



## ORAL HEALTH STATUS IN GERIATRIC DIABETICS

### *Condições de saúde bucal em pacientes diabéticos geriátricos*

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#### Abstract

**OBJECTIVE:** To determine if any difference exists in the oral health status between geriatric patients with diabetes mellitus and the normal population. **SUBJECTS AND METHODS:** The oral health status of 100 metabolically controlled geriatric diabetic patients attending the Diabetes Clinic of the Manipal Hospital, were prospectively assessed over six months and compared with that of 50 non-diabetic acting as controls. **RESULTS:** The mean duration of diabetes was  $100.5 \pm 85.1$  months. The degree of hyposalivation between the two groups was statistically significant ( $p < 0.05$ ). No significant difference was observed in the taste, burning mouth sensation, angular cheilitis, glossitis, and stomatitis status of the two groups and no pathognomonic lesions or alterations could be observed in relation to the disease. **CONCLUSION:** It was concluded that, with adequate metabolic control, the oral health status of a diabetic may not be significantly different from that of a non-diabetic except for xerostomia.

**Keywords:** *Diabetes mellitus*. Geriatric patients. Oral health. Oral pathology.

#### Resumo

**OBJETIVO:** Avaliar possíveis diferenças na saúde bucal de pacientes geriátricos com diabetes mellitus em comparação a uma população normal. **CASUÍSTICA E MÉTODO:** A condição de saúde bucal de 100 pacientes geriátricos diabéticos, metabolicamente controlados, atendidos na Clínica de Diabetes do Hospital Manipal foram avaliados prospectivamente durante seis meses e comparados com 50 pacientes geriátricos não diabéticos (grupo controle). **RESULTADOS:** A duração média do diabetes foi  $100,5 \pm 85,1$  meses. O grau de hipossalivação entre os dois grupos foi estatisticamente significativa ( $p < 0,05$ ). Não foram encontradas diferenças significativas no paladar, sensação de queimação bucal, queilite

*angular, glossite e estomatites entre os dois grupos. Não foram observadas lesões patogênicas ou alterações relacionadas ao diabetes. CONCLUSÃO: Concluiu-se que, com controle metabólico adequado, as condições bucais de pacientes diabéticos geriátricos pode não ser significativamente diferente das de um não diabético, com exceção da xerostomia.*

**Palavras-chave:** Diabetes mellitus. Pacientes geriátricos. Saúde bucal. Patologia bucal.

## INTRODUCTION

Diabetes mellitus is a highly prevalent worldwide disorder with a rising prevalence particularly of type 2 diabetes mellitus. It is projected that 221 million people will have diabetes by the year 2010 (1). Asia is designated as the region where the current number is expected to double the number experienced today. Diabetes, with its acute complications, has become a major health hazard in India. World Health Organization (WHO) projections shows that at present 32 million Indians have diabetes, but half of them are not aware of it. This number is expected to swell to 80 million by the year 2030 (2). Diabetes mellitus is a syndrome of abnormal carbohydrate, fat and protein metabolism that results in acute and chronic complications due to the absolute or relative lack of insulin (3).

### Diabetes and dental? a big query to answer

Ascertaining underlying systemic diseases from oral symptoms is a valuable tool in discovering occult systemic diseases. The correlation between oral symptoms and systemic diseases provides a

means for early diagnosis of such conditions. Oral candidiasis and other opportunistic fungal infections are some of the early, non-specific signs of uncontrolled diabetes (4).

Diabetics are said to exhibit poorer oral health than non-diabetics in some oral conditions. Diabetics have been found to have a higher average gingival index and higher or the same plaque index levels relative to controls. Severe periodontitis is considered a risk factor for poor glycemic control and duration of diabetes is a more significant factor for the severity of periodontitis in type 2 diabetics than the patient's age (5). So the present study aimed at evaluating the oral health status among the diabetic and non diabetic population. Our objective was to see if any difference exists in the oral health status between patients with Diabetes mellitus and the normal population.

