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DENTAL CONSIDERATIONS FOR THE TREATMENT OF PATIENTS WITH DIABETES - A REVIEW

Running Title: Clinical complications and Considerations for dental treatment with diabetic patients.

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Abstract:*Diabetes Mellitus (DM) is one of the most prevalent diseases that dentists encounter, because of its high global prevalence. It is diagnosed by frequent diagnosis of fasting plasma glucose levels (Reference range is 126 mg/ dl or higher). Diabetes, if not controlled properly, leads to a higher risk of periodontal disease on glycemic control and its mechanisms still not well established. Many oral symptoms include xerostomia, sialadenitis, burning mouth syndrome. Inorder to avoid the practical difficulties on dental treatment for a diabetic patient, a dentist should know the dental patient's medical history before start the practice. Concomitantly, the treatment should be done at morning time to alleviate patients' discomfort with their diabetic complication. The dentist must be conscious that an acute complication can occur (hypoglycaemia or Hyperglycaemia). Furthermore, these patients suffer from delayed wound healing and major susceptibility to infections.*

Keywords: *Diabetes mellitus, dental management, periodontal disease, clinical complications, dental considerations.*

1. INTRODUCTION:

Diabetes mellitus (DM) is one of the most common pathological conditions encountered by dentists. It is characterized by an altered carbohydrate, protein, and lipid metabolism of hyperglycemia. This could be attributed to inactivity or resistance to insulin, as a direct result of destruction or dysfunction of the pancreatic beta-cells. Diabetes grows as an epidemic, and India is the world's diabetic capital. India faces the burden of the consequences of the illness; every fifth diabetic in the world is currently estimated to be an Indian. The potential occurrence of acute complications, the severity of which could be an immediate danger to a diabetic patient's life and require urgent diagnosis and treatment, is clinically significant [1]. Diabetes mellitus includes a group of illness characterized by impaired action or insulin secretion. Four etiologic types of diabetes are present , although type 1 (90%) and type 2 (5 - 10%) are the most prevalent [2].The incidence of diabetes in adults worldwide was measured at 4 per cent in 1995 and is expected to increase to 54 per cent by 2025. India, China and the United States are the countries with the highest number of people with diabetes. The majority of people with diabetes in developing countries are aged between 45 and 64 years in the developed nations of the world. There are more women than men with diabetes. [3] Poorly regulated diabetes may lead to life-threatening complications.

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Long term risks include, retinopathy, nephropathy , autonomic neuropathy , peripheral neuropathy and cardiovascular disease [4]. The dentist plays an important in helping a patient maintain glycemic control by optimal oral disease role with other members of the health team; and refers patients with undiagnosed complications [5]

2. OBJECTIVES:

The objectives of this paper are.

*. To do a review of literature about diabetes mellitus and the consequences of the disease in dentist at bay.

* To summarize management Strategies for the treatment of those patients in dental hospitals.

3. MATERIALS AND METHODS:

For this review, the articles were selected and referred from search engines like pubmed, google scholar, ChemRXIV, bioRxIV. The articles all of them referred to diabetes, it's complications and considerations for dental management. All these articles were transversal studies, meta-analysis, clinical cases, clinical trials and case-control studies.

4. DISCUSSION:

ORAL MANIFESTATION:

Periodontal disease is one of the most common oral complications of diabetes as reported by Lox [6]. He referred it to as " the sixth complication with diabetes mellitus?" A patient with poorly controlled diabetes is at considerable risk for high chances of periodontal disease [7] which begins with gingivitis and eventually progresses to a more severe periodontitis if glycemic regulation becomes insufficient. Several studies have shown that poorly Controlled type 1 diabetes mellitus patients have worsened and serious periodontal disease than patients with adequate glycemic control [7] which could be correlation between impaired glycemic control and elevated gingival crevicular fluid interleukin-I beta . Studies have shown that Advanced glycation end products (AGE) synthesized due to hyperglycemia can convert macrophages into cells with a destructive phenotype. Moreover, AGE is also able to increase the endothelin permeability and express high levels of molecular adhesion receptors. These Changes could explain the greater susceptibility to infections and delayed wound healing [8]. The attempt to assess the capacity of periodontal disease to control diabetes by altering glycemic levels, may contribute to insulin resistance due to the chronic low grade inflammations [9]. Some studies report that specific treatment of periodontal disease can enhance the glycemic control in diabetic patients.[10] The currently available evidence does not provide sufficient information to base clinical recommendations confidently [11,12]. The results obtained vary greatly depending on the study ; some of them found a higher prevalence of caries in diabetic patients [13,14] , some found lower [15] while others reported no difference [16]. Diabetic patients sometimes complain of having a dry mouth (xerostomia) which may be thirst due to dehydration , a typical manifestation of diabetes [17]. In another study, , most diabetic patients did not suffer xerostomia [18] . Sialadenosis is an asymptomatic bilateral parotid gland enlargement common in type 2 diabetes. It has also been reported in alcoholism with liver dysfunction and in chronic malnutrition [19]. Parotid enlargement in diabetic people has also been documented as a consequence of lipid metabolism in diabetes[20]. The mechanism by which diabetes predisposes a high coral presence of Candida is not yet established [21]. Several reports have also shown that the majority of diabetic patients with Burning Mouth Syndrome (BMS) developed peripheral neuropathy as a result of diabetic condition [22]

DENTAL CONSIDERATIONS:

To identify and optimally treat diabetic patients is one of the toughest jobs for a dentist and also have to follow some basic procedures for those individuals who have suffered from diabetes. (1) to identify which type of diabetes they have. (2) to follow up their medical records and their medication. (3) to monitor their blood glucose level (A normal plasma glucose level at fasting state is <100 mg/dl, and a normal glucose level at 2-hour post-prandial is <140 mg/dl.) before start their dental procedure like tooth extraction or dental implant.

