey" in Greek. The 20th annual World Diabetes Congress of the International Diabetic Federation has said that India leads the world in the looming epidemic of diabetes. The country currently has the highest number of 50.8 million people suffering from diabetes, followed by China with 43.2 million and the US with 26.8 million. The causes, symptoms, complications, and management of diabetes vary depending on the specific type of diabetes.^{1,2}

Types of Diabetes:^{3,4}

The hormone insulin is a key player in diabetes. Insulin is produced by the pancreas, an endocrine gland located in the upper abdomen. Insulin's role is to facilitate the movement of glucose from the bloodstream into the body's cells, where it is used for energy.

There are 4 main types of diabetes

- Insulin-Dependent Diabetes Mellitus (IDDM) or type1 diabetes.
- Non Insulin-Dependent Diabetes Mellitus (NIDDM) or type2 diabetes
- Gestational Diabetes
- Secondary Diabetes

In type 1 diabetes the cells that make insulin in the pancreas are destroyed. In type 2 diabetes the body still produces insulin, but the body's cells become resistant to its effects. In gestational diabetes, the body still makes insulin, but the hormones that are produced during pregnancy make the body's cells more resistant to it. Secondary diabetes mellitus refers to elevated blood sugar levels that develop as the result of another medical condition. Secondary diabetes mellitus also develops when the pancreatic tissue responsible for the production of insulin is absent because it is destroyed by disease, such as chronic pancreatitis, trauma, or surgical removal of the pancreas. Diabetes can also result from other hormonal disturbances, such as excessive growth hormone production (acromegaly) and Cushing's syndrome.

Diagnosis: Diabetes is easy to diagnose during a routine office visit with a simple blood test, called a fasting blood glucose test, which will detect hyperglycemia. High levels of glucose may also be quickly seen on a random blood glucose test or a urine analysis performed on urine. Pregnant women are

generally tested with a glucose challenge test. The newest form of testing for diabetes is the glycated hemoglobin (A1C) test, which measures the average overall blood sugar for the past several months.⁵

Treatment: Treatment of diabetes varies depending on the type, but management of all types of diabetes includes regular monitoring of blood sugar levels, eating a well-balanced healthy diet and regular exercise. Type 1 diabetes is always treated with injected insulin and some people with type 2 diabetes or gestational diabetes may need insulin injections as well. Type 2 diabetes is often treated with oral anti diabetic medications.

Oral hypoglycemic drugs include sulfonyl urea (which enhance insulin secretion), biguanides (which reduce hepatic glucose production), alpha glucosidase inhibitors (which delay glucose adsorption), thiazolidinediones (which enhance insulin sensitivity). Insulin is available in short acting (one to one & half hrs), regular acting (4-6 hrs), intermediate acting (8-12 hrs) & long acting (24-36 hrs) formulations.³⁻⁵

If the blood sugar level is not brought under control it could lead to complications such as: Heart problems, High blood pressure, Stroke, Eye problems including possible blindness, Kidney disease, Nervous system damage, Foot problems, Skin disorders, Dental disease.¹⁻⁵

ROLE OF DENTISTS IN DIAGNOSING DIABETES:⁶⁻⁸

Help in detecting diabetes may come from an unlikely source like a dentist as an allied health team, as it is rightly said 'oral cavity is the mirror of the body system'. They may diagnose undetected cases of diabetes and may refer to a physician for further evaluation and treatment. Research studies have found a link between periodontal (gum) disease and diabetes.

Symptoms of the disease often appear in the mouth, while almost one-third of people with diabetes have severe periodontal disease.

This is believed to be a result of the diabetic patient's greater susceptibility to developing infections. Conversely, severe periodontal disease may increase the risk of developing diabetes, and may make it more difficult to manage blood sugar levels. However, studies have found that patients who receive treatment for periodontal disease may be able to control the condition with less insulin.

Dentists often detect symptoms of diabetes during routine oral health examinations. Foamy saliva, unusually dry and irritated tissue, poor periodontal conditions inside the mouth are tell-tale signs of the condition. And, diabetic patients often lose more teeth compared to patients without the disease.

Proper and effective management of patients with diabetes requires that the practice evaluate all aspects of patient interaction. Systems need to be customized so that all procedures and patient communication scripts are implemented consistently to meet the distinct needs of patients with diabetes.

Oral Health Problems:^{7,8}

The most common oral health problems associated with diabetes are:

- Tooth decay mainly because of dry mouth.
- Periodontal (gum) disease
- Tooth loss.
- salivary gland dysfunction
- fungal infections
- Oral ulcers.
- lichen planus and lichenoid reactions (inflammatory skin disease)
- infection and delayed healing
- Taste impairment.

