

## Review Article



## Dentistry &amp; Diabetes – A Review

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## Abstract:

Diabetes mellitus is a mixed metabolic as well as vascular disorder, one of the major public health concerns and the number of people suffering from diabetes is rapidly increasing in India. It has an affect on all the major organ systems as well as tissues including the oral cavity. Where it manifests as oral thrush, xerostomia, gingivitis, periodontal abscess, and periodontitis, in fact periodontitis is the 6<sup>th</sup> common complication in diabetic patients,

**Key words:** Diabetes, Oral Health, Insulin, Periodontitis.

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## Introduction:

Diabetes mellitus is a mixed metabolic as well as vascular disorder, which is characterized by increased level of blood glucose with decreased level of insulin or absence of insulin hormone, and there is also an abnormality in the lipid protein metabolism.

It is one of the major public health concerns and the number of people suffering from diabetes is rapidly increasing in India or we can say that India has become the diabetes capital in the world (1). The countries with the largest number of people with diabetes are India, China, and the U.S and in case of developing countries, most of the population suffering from diabetes falls in the age range of 45–64 years of age and in the developed countries, most people with diabetes are aged 65 years. Also, the women are affected by the diabetes are much than men (2).

## Etiological classification of DM –

- **Type 1** – Type 1 DM also known as insulin-dependent or juvenile diabetes and it includes

those cases attributable to an autoimmune process, as well as those with beta-cell destruction but it does not include those forms of beta-cell destruction to which specific causes can be assigned as like in case of cystic fibrosis, mitochondrial defects, etc (3). Type 1 diabetes is less common than type 2.

- **Type 2** – Type 2 diabetes most often develops in people over age 40, but nowadays, children, teens, and young adults are also developing it. The underlying pathophysiologic defect in type 2 diabetes does not involve autoimmune beta-cell destruction. Mostly, type 2 diabetes is characterized by the following three disorders, those are (3)-
  1. Peripheral resistance to insulin, especially in muscle cells;
  2. Increased production of glucose by the liver; and
  3. Altered pancreatic insulin secretion.

- **Other types:**

1. Drug induced – like steroid hormones, glucocorticoids.
2. Cushing's syndrome
3. Gestational diabetes, etc.

**Clinical features of DM** – The clinical symptoms and presentation in diabetes mellitus are as follows

1. Feeling thirstier than usual that is known as polydipsia.
2. Urinating often called as polyuria.
3. Losing weight without any workout.
4. Presence of ketones in the urine.
5. Feeling of tiredness.
6. Irritable mood.
7. Delayed healing of sores.
8. Getting a lot of infections, such as oral, skin, and vaginal infections.

**Diagnosis:** Criteria for the diagnosis of diabetes (4) -

1. Glycosylated hemoglobin (HbA1c) – If more than 6.5% indicates diabetes. It reflects average blood glucose levels over a 2- to 3-month period.
2. Fasting plasma glucose – If values come more than 126 mg/ dl (7.0 mmol/ l) and it indicates the diabetic condition in a patient and the fasting is defined as no caloric intake for 8 hours.
3. Postprandial plasma glucose i.e., 2 hours after caloric intake – if value come more than 200 mg / dl (11.1 mmol/ l). The test should be performed as described by the World Health Organization, using a glucose load containing the equivalent of 75g anhydrous glucose dissolved in water 300 ml of water.
4. Random plasma glucose  $\geq$  200 mg / dl (11.1 mmol/ l) indicates diabetes.

**Risk factors:**

Certain factors increase your risk for diabetes, people who are overweight, have a parent or sibling with the condition, lethargic people, ladies who have had gestational diabetes, people having high blood pressure, high cholesterol, or high triglycerides.

**Management of diabetes –**

1. Diet and exercise – reduction in dietary carbohydrate and fat rich foods, reduction in the daily salt intake.
2. Lifestyle habit modifications like avoid smoking, alcohol drinking.
3. Medications – like metformin, acarbose, glimepiride, glipizide, pioglitazone, canagliflozin, etc.
4. Insulin.

**Oral health manifestations in diabetic patient –**

Oral complications in diabetic patients are

1. Xerostomia
2. Burning mouth syndrome
3. Delayed and abnormal wound healing
4. Increased chances of dental caries
5. Decreased salivary flow
6. Gum problems & gingivitis
7. Periodontitis
8. Oral lesions like oral candidiasis
9. Mucositis
10. Increased chances of abscesses, etc.

The degree of a patient's glycemic control appears to be a significant factor in predicting the severity and likelihood of oral complications and therefore, it is important that dentists take an active role in educating patients about diabetes control and the potential impact of lack of control on their oral health (5).