## SUBJECT AND METHODS

100 consecutive diabetic, adult patients attending the Outpatient Department of Oral Medicine and Radiology over a six-month period were recruited. 50 non-diabetic controls which were age and gender matched were also selected from the outpatient clinic (Table 1).

**Table 1** - Demographic data of the subjects

Gender	Cases	Controls	Total
Male	66	33	99
Female	34	17	51
<b>Total</b>	100	50	150

Informed consent was obtained from both the patients and the controls. Age, sex, educational status, patterns of oral hygiene and history of professional dental care, duration of the illness, levels of fasting blood sugar, and two hour postprandial sugar levels and Glycated Hb1c were recorded. Complete extra oral and intra oral examination was done using plain mouth mirrors and sickle shaped probes. Periodontal probe was used to assess the periodontal status.

Xerostomia was assessed based on the following questionnaire:

- 1) Does the amount of saliva in your mouth seem to be too little, too much, or you do not notice it?
- 2) Do you need to sip liquids to aid you in swallowing dry foods?
- 3) Does your mouth feel dry when eating a meal?

Other oral diseases were recorded as either present or absent. All patient data were recorded in a case record form (CRF) and then patients in need of treatment were referred to the appropriate units of the hospital for management.

### Statistical analysis

The data were analyzed using the SPSS statistical software version 13.0.

The students t-test was done as appropriate to determine differences, and these were taken as significant when p was less than 0.001 ( $p < 0.001$ ).

## RESULTS AND DISCUSSION

Diabetes mellitus (DM) refers to a group of diseases characterized by hyperglycemia because of reduction or defects in insulin production or function. DM is a chronic disorder characterized by abnormalities in carbohydrate, fat, and protein

metabolism (1). The systemic complications associated with DM can be extremely serious and these patients have an increased propensity to develop specific forms of renal, ophthalmic, neurologic, oral and cardiovascular diseases (6). Of all the best known systemic diseases, diabetes has been the one most frequently blamed as a risk agent for periodontal disease and other oral pathologic disorders. Therefore, every dentist should have a basic understanding of the incidence, etiology, systemic implications and possible oral associated findings of diabetes (7).

Type 1 DM, previously known as insulin-dependent DM (IDDM) or juvenile-onset DM, affects approximately 5–10% of all diabetic patients and occurs most commonly in children and young adults. It is a state of insulin deficiency resulting from the destruction of the beta cells within the Islets of Langerhans of the pancreas due to immune dysfunction. Auto reactive cells directed toward the beta cells are produced and proliferate, resulting in a destruction of the beta cells.

Type 2 DM, known previously as non-insulin-dependent DM (NIDDM) or adult-onset DM, accounts for approximately 90–95% of diabetic patients; this figure is increasing due to aging, obesity, and sedentary lifestyles. This results from the body's inability to make a sufficient amount of insulin or to properly use the insulin that is produced. It usually begins as an insulin resistance phenomenon; the pancreas gradually loses the ability to produce a sufficient amount of insulin as the need for insulin increases (7).

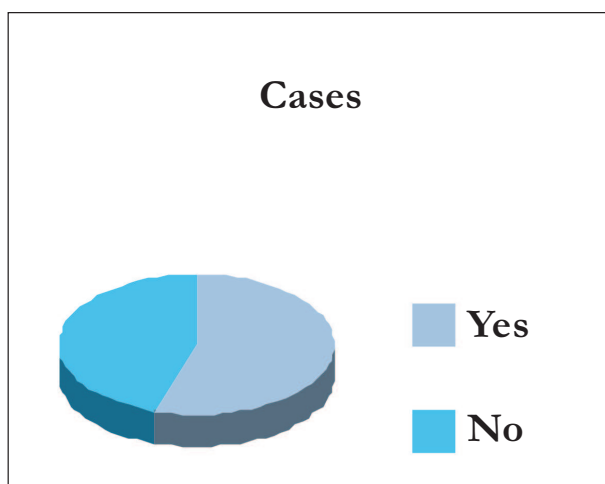
In the present study all the 100 diabetics had non insulin dependent *diabetes mellitus* (NIDDM); this is corroborated by previous studies that insulin dependent *diabetes mellitus* (IDDM) is less frequent and NIDDM accounts for about 97% of all cases of diabetes (6). Age and sex match was done in the present study, yet we had less number of female subjects but were not statistically significant. Blood glucose estimation done at two periods of fasting and post prandial was highly significant among the two groups (Table 2).

