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DIABETES MELLITUS AND DENTAL DISEASE

Dental Science

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KEYWORDS

INTRODUCTION:

Diabetes mellitus is a complex syndrome characterized by abnormalities in carbohydrates, lipids and protein metabolism that result in impaired action or secretion of insulin. There are four etiologic type of diabetes, although the most frequent are type 1 (90%) and type 2 (5-10%) (1). Prevalence of diabetes in adults is predicted to rise to 5'4% by the year 2025. The countries with the largest number of people with diabetes are India, china and the U.S. (2). Poorly controlled diabetes could lead to complications that may even be life threatening. Long term complications include retinopathy, nephropathy, autonomic neuropathy, peripheral neuropathy and cardiovascular disease (1, 3).

Dentist plays a major role in helping a patient maintain glycemic control by achieving optimal oral health. They also help to identify undiagnosed diabetic patients and referring them to physicians for further evaluation (4).

ORAL COMPLICATIONS OF DIABETES:

The oral complications of uncontrolled diabetes mellitus are devastating. These may include, but are not necessarily limited to, gingivitis and periodontal disease; xerostomia and salivary gland dysfunction; increased susceptibility to viral and bacterial infections; lichen planus; burning mouth syndrome (5).

PERIODONTAL DISEASE:

Diabetes mellitus has been known to have a significant influence on periodontium and it is viewed as a risk factor for both gingivitis and periodontitis. But it doesn't occur in all patients with diabetes mellitus, the relationship seems highly dependent upon the levels of glycemic control (6). A patient with poorly controlled diabetes has a major risk of developing periodontal disease (7), which will start as gingivitis and gradually, if the glycemic content is deficient, this may progress to an advanced periodontitis. Several studies have demonstrated that patients with poorly controlled type 1 diabetes mellitus have more advanced and severe periodontal disease than patients with adequate glycemic control; this could be due to the association found between the poorer glycemic control and elevated gingival crevicular fluid interleukin -1 beta (7). Studies demonstrated that the advance glycation end products (AGE) synthesis due to hyperglycemia, can convert macrophage into cells with a destructive phenotype, producing high levels of interleukin 1 beta, interleukin 6 and tumor necrosis factor- alpha (TNF). AGE have the capacity to increase endothelium permeability and increase the level of molecular adhesion receptors. These changes are the reason for delayed wound healing and greater susceptibility (8). Because of depressed immune response it is difficult to eradicate periodontal disease after conventional periodontal therapy. This might be one of the reasons why antibiotics may be suggested with mechanical therapy for diabetic patients, especially for uncontrolled cases.

In diabetes, collagen metabolism is significantly disrupted, which affects tissue homeostasis and wound healing. AGE modification inhibits normal tissue turnover. Formation of new collagen is reduced and matrix metalloproteinase such as collagenase are elevated, resulting in wound healing capacity. Neutrophils appear to be the primary source of collagenase in gingival crevicular fluid of diabetes mellitus patients and collagenase appears to be in the active form. Importantly, the solubility of collagen can be returned to near normal with insulin treatment and normal glycemic control (9).

SALIVARY GLAND DYSFUNCTION AND XEROSTOMIA

Reports suggest that patient with diabetes presents with dry mouth and salivary gland hypo function (10, 11), which may be due to polyuria, metabolic or endocrine problem. When the normal environment of the oral cavity is altered due to decreased salivary flow, a healthy mouth can become more susceptible to dental caries and tooth deterioration. An association exists between older adults with diabetes and active caries and tooth loss; this was more significant in patients with uncontrolled diabetics (12).

CANDIDIASIS:

Candidial colonization in complete denture wearers is a commonly encountered condition which is more worsens in uncontrolled diabetics. Uncontrolled diabetes mellitus which can affect tissue function and cellular infrastructure. Ageing oral mucosa is not resistant to harmful effects of diabetes mellitus. Diabetic microangiopathy can cause thinning of epithelial membrane thickness and decreased immune response (13). This makes the oral mucosa vulnerable to opportunistic microbial invasion (14). Denture bearing mucosa is subjected to greater stress compared to the normal mucosa. Dimensional changes in denture bases due to salivary and fluid sorption affects the health of the underlying tissues due to impaired capillary blood flow. Salivary dysfunction, immunocompromised condition and salivary hyperglycemia that provide potential substrate for fungal growth are the major contributing factors for oral candidiasis in patients with diabetes.