- **Periodontal diseases** – periodontitis is often called the “sixth complication of diabetes mellitus”—is the most common oral complication of diabetes (6). The patient with poorly controlled diabetes is at greater risk of developing periodontal disease and initially it starts with gingivitis and then, with poor glycemic control, progresses to advanced periodontal disease. Due to impaired immunity and healing process associated with diabetes, it may be more severe and progress more rapidly. From a dental perspective, pregnancy leads to hormonal changes that increase the mother's risk of developing gingivitis and gingival lesions called pregnancy tumors (8).
- **Oral candidiasis** – Although oral thrush can affect anyone, but it is more likely to occur in babies and older adults because they have reduced immunity and in people with

suppressed immune systems or certain health conditions as like in diabetes mellitus (7). Oral lesions associated with oral thrush include median rhomboid glossitis, atrophic glossitis, denture stomatitis, pseudomembranous candidiasis and angular cheilitis. *Candida albicans* is a constituent of the normal oral microflora that colonizes in case of immunocompromised states in population like diabetes, HIV, etc.

- **Burning mouth syndrome** – Burning mouth syndrome represents with the pain and burning sensation in the oral cavity without any specific clinically detectable lesions. In uncontrolled diabetes, autonomic and sensory-motor neuropathies are part of the diabetes syndrome, and the prevalence of neuropathy in diabetes mellitus approximates 50 percent 25 years after the onset of the disease, with an overall 30 percent rate among adults with diabetes which could be associated with pain (9).
- **Xerostomia** – Also known as dry mouth results due hypofunction of the salivary glands in diabetic patients (10) and this decreased salivary flow in the oral cavity results in dry mouth which can precipitate to other dental problems like increase risk of dental caries, cracking of oral mucosa.
- **Oral infections** – There are the increased chances of dento-oral infections in diabetic patients due to diminished response of the immune system, like dentoalveolar abscess, periodontal abscess, candidiasis, oral herpes viral infections, etc. And so, good glycemic control in diabetic patient is the key to reduce the impact of oral infections.
- **Delayed wound healing** – As we all know that uncontrolled glycemic control can result in the delayed wound healing and this applies to the oral region also, as in case of tooth extraction if patient's glycemic control is not good then it results in delayed healing of the tooth socket and sometimes can lead to secondary bacterial infection in that socket.

#### **Dental considerations in diabetic patient –**

- Dentist should always go for a blood investigation for the status of glycemic control in a diabetic patient and in non-diabetic patient

or person who has no idea about his diabetic condition must go for a proper history taking.

- Proper understanding of patient's medical treatment including his medications and the degree of glycemic control, as well as any systemic complications resulting from diabetes.
- Patients who are diabetic and suffering from any cardiovascular disease, monitoring of their blood pressure is extremely important.
- Dentist should fix diabetic patient appointment usually in the morning to reduce the stress.
- In case of uncontrolled diabetes, patient must be referred first to his general physician or an endocrinologist.
- Use a glucometer to avert emergencies related to diabetes.
- Lengthy appointments should be tried to be avoided.
- All procedures should be done involving minimal possible trauma and should be carried in stress free environment.
- Maintenance of good oral hygiene is important for all dental procedures and the use of antimicrobial agents like chlorhexidine, etc., is found very useful.
- In surgical procedures, antibiotic prophylaxis should be done prior to the procedure.

**Impact of diabetes in root canal treatment–** For all root canal procedures in well-controlled diabetic patients, appointments should be scheduled at early morning because at that time cortisol levels are generally higher and patients receiving insulin therapy, appointments should be scheduled so that they do not coincide with peaks of insulin activity, because if it coincides there are the high chances of developing hypoglycemia (11). DM predisposes to oral infection and could also act as a risk factor for acute periodontitis, which may be expressed as flare up, increasing the rate of root canal treatment failure and many studies have been conducted to answer this hypothesis –

Fouad & Burleson investigated endodontic diagnostic and treatment outcome data in patients with and without diabetes (12).

Genet et al. found that subject with pre-operative pain had more percentage of flare up than those without preoperative pain which is consistent with the present study (12).

Walton et al. found that teeth with necrotic pulp are more prone to endodontic flare ups (12).

Recent studies also have supported this and showed that incidence of flare up in diabetic patient is more than non-diabetic patient especially if the tooth is symptomatic (12).

**Tooth extraction in diabetic patients** – Fasting blood glucose level of 180 mg/dl is a cut-off point for any selective dental extraction and Random blood glucose level of 234 mg/dl (13 mmol/l) is a cut-off point for an emergency tooth extraction and tightly controlled diabetic patients (blood glucose level below 70 mg/dl) are susceptible to hypoglycemia. The safety scale of blood glucose levels for tooth extraction is given in the table 1 (13).

Blood glucose level	Excellent	Good	Acceptable
Fasting (before a meal)	72–109 mg/dl	110–144 mg/dl	145–180 mg/dl
2 h after meal	90–126 mg/dl	127–180 mg/dl	181–234 mg/dl

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### Conclusion:

The dentist plays a major role in helping a patient to maintain glycemic control by properly treating oral infections, and by educating the patients regarding the diabetes and, he guides patient to change about their lifestyle modifications to control the glycemic levels.

The dentist also can play a vital role in diagnosis and referring patients to the general physician for further evaluation in diabetic patients by taking proper history in dental OPD and through blood investigations if required prior to any dental surgery.

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