**Table 2** - Comparison of age and blood sugar level in patients and controls

	<b>PATIENT (100)</b>	<b>CONTROL (50)</b>	<b>t-test</b>	<b>P value</b>
Mean age	45.53±12.13	46.44±11.51	0.445	p=0.660 ns
Mean number of teeth present	18.92±5.69	22.87±5.10	0.996	p=0.320 ns
FBS	94±12.94	55.16±10.22	18.125	p<0.001 vhs
PPBS	110.98±14.02	65.97±10.57	20.02	p<0.001 vhs

Glycated blood sugar level estimation was done only in case of the test group and not in the control group because of its non relevance in case of non diabetic individuals.

In the present study the most common complaint that was recorded was that of oral dryness (Graph 1).

**Graph 1** - Distribution of hyposalivation

This complaint was considerably more in the study group (66%) and this study showed a significant difference in hyposalivation between cases and controls (33%) and was more predominant in females rather than males. This very common symptom of the disease and has been linked with.

- Dysfunction of the parenchyma of the major salivary glands and with polyuria;
- The substitution of the functioning tissue by adipose tissue has been suggested to quantitatively and qualitatively modify saliva production,

facilitating hyposalivation and burning mouth symptoms.

Chavez et al. (8) suggest older adults with poorly controlled diabetes may have impaired salivary flow in comparison with subjects with better-controlled diabetes. Xerostomia, consequent to diminished salivary flow, can lead to burning mouth syndrome and caries as well as facilitate the development of candidiasis (9). A recent study demonstrated impaired salivary uptake and excretion by salivary scintigraphy in adults with type 2.

The other parameters that were evaluated (Table 3) were glossitis, altered taste, angular chelitis, candidiasis, delayed healing, burning mouth sensation.

**Table 3** - Sign and Symptoms noted and reported by subjects

Sign and Symptoms	Cases		Controls	
	Number	%	Number	%
Glossitis	5	5.8	5	9.3
Altered Taste	4	6.2	3	5.6
Candidiasis	2	3.1	0	0
Delayed Healing	1	1.6	1	1.9
Burning mouth Sensation	1	1.6	0	0

Even though these oral mucosal changes were observed in increased frequency in the study population an almost equal prevalence was observed in the test population and hence there was no statistically significant difference between both the groups.

### Candidiasis

Guggenheimer et al. (11) concluded that *candida* pseudohyphae and oral soft tissue manifestations of candidiasis such as median rhomboid glossitis, denture stomatitis and angular cheilitis were more prevalent in Type 1 diabetics than in controls with a significant association between the presence of *candida* pseudohyphae and poor glycemic control. Candidiasis may result from xerostomia, hyperglycemia or deficient leukocyte function and is more prevalent in diabetics with poor blood glucose control. Patients may have angular cheilitis, median rhomboid glossitis and other signs of infection; altered gustatory perception and/or burning mouth syndrome also may be present. Initial treatment is usually topical antifungal therapy, although most antifungal agents contain sucrose and may be contraindicated in caries prone diabetic patients. If patients experience only minimal relief from the burning sensations, treatment using an antidepressant may help by affecting neural inflammation (6).

### Infections

Diabetic patients are prone to bacterial, viral, and fungal infections; the mouth and gingival are no exception. The outcomes of certain dental treatments may be compromised for DM patients.

A 2003 study reported that patients with DM demonstrated an increased amount of periodontal disease on those teeth with endodontic involvement compared to patients who did not have DM. (12) found a more pronounced reduction of immunity indices in patients with NIDDM and the severity of purulent infections to be largely dependent on immune disorders.