(4) usually should give first priority to diabetes patients for dental treatment, so that They must not swiftly avoid hypoglycemic condition. These are the major considerations for diabetic patients on dental treatment. Generally, these patients have two types of complications. The acute complications has break out during appointment, which are hypoglycemia and hyperglycemia[1] chronic complications are systemic and affect the stomatognathic area such as[6] periodontal diseases and cause sialadenosis[18], BMS[17] and osteoporosis and possible temporomandibular joint dysfunction [5]. We should be aware of these patients' increased susceptibility to various types of infections and delayed wound healing[9].

5. MANAGEMENT OF DENTAL TREATMENT AND CARE FOR DIABETIC PATIENTS:

General procedure should carried out with certain considerations for diabetic patients on dental treatment as given below:

Diabetic type 1 patients under dental treatment:
Invasive dental procedures:

Physicians should give a proper instruction and also investigate the previous day food intake time before collecting the sample. Blood sugar level must be measured preoperatively.Invasive dental procedures can be carried out between 100 and 200mg/dl. If blood glucose is >200 mg/dl then an intravenous infusion of 10% dextrose in half normal saline is initiated and the fast-acting insulin is administered subcutaneously. Blood glucose should be measured preope- ratively. If it is between 100 and 200 mg/dl, the in- vasive dental procedure can be performed. If blood glucose is >200 mg/ dl, an intravenous infusion of 10% dextrose in half- normal saline is initiated, and rapid- acting insulin is administered subcutaneously. If the treatment lasts more than 1 hour, blood glucose should be measured hourly. The risk factors for infection with Type 1 diabetes mellitus is considered as the reason, when invasive antibiotic prophylaxis dental procedures are not performed, and not followed the guidelines for the diabetic patient.

Non - invasive dental procedure:

Well-controlled patients are treated like non-diabetic patients. Delay dental treatment in poorly controlled patients until they have good metabolic control. In poorly controlled patients, delay in the dental treatment must be done until they have achieved a good metabolic control.

Type 2 diabetic patients under dental treatment:
Non- invasive dental procedures:

They require me to have a pre-operative procedure. Like type 1 diabetes mellitus. People who control their disease well by diet and exercise require no special perioperative intervention. Like in type 1 diabetic patients, always be aware of the patients' susceptibility to infections and their delayed wound healing. In poorly- controlled patients, delaying the dental treatment until they have achieved good metabolic control is a standard procedure.

Invasive dental procedures:

Patients should ask the doctor for instructions on their medication patients who are trusted with oral hypoglycemic agents should take their normal morning closure and eat their regular diet. There is a general agreement on administering prophylactic antibiotics in diabetic patients.

In acute complications, hypoglycemia is one of the major issues that confronts dental practitioners when treating patients with diabetes, especially when patients are fasting. The clinical presentation of hypoglycemia is very close to hyperglycemia. When in doubt, the patient should definitely be treated as hypoglycemic. Hypoglycemia usually appears in response to the stress experienced before, during or after the treatment, and has been shown to cause a significant increase in periopera- tive morbidity and mortality .The stress response is characterized by acute metabolization of carbohydrates, proteins and fats to provide increased levels of glucose, which is necessary as a major fuel source to the vital organs. In addition, resistance to the effects of insulin is increased. There are no specific guidelines regarding which levels of hyperglycemia are dangerous or how it should be managed before or during the procedure, so if the patient is conscious and can follow other instructions, it is prudent to continue with the treatment.

In chronic complications, the possible cardiovascular complications of diabetes should be properly assessed before dental treatment. Autonomic neuropathy can predispose to orthostatic hypotension, respiratory arrest or hemodynamic instability. If the patient has renal complications, a dose adjustment of the drugs should be performed, using the creatinine clearance. Osteoporosis present in type 1 DM requires great care when performing surgery, in order to prevent iatrogenic fractures. In any case, the individuals could be candidates for the placement of dental implants if they did have good control over their metabolism. There is in general agreement in advocating the use of prophylactic antibiotics in patients with diabetes. Previously our team had conducted numerous experimental analyses [23,24,25,26,27,28,29], such as in vivo studies [30,31,32,33] and in vitro studies [34,35,36] over the past 5 years. The idea for this review stemmed from the current interest in the community.

6. CONCLUSION:

Diabetes is a persistent metabolic disease that constantly raises worldwide prevalence. Parodontal conditions are the primary oral symptom for diabetic patients and we should recognize that these patients are more vulnerable to infection and that wound healing is slow. Well-controlled diabetics in the dental office are similar to non-diabetic patients, but early day appointments are better and patients should not be instructed quickly so that the risk of hypoglycemia is reduced.

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