

ORIGINAL RESEARCH

Oral Mucosal Changes in Type II Diabetes Mellitus Patients: A Case–control Study

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ABSTRACT

Introduction: Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The world health organization considered diabetes as a public health problem since 1975. The purpose of this study is to investigate oral mucosal changes in patients with Type II diabetes mellitus.

Aims and Objectives: This study was conducted to investigate the oral mucosal alteration in type II diabetes mellitus patient and to evaluate clinical attachment level of periodontium.

Materials and Methods: An observational case-control study was carried out in M.R. Ambedkar Dental College and Hospital, Bangalore. Blood samples were taken from patients and random blood sugar was calculated by enzymatic God-Pod method. Total 75 cases (diabetic patients) and 75 controls (normal patients) were selected. A questionnaire was applied to gather data of the clinical history. Periodontal Health Status was assessed by using WHO assessment form 1997.

Results: The mean age of cases and control group was 53.43 years and 52.37 ± 10.05 years. The mean value of community periodontal index (CPI) score was 2.32 for diabetic cases and 1.96 for control group. The association between cases and control group of CPI was found to be statistically significant.

Conclusion: It is absolutely vital for oral physicians to be acquainted with the oral manifestations of diabetes mellitus owing to the strong association between the oral and systemic status of the diabetic patient. It has thus been rightly stated: "Mouth is the mirror of the human body."

Keywords: Community periodontal index, Diabetes mellitus, Oral mucosal lesions.

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INTRODUCTION

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both.^[1] World health organization considered diabetes as a public health problem since 1975. Diabetes is a dangerous disease since the patient's, and health-care promoter's negligence may impair the patient's quality of life and even lead to the death of the patient. In 1997, the American Association of diabetes proposed a classification system for diabetes, based on its etiology. Diabetes is currently classified as Type I or juvenile diabetes and Type II or acquired diabetes. It is estimated that there are about 170 million people with diabetes mellitus in the world. In 1993 according to the World health organization, about 7% of the world adult population has diabetes, and the periodontal disease is considered to be a classic complication of diabetes mellitus.^[2]

Several systemic diseases manifest in the mouth, including diabetes. Absence of metabolic control appears to alter the susceptibility of patients with diabetes to periodontal disease, fungal infections, and changes in taste. The relationship between diabetes and oral lichen planus and dental caries is less obvious, several studies have shown widely diverging results.^[3] The most common oral manifestations in diabetic patients include xerostomia, burning and eventual erythema, ulcerations, pharyngeal infections caused by *Candida albicans*, cheilitis, lichen planus, tumefaction of salivary glands, gingival, periodontal problems, abscesses and marked loss of alveolar bone, although none of them is a pathognomonic lesion.^[4] Diabetes requires deep knowledge by all health care professionals involved in the diagnosis of oral lesions since it has several intervening factors in the patient's oral condition.

The purpose of the study is to investigate the oral mucosal changes in Type II diabetes mellitus patient and to evaluate clinical attachment level of the periodontium.

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MATERIALS AND METHODS

An observational case-control study was carried out in patients who reported to hematology laboratory for blood sugar investigation in M.R. Ambedkar Dental College and Hospital, Bangalore. Blood samples were taken from patients, and random blood sugar (RBS) was calculated by enzymatic god-pod method and glucometer (code free company). The patients with RBS level ≤ 180 mg/dL were considered as normal or non-diabetics, whereas patients with ≥ 180 mg/dL were considered as diabetics. A total of 75 cases (diabetic patients) and 75 controls (non-diabetic patients) were selected. Inclusion criteria include patients from both sexes aged 38 years or more diagnosed with Type II diabetes (case group) and patients from both sexes and same age group diagnosed as non-diabetes (control group). Exclusion criteria included patient with Type I diabetes and aged <38 years. Convenience sampling was used to select the patients, and the study was carried out from 02/01/2013 to 02/04/2013. A questionnaire was applied to collect data on the clinical history. Periodontal Health Status was assessed using WHO assessment form (1997).^[5]

Statistical Analysis

Data were analyzed using SPSS 16.0. Cohen's Kappa statistics was used to assess the examiner reliability. Descriptive statistics such as mean, standard deviation, and percentage were used. Association was evaluated using Chi-square test. $P \leq 0.05$ was considered as statistically significant.

RESULTS

Age Group

The mean age of cases and control group was 53.43 ± 9.98 years and 52.37 ± 10.05 years. The mean value of community periodontal index (CPI) score was 2.32 for diabetic cases and 1.96 for the control group. The mean value of the loss of attachment score was 1.64 for

diabetic cases and 1.28 for the control group. The association between cases and control group of CPI and loss of attachment was found to be statistically significant ($P < 0.001$) [Table 1].