### Periodontal diseases

A number of surveys have suggested the association of *diabetes mellitus* with severe periodontal destruction increases the risk threefold because of abnormal polymorph nuclear leucocyte function, angiopathy, altered microbial flora, abnormal collagen metabolism, alterations in salivary flow and composition. More recent studies show the diabetic patient experiences greater loss of periodontal attachment than the non-diabetic with similar levels of plaque control when metabolic control is poor, but with good metabolic control and oral hygiene, the incidence of loss of periodontal attachment is not more than in the average population (12). The prevalence of overt periodontal disease did not significantly differ between the diabetic and nondiabetic patients in our study and the difference was not statistically significant.

### Periodontal abscesses

It has been statistically proven that diabetes is one of the predisposing factors for the development of periodontal disease. Likewise marked gingival inflammation, even with low levels of plaque, is more prevalent in the uncontrolled diabetic than in the non-diabetic.



Properly controlled diabetics seem to have the same prevalence of gingivitis and periodontal disease than non-diabetics. Young adults and adolescent diabetics have a greater prevalence of gingival inflammatory hypertrophy and periodontal disease than their non-diabetic counterpart. Recurrent periodontal abscesses are also typical of diabetic patients. The clinical manifestations of periodontal disease in adults and young diabetics are more severe than those observed in the non-diabetic population. Those with diabetes have a greater prevalence of attachment loss and bone loss than aged matched controls. Diabetics also have increased severity of periodontal destruction with subjects 15 to 34 years old having twice the amount of periodontal destruction as normal subjects (13). The increased prevalence of gingival and periodontal disease in diabetics is assumed to be multifactorial in origin. Deposition of AGE in gingival capillary walls as well as in the collagen of the periodontal ligament and the alveolar bone matrix, increased levels of LDL with atheroma formation, hyperglycemia interfering with normal periodontal wound healing, altered immune response, increased oxidation, altered polymorphonuclear leukocyte functions and genetics are all contributing factors to the development of periodontal disease in the diabetics (7).

### **Oral lichen planus**

The clinical features of oral and esophageal LP have been well documented, Amos et al. (1) and the disease appears to develop most commonly in patients with DM. Whether these OLP like lesions are truly lichen planus or are lichenoid reaction to the OHD is something to be thought of. These types of lesions were not statistically significant in our study. These associations have not been found consistently in all populations of subjects with diabetes, they may be due to chronic immunosuppression and require continued follow up.

### **Parotid gland enlargement**

It is another sign documented to be common in diabetes mellitus, but this study did not record any case of parotid gland enlargement.

### **Delayed wound healing**

This is the most common complication that scares the clinician while treating diabetic patients. In the present study there was no statistically significant difference result. Postoperative wound healing is delayed due to impairment of all types of metabolism and development of endogenous intoxication, which depresses the protein-generating function of the liver.

Alterations in the flow and composition of saliva have also been suggested to predispose the diabetic patient to oral infection but the alterations may improve as the diabetes gets controlled (7). No single case of chronic osteomyelitis was seen in the present study.

### **CONCLUSION**

The findings of the present study have disclosed that diabetics, if controlled, can maintain healthy oral conditions. Due to the occasional asymptomatic nature of diabetes, the dental surgeon, irrespective of the specialty, has a significant role to play in the early diagnosis and should refer patients with findings suggestive of diabetes mellitus. The recent findings on bidirectional interactions between oral and systemic diseases make it imperative for the dentist to be closely involved with the management of these patients. Since the disease is bi-directional, dentists should help patients reduce oral bacteria through in-office care, diet counseling, and home care instruction. A good understanding of the interactions between systemic diseases and oral health is mandatory for the complete management of a diabetic patient.

### **CONFLICT OF INTEREST STATEMENT**

The authors declared no conflict of interest in the present manuscript.

### **INFORMED CONSENT STATEMENT**

The patients signed an informed consent, kept in the records, in the archives of the Manipal College of Dental Sciences.

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