Warning signs of periodontal disease:^{9,10}

- Red ,swollen or tender gums
- Bleeding gums on brushing or eating.
- Gums that have pulled away from the teeth.
- Pus between the gums and teeth.
- Change in the way the teeth fit together when you bite.
- Persistent bad breath or unusual taste in the mouth

DENTAL MANAGEMENT OF A DIABETIC PATIENT :^{11,12}

- A thorough understanding of their medical treatment including medications, regimen and glycemic control as well as any systemic complications resulting from diabetes must be methodically established. For e.g. in patient with cardiovascular disease, monitoring blood pressure is extremely important as is the possible modification of anticoagulant therapy for e.g. aspirin before surgery
- The avoidance of nephrotoxic drugs is recommended for dental treatment in patients having renal complications.
- With respect to surgical procedures, the dentist should test the patients glucose level with a glucometer to avert any emergency related events like insulin shock.
- In the case of acute oral infections, antibiotics and alteration in the patients medications (e.g. increasing the insulin dose to prevent hyperglycemia related to the pain &infection) is extremely important.
- Patient should receive short morning appointments to reduce stress.
- Impact of smoking should be assessed.
- Importance of maintaining oral hygiene must be emphasized.
- For periodontal involvement, non surgical, surgical debridement , flossing and mouthwashes are extremely important as the case indicates.

***Fungal Infections*^{6,8,11}**

Bacteria, viruses and fungi occur naturally in the mouth. The body's natural defenses and regular oral hygiene generally keep them in check. Oral candidiasis, a fungal infection in the mouth, appears to occur more frequently among people with diabetes, including those who wear dentures. Diminished salivary flow and an increase in salivary glucose levels create an attractive environment for fungal infections such as thrush. Thrush produces white (or sometimes red) patches in the mouth that may be sore or may become ulcers. It may attack the tongue, causing a painful, burning sensation. It also can cause difficulty in swallowing and compromise your ability to taste. Dentist may prescribe antifungal medications to treat this condition. Good oral hygiene is critical.

GUIDELINES TO KEEP DIABETES UNDER CONTROL: ¹³ [*Recommendations for patients*]

- Follow the healthy eating plan that you and your health care provider, dietician& nutritionist have set.
- Try to exercise atleast 30min per day. Check with your health care provider to see what activities are best for you.
- Take the medications as recommended by your health care provider.
- Check your blood sugar level regularly. Keep your blood sugar levels as close to normal as possible. Let your health care provider know if your blood sugar levels are too high or too low for two or three days.
- Do not smoke.
- Brush and floss your teeth everyday & visit your dentist at least twice a year. Tell your dentist if your diabetic and see your dentist if you have a problem with your teeth and mouth. . Tell your dentist if your diabetic and see your dentist if you have a problem with your teeth and mouth.
- Check your feet everyday for cuts, sores, blisters, swelling redness, or sore toe nails. Wear shoes that fit you well and dry your feet between the toes after washing.

DIABETES EDUCATION AND PREVENTION:

Understand Diabetes and Take Control:

Diabetes Education and Prevention is the World Diabetes Day theme for the period 2009-2014.¹⁴ The campaign calls on all those responsible for diabetes care to understand diabetes and take control. For people with diabetes, this is a message about empowerment through education. For governments, it is a call to implement effective strategies and policies for the prevention and management of diabetes to safeguard the health of their citizens with and at risk of diabetes. For healthcare professionals, it is a call to improve knowledge so that evidence-based recommendations are put into practice. For the general public, it is a call to understand the serious impact of diabetes and know, where possible, how to avoid or delay diabetes and its complications. The key messages of the campaign are:

- Know the diabetes risks and know the warning signs
- Know how to respond to diabetes and who to turn to
- Know how to manage diabetes and take control

FUTURE PROSPECTS:

The incidence and prevalence of diabetes mellitus are increasing, with more than 135 million people affected worldwide. Diabetes mellitus is a major, although sometimes overlooked, cause of morbidity and mortality. This chronic metabolic disorder is known to affect at least 5 percent of the population, while another 2 to 3 percent of the population may have the disorder but have not been diagnosed. Major medical complications associated with diabetes include nephropathy, retinopathy, neuropathy, peripheral vascular disease and coronary heart disease.

Oral health complications, including extensive periodontal disease, tooth loss; soft-tissue pathologies, xerostomia and burning mouth syndrome have been reported among patients with long-standing and poorly controlled diabetes. Dentists have an opportunity and responsibility to educate patients with diabetes about the oral complications of the disease, and to promote proper oral health behaviors that limit the risks of tooth loss, periodontal disease and soft-tissue pathologies.

So, all the allied health professional can come together to combat this looming disorder.