Gender

Among case group, 61.0% were males and 39.0% were females whereas in control group 55.0% were males and 45.0% were females [Figure 1].

Location

Among case group, 60.0% were belongs to an urban area, and 40.0% were belongs to rural area, whereas in control group 91.2% were belongs to urban area and 9.8% were belongs to rural area [Table 2].

Oral Mucosal Changes

Among case group, oral mucosal changes were seen 3 (4.0%) malignant tumors were present in diabetic group, leukoplakia was seen in 10 patients 5 in each group (6.67%). Lichen planus, ulceration and candidiasis were seen in 3 individuals 2 (2.67%) in diabetic patients and 1 (1.33%) in control group, acute necrotizing gingivitis seen in 4 patients one in control (1.33%), and 3 in diabetic (4.0%), other conditions such as atrophy of tongue,

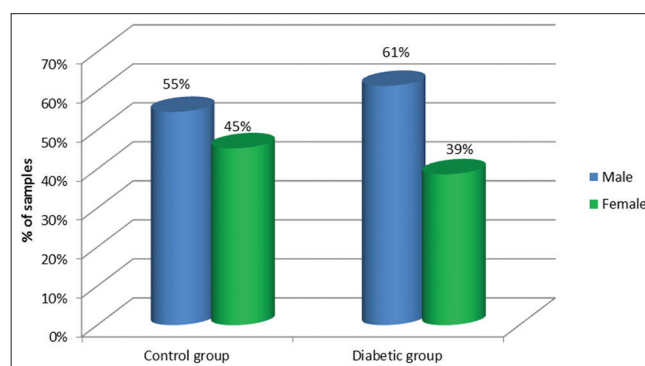


Figure 1: Number and percentage of case and control group according to gender

Table 1: Mean age group, CPI, and loss of attachment of cases and control group

Parameter	Group	n	Mean	SD	SE of mean	Mean difference	Z	P value
Age	Control group	75	52.37	10.05	1.16	-1.053	-0.813	0.416
	Diabetic group	75	53.43	9.98	1.15			
RBS (mg/dl)	Control group	75	113.59	22.54	2.60	-118.065	-10.234	<0.001*
	Diabetic group	66	231.65	40.69	5.01			
RUS%	Control group	75	0.00	0.00	0.00	-1.008	-9.713	<0.001*
	Diabetic group	66	1.01	0.76	0.09			
CPI	Control group	75	1.96	0.70	0.08	-0.360	-3.328	0.001*
	Diabetic group	75	2.32	0.75	0.09			
LOA	Control group	75	1.28	0.56	0.06	-0.357	-3.240	0.001*
	Diabetic group	75	1.64	0.70	0.08			

Statistically significant for RBS ($P < 0.001$), RUS% ($P < 0.001$), CPI ($P < 0.01$), and LOA ($P < 0.01$). CPI: Community periodontal index, RBS: Random blood sugar

chronic generalized periodontitis, localized periodontitis seen in 49 individuals 28 in controls (37.33%) and 21 in diabetic (28%), abscess in 20 patients 5 (6.67%) in control, and 15 (33.33%) in diabetic patients, more than one condition seen in 39 patients, 7 (9.33%) in control, and 32 (42.67%) in diabetic group. Lesions mainly located in buccal mucosa, floor of the mouth, tongue, alveolar ridges, and gingival and most of the patient showing chronic generalized periodontitis [Table 3].

DISCUSSION

The study of oral mucosal abnormalities in diabetic patients is important due to the need of greater knowledge about the oral abnormalities in these individuals. Conflicting results in regards to the prevalence of oral abnormalities seen in the literature, in addition to the fact that diabetes is a worldwide health problem. Guggenheimer *et al.*^[6] reported that this variable prevalence of oral abnormalities may be a reflection of the different physiological behaviors of the two clinical types of diabetes. Other factors that can also be responsible include variations in glucose level, duration of the disease and patient's age. Diabetes mellitus has a worldwide distribution, occurring in about 1–2% of the world population, and it is more prevalent in well-fed populations because they have better access to mostly high-calorie foods. The incidence of diabetes is predominant in adults, with 85% of the individuals are above 40 years of age who develop the disease due to poor instructions on health prevention and dietary control. Only 5% of patients present the disease before they are 20 years