RESIDUAL RIDGE RESORPTION IN EDENTULOUS PATIENT

Alveolar ridge resorption after teeth extraction is a chronic and progressive disease of bone reconstruction. The risk for alveolar bone loss is greater and more severe in patients with in poorly controlled diabetes compared to non-diabetic individuals (15). Several studies suggest that poorer glycemic control needs to increased risk for bone loss and increased susceptibility to infection.

Accursi (16) concluded that diabetic patient were more likely to have increased crestal bone loss around the implants compared to the normal individuals.

In the present study, gender related differences suggest that females with diabetes mellitus are more prone to bone loss compared to normal individual. It is common in post menopause period due to depletion of estrogen levels which leads to increased bone loss in edentulous mandible but not in dentate mandible (17).

All these studies significantly show that diabetic patients have increased amount of bone resorption compared to normal individuals.

COMPLICATIONS DURING DENTAL PROCEDURE

ACUTE COMPLICATIONS: hypoglycemia is the major issue that confronts the dental practitioners when treating diabetic patients, particularly if the patients are fasting. Hypoglycemia occurs most commonly due to stress experienced before, during or after treatment which causes increased perioperative morbidity and mortality (20). The Stress response is characterized by increased level of glucose and resistance to the effects of insulin increases (20).

CHRONIC COMPLICATIONS: the possible cardiovascular complications should be assessed prior to any dental treatment.it is recommended to associate antibiotic treatment when mechanical periodontal treatment is performed, and also administers an antibiotic prophylaxis (7, 21). Osteoporosis present in type 1 diabetes requires great care when performing surgery, in order to prevent iatrogenic

fractures. Due to delayed healing response in patients (8, 21) implant placement is still controversial .in any case these individuals could be candidates if they have good control of their metabolism.

GENERAL MANAGEMENT CONSIDERATIONS:

1. Assess glycemic control

2. Refer patients with signs and symptoms suggestive of uncontrolled diabetes to physician for diagnosis and treatment.

3. if systemic complications are present refer the patient's physician and /or access the use of medications to treat oral complications.

4. use a glucometer to avert emergencies related to diabetes.

5. frequent recall visits should be maintained to monitor and treat oral complications and maintain optimal oral hygiene and diet.
support and follow up patients in smoking –cessation programmes (18, 19).

DENTAL MANAGEMENT:

Type 1: In well controlled patients treatment plan is similar to the normal individuals. But it should be kept in mind that they are more prone to infections and delayed wound healing complication. In poorly controlled individuals the treatment should be postponed until they achieve good metabolic control.

For invasive procedures patient's physician consultation is required. Blood glucose level must be measured prior to dental treatment. If it is between 100 and 200 mg/dl, invasive dental procedure can be done. If blood glucose level is increased above 200 mg/dl, an IV infusion of 10% dextrose in half normal saline is initiated, and rapid acting insulin is administered subcutaneously. If the treatment exceeds one hour, blood glucose should be measured hourly. There are at high risk for infection so guidelines for antibiotic prophylaxis should be followed (22).

Type 2: non- invasive procedure can be performed if the patient follows strict diet and under medication. For invasive procedure physician consultation regarding medications is must prior to any invasive dental procedure.

CONCLUSION:

Periodontal disease is the major complication in patients with diabetes mellitus. It is also associated with other complications like burning mouth syndrome, dry mouth and sialadenosis. Before treating dentist should be aware of their increased susceptibility to infections and delayed wound healing. If the patient is under proper diet and medication with well controlled diabetes treatment planning is the same as normal individual but in case of uncontrolled diabetes treatment should be postponed in order to prevent hypoglycemic complications.