REFERENCES

1. Harris MI. Summary. In: Diabetes in America. 2nd ed. Bethesda, Md.: National Diabetes Data Group; National Institute of Diabetes and Digestive and Kidney Diseases; National Institutes of Health;. National Institutes of Health publication 1995; 95 ;146-8.
2. U.S. department of health and human services, national institute of health. National diabetes information clearing house; NIH publication, 2000; 00- 4280.
3. Robertson C, Drexler AJ, Vernillo A. Update on diabetes diagnosis and management. JADA 2003;134(supplement):16S–23S.
4. Eisenberg .Educational resources on diabetes mellitus.JADA 2003;134(supplement):59S–60S
5. Guggenheimer J, Weyant R, Rossie K,et al. Dental disease in insulin-dependent diabetics (abstract 689). J Dent Res1994;73:188.
6. Lalla R.V., D’Ambrosia JA. Dental management considerations for the patient with diabetes mellitus. JADA 2001;132:1425-1432.
7. Little J.W., Falace DA, Miller CS, Rhodus NL. Dental management of the medically compromised patient. Sixth edition.St Louis:Mosby, 2002; 248-270.

8. Grossi S. Treatment of periodontal disease and control of diabetes; an assessment of the evidence and need for future research. *Ann periodontol* 2001; 6(1):138-145.
9. Oliver RC, Tervonen T. Diabetes: a risk factor for periodontitis in adults. *J Periodontol* 1994; 65(5): 530-538.
10. Ryan M, Carnu O, Angela K. The influence of diabetes on the periodontal tissues. *JADA* 2003; 134: 34s-40s.
11. Jonathan A. Diabetes and oral health. An overview. *JADA*, 2003; 134: 4s-10s.
12. Anthony T .Vernillo. Dental considerations for the treatment of patients with diabetes mellitus. *JADA*, 2003; 134: 24s-33s.
13. Paul Moore, Orchard T. Diabetes and oral health promotion. *JADA* , 2000;131:1333- 1341.
14. Thorstensson H, Falk H, Hugoson A, Kuylenstierna J., Dental care habits and knowledge of oral health in insulin-dependent diabetics. *Scand J Dent Res* 1989; 97(3):207-15.
15. Pohjamo L, Tervonen T, Knuutila M, Nurkkala H. Adult diabetic and non diabetic subjects as users of dental services: a longitudinal study. *Acta Odontol Scand* 1995;53(2):112-4.
16. Amos A.F., McCarty D. J., Zimmet P. The rising global burden of diabetes and its complications: estimates and projections to the year 2010. *Diabet Med* 1997;14(supplement 5):S1-85.
17. Gu K, Cowie CC, Harris MI. Mortality in adults with and without diabetes in a national cohort of the U.S. population, 1971-1993. *Diabetes Care* 1998;21:1138-45.
18. Beckles GL, Engelgau MM, Narayan KM, Herman WH. Population-based assessment of the level of care among adults with diabetes in the U.S. *Diabetes Care* 1998;21(9):1432-8.
19. Cianciola LJ, Park BH, Bruck E, Mosovich L. Prevalence of periodontal disease in insulin-dependent diabetes mellitus (juvenile diabetes). *JADA* 1982;104(5) :653-60.
20. Taylor GW, Borgnakke WS. Periodontal disease: associations with diabetes, glycemic control and complications. *Oral Dis* 2008;14(3): 191-203.
21. Ship JA. Diabetes and oral health: an overview. *JADA*, 2003;134(suppl):4S-10S.
22. Moore PA, Guggenheimer J, Etzel KR, Weyant RJ, Orchard T. Type 1 diabetes mellitus, xerostomia, and salivary flow rates. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2001; 92(3):281-291.
23. Taylor GW, Manz MC, Borgnakke WS. Diabetes, periodontal diseases, dental caries, and tooth loss: a review of the literature. *Compend Contin Educ Dent* 2004; 25(3):179-192.

24. Wilson DE. Excessive insulin therapy:biochemical effects and clinical repercussions—current concepts of counterregulation in type I diabetes. *Ann Intern Med* 1983; 98(2):219- 27.
25. Guggenheimer J, Moore PA, Rossie K, et al. Insulin-dependent diabetes mellitus and oral soft tissue pathologies, II: prevalence and characteristics of Candida and Candidal lesions. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2000; **89**(5):570–576.
26. Matsuo S, Nakamoto M, Nishihara G, et al. Impaired taste acuity in patients with diabetes mellitus on maintenance hemodialysis. *Nephron Clin Pract* 2003; **94**(2):c46–c50.
27. Ebersole JL, Holt SC, Hansard R, Novak MJ. Microbiologic and immunologic characteristics of periodontal disease in Hispanic Americans with type 2 diabetes. *J periodontol* 2008;**79**(4):637–646.
28. Lalla E, Kaplan S, Chang SM, et al. Periodontal infection profiles in type 1 diabetes. *J Clin Periodontol* 2006;**33**(12):855–862.
29. Graves DT, Liu R, Alikhani M, Al-Mashat H, Trackman PC. Diabetes-enhanced inflammation and apoptosis: impact on periodontal pathology. *J Dent Res* 2006;**85**(1):15–21.
30. Taylor GW. Bidirectional interrelationships between diabetes and periodontal diseases: an epidemiologic perspective. *Ann Periodontol*2001; **6**(1):99–112.