of age. As of the gender, the disease is more common below the age of 50 years. The incidence is similar in both genders.^[7] Of the 75 diabetic patients examined in this study, 50 (66.66%) patients were more than 50 years of age, 25 (33.33%) patients were <50 years of age, this results similar to the one seen in the studies carried out by Marcondes *et al.*^[7] and Souse *et al.*^[8] As to gender in this study 46 (61%) males and 29 (39%) females in the diabetic group, 41 (55%) males and 34(45%) were females in control these results are not in agreement with the study from Marcondes *et al.*,^[6] in which the prevalence of women surpassed the one in men and showed that in individuals <50 years old the incidence was similar in both genders. Gingivitis and periodontitis present in 40% of the patients in this study. These findings similar to those of literature studied,^[8-13] loss of attachment is identified by periodontal probing to evaluate the incidence of periodontal disease in the diabetic group, the present study showed significant results with respect to the diabetic group. However, literature says there is no significant change. Tommasi^[14] and Sousa *et al.*^[8] observed a high frequency of Candida infections in patients with diabetes mellitus, whereas in this study Candida infection was seen only in 3 patients. The literature did not reveal any factors that could relate ulceration with diabetes. Guggenheimer *et al.*^[6] and Quirino *et al.*^[15] linked the advanced age and the poor conditions of the total prosthesis with the presence of this abnormality. The use of a total prosthesis by the diabetic patients who presented this abnormality in this study corroborates the ideas of Guggenheimer *et al.* Oral lichen planus was not seen in this study, although it was present in approximately 5% of patients with type 2 diabetes in the studies carried out by Petrou-Amerikanous *et al.*^[16] Present study showed only 1.13% of oral lichen planus lesions. The relationship between lichen planus and diabetes mellitus has been extensively studied, but the conclusions are controversial^[17] because the prevalence of the lichen planus can range from 1.6% (31) to 85% (19) and also some studies can verify this association.^[17-19]

According to Dikshit *et al.*,^[21] patients with diabetes were 2 times more likely to develop leukoplakia. Ujjal *et al.*^[21] and Albrecht *et al.*^[19] observed this alteration in 6% and 6.2% of diabetes mellitus patients, respectively. In the present study, leukoplakia was diagnosed in 6.67%, and there is no significant difference between control and diabetic group, occurrence of leukoplakia was similar in both groups. According to Ujjal *et al.*,^[21] diabetes patients who smoke are high-risk group to develop oral mucosal alterations such as leukoplakia. A significantly high prevalence of potentially malignant disorders was found in Type II as compared to control group. In the

Table 2: Number and percentage of case and control group according to location

Location	Control group	Diabetic group	Total
	n (%)	n (%)	
Urban	68 (91.2)	47 (60.0)	115
Rural	07 (9.8)	29 (40.0)	40
Total	75 (100)	75 (100)	150

Table 3: Number and percentage of case and control group according to oral mucosal changes

Oral mucosa	Control group	Diabetic group	Total
	n (%)	n (%)	
Malignant tumor	00 (0.00)	03 (4.00)	03
Leukoplakia	05 (6.67)	05 (6.67)	10
Lichen planus	01 (1.33)	02 (2.67)	03
Ulceration	01 (1.33)	02 (2.67)	03
Acute necrotizing gingivitis	01 (1.33)	03 (4.00)	04
Candidiasis	01 (1.33)	02 (2.67)	03
Abscess	05 (6.67)	15 (33.33)	30
Other condition	28 (37.33)	21 (28.00)	49
More than one	07 (9.33)	32 (42.67)	39

present study, there are 3 cases of malignant tumors 3 (4.0%) in diabetic patients and no malignant tumor associated with the control group. Diabetes mellitus has been associated with the advanced periodontal disease since 1892.^[22] This has led to the proposal that periodontitis be listed among the “classic” complication of diabetes^[23] Enlarged velvety-red gingivae that bleed readily, a typical bluish-purple hue of the gingivae, proliferation of tissue at the gingival margin, putrescent exudates from periodontal pockets, multiple lateral periodontal abscesses as well as advanced loss of supporting alveolar bone leading to mobility of teeth in areas where this cannot be attributed to local factors, and the patient’s age are considered as the characteristic signs of gingivitis and periodontitis in diabetic patients.^[2,8] The present study showed there is the presence of a periodontal abscess in 33.33% in diabetic group and 6.67% in control group. Usually, more than one condition present in diabetic patients.^[3] In the present study, about 32 (42.67%) patients showed more than one lesion in oral mucosa as compared to 7 patients (9.33%) in control group.

CONCLUSION

The results obtained in this study and the literature, present a conflicting data. The oral signs and symptoms of diabetes mellitus empower an oral physician with the ability to predict the systemic status of the patients examined thus enabling identification of the underlying undiagnosed disease. In addition, oral physicians may play a dynamic role in improving the overall quality of life of diabetic patients. It is absolutely vital for oral physicians to be acquainted with the oral manifestations of diabetes mellitus due to the strong association between the oral and systemic status of the diabetic patient. It has thus been rightly stated: “Mouth is the mirror of the human body.”

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