REFERENCES:

1) American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care. 2010;33:62-9.
2) King H, Aubert RE, Herman WH. Global burden of diabetes, 1995- 2025: prevalence, numerical estimates, and projections. Diabetes Care. 1998; 21:1414-31.
3) Kidambi S, Patel SB. Diabetes mellitus: considerations for dentistry. J Am Dent Assoc. 2008; 139:8S-18S.
4) Vernillo AT. Dental considerations for the treatment of patients with diabetes mellitus. J Am Dent Assoc. 2003;134:24S-33S.
5) Vernillo AT. Diabetes mellitus: relevance to dental treatment. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2001; 91:263-70.
6) Löe H. Periodontal disease. The sixth complication of diabetes me- llitus. Diabetes Care. 1993; 16:329-34.
7) Tan WC, Tay FB, Lim LP. Diabetes as a risk factor for periodontal disease: current status and future considerations. Ann Acad Med Sin- gapore. 2006;35:571-81.
8) Kaur G, Holtfreter B, Rathmann W, Schwahn C, Wallaschofski H, Schipf S, et al. Association between type 1 and type 2 diabetes with periodontal disease and tooth loss. J Clin Periodontol. 2009;36:765-74.
9) PERIODONTAL DISEASE, INSULIN RESISTANCE, AND DIABETES MELLITUS: A REVIEW AND CLINICAL IMPLICATIONS Alan J. Moritz, DDS MS and Brian L. Mealey, DDS, MS
10) 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;92:281-91.
11) Chavez EM, Borrell LN, Taylor GW, Ship JA. A longitudinal anal- ysis of salivary flow in control subjects and older adults with type 2 dia- betes. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2001;91(2):166-73.
12) Lin BP, Taylor GW, Allen DJ, Ship JA. Dental caries in older adults with diabetes mellitus. Spec Care Dent 1999; 19(1):8-14.
13) Soell M, Hassan M, Miliauskaite A, Haikel Y, Selimovic D. The oral cavity of elderly patients in diabetes. Diabetes Metab. 2007; 33(Suppl 1):S10–8.
14) Barbeau J, Seguin J, Goulet JP, de Koninck L, Avon SL, Lalonde B, et al. Reassessing the presence of Candida albicans in denture-related stomatitis. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2003;95:51–9.
15) Taylor, G.W., Burt, B.A., Becker, M.P., Genco, R.J. and Shlossman, M. (1998) Glycaemia control and alveolar bone loss progression in type 2 diabetes. Annals of Periodontology,
16) Accursi, GE. (2000) Treatment outcomes with Osseo integrated Branemark implants in diabetic patients: A ret- rospective study. University of Toronto, Toronto.
17) Elsubeihi, E.S., Grynpas, M.D., Cheung, A., Zarb, G.A. and Heersche, J.N.M. (2001) The effect of ovariectomy on bone loss in the edentulous and dentate mandible. Bone, 28, 525-529.
18) U.S. Preventive Services Task Force. Guide to clinical preventive services: Report of the U.S. Preventive Services Task Force. 2nd ed. Balimore: Williams & Wilkins; 1996:597-609.
19) U.S. Smoking Cessation Guideline Panel, U.S. Agency for Health Care Policy and Research, Centers for Disease Control and Prevention. Smoking cessation. Rockville, Md.: U.S. Department of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research, Centers for Disease Control and Prevention; 1996. Publi- cation AHCPR 97-N004:1-601.
20) Bergman SA. Perioperative management of the diabetic patient. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2007;103:731-7.
21) Beikler T, Flemmig TF. Implants in the medically compromised patient. Crit Rev Oral Biol Med. 2003;14:305-16.
22) Gutiérrez JL, Bagán JV, Bascones A, Llamas R, Llena J, Mora- les A, et al. Consensus document on the use of antibiotic prophylaxis in dental surgery and procedures. Med Oral Patol Oral Cir Bucal. 2006; 11:188-205.