

## Clinical Lesions of Oral Mucosa in Type 2 Diabetes Mellitus

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### ABSTRACT

**Aim:** To determine the clinical changes in oral mucosa in patients with type 2 DM.

**Methods:** A detailed oral examination was carried out in n=200 patients diagnosed of having type 2 DM for at least 5 years. Latest random blood sugar (RBS) levels were collected from clinical record.

**Results:** Mean age of the patients was 52.21±8.39 years with a male to female ratio being 1:1.8. Oral lesions were present in 77% patients including chronic periodontitis (37%), xerostomia (25%), mobility of teeth (13%) and traumatic ulcers (2%). Family history was positive in 53% patients. The RBS levels of >200 mg/dl and ≤ 200mg/dl were found in 88% and 12% patients respectively. When clinical variables were compared, chronic periodontitis was significantly associated with RBS levels >200 mg/dl (p=0.021) while xerostomia was significantly associated with female gender (p=0.049).

**Conclusion:** Type 2 DM may produce many pathological changes in the oral mucosa. Routine screening and early detection of such changes through regular dental visits may help to improve oral health, compliance to drug therapy and prevent complications in these patients.

**Keywords:** Type 2 DM, clinical lesions, mucosa

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### INTRODUCTION

“Diabetes mellitus (DM) is a heterogeneous group of metabolic diseases which are characterized by chronic hyperglycaemia and disturbances in carbohydrate, lipid and protein metabolism resulting from defects in insulin secretion and/or insulin action.” Diagnosis of DM is made by evaluating blood glucose levels. If fasting blood glucose level is greater than 126mg/dl or random blood glucose level is greater than 200mg/dl, then the diagnosis of DM is confirmed<sup>1</sup>. Diabetes Mellitus is one of the most prevalent chronic diseases and accounts for 5% of causes of deaths in the world<sup>2</sup>. DM is mainly classified into type1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM) on the basis of aetiology. Type2 DM makes up almost 95% cases of DM<sup>1</sup>. Risk factors for type 2 DM include obesity, sedentary lifestyle, age above 45 years and a first-degree relative with DM<sup>3</sup>. Obesity causes insulin resistance by inducing free fatty acids, adipokines, and chronic inflammatory response in adipose tissue. Pancreatic β cells try to compensate for insulin resistance by over-secretion of insulin. But after some time, β-cells fail to compensate the insulin resistance, and diabetes mellitus ensues<sup>4</sup>.

The oral findings in the diabetic patients are produced as a result of micro-vascular changes, low resistance to infection, elevated glucose levels in saliva and dehydration<sup>5</sup>. In diabetic patients, progressive atrophy of oral mucosa occurs due to

decreased rate of salivary secretion and low salivary pH, resulting in increased risk of the development of lesions<sup>6</sup>. Inflammation is greatly marked in the presence of diabetes mellitus, insulin resistance and hyperglycemia. Type 2 diabetes mellitus is associated with increased production of inflammatory products which include sialic acid alpha-1 acid glycoprotein, C-reactive protein, serum amyloid A, interleukin-6 and cortisol<sup>7</sup>.

Oral manifestations of DM include xerostomia, epithelial atrophy, burning mouth syndrome, increased susceptibility to infections, delayed wound healing, ulcerations and periodontal destruction<sup>8</sup>. DM have been shown to be associated with oral premalignant lesions like lichen planus<sup>9</sup>. This study was therefore designed to determine the clinical changes in oral mucosa in patients with type 2 DM.

### MATERIALS AND METHODS

A detailed oral examination was carried out in n=200 patients diagnosed of having type 2 DM for at least 5 years from Jinnah Hospital, Lahore and Hamza Foundation, Lahore from May to July, 2013. Latest random blood sugar (RBS) levels were collected from clinical record. Patients were selected by convenient sampling technique. Patients of 40 to 70 years of age were selected without any gender discrimination. Patients with other chronic debilitating ailments and immune disorders were excluded from the study. Patients with oral addictions like pan, betel nut, snuff, tobacco and alcohol were also excluded from the study. A written informed consent proforma was signed by the participants. Socio-demographic information (name, age, sex, occupation, full address,

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family history of type 2 diabetes mellitus) was obtained along with relevant clinical details. Clinical examination of the soft and hard tissues of the oral cavity was performed using a dental mirror. The data was entered and analysed using PASW statistics 18.0. Mean±S.D was given for quantitative variables like age, duration of type 2 DM etc. Frequencies and percentages were given for qualitative variables like gender, oral clinical changes etc. The data was analysed by applying Chi-Square test and Fisher's exact test.

**RESULTS**

Out of 100 patients, n=70 were males and n=30 were females. Male to female ratio was 1:1.8. Mean age of the patients was 52.21±8.39 years with age range of 40-70 years. Family history of type 2 DM was present in 53% patients; among them 38% were males and 62% were females. Random blood sugar (RBS) levels ranged from 120mg/dl to 556mg/dl with a mean of 323.85. The RBS levels were classified into 2 categories: The RBS levels of >200 and □ 200mg/dL were found in 88% and 12% patients respectively. The duration of DM ranged from 5years and two months to 27 years. The duration of diabetes mellitus was split into 3 categories of 5-10 years, 10-15 years and >15 years (Table 1).

Table 1: Duration of Type 2 Diabetes Mellitus

Duration of type 2 DM	Frequency	%age
5-10 years	55	55
11-15 years	29	29
>15 years	16	16

On Oral Clinical Examination, oral hygiene was found to be poor in 76% patients, moderate in 22% patients and good in only 2% patients. Xerostomia (mild degree) was found in 25% patients. Chronic periodontitis was seen in 37% patients. Mobility of teeth (>2mm) was present in 13% patients. Traumatic ulcers were seen in 2% of the patients (Table 2).

Table 2: Oral Lesions in Diabetic Patients

Oral findings in diabetic atuebts	Present	Absent
Xerostomia		
Male	5 (20%)	75(75%)
Female	20 (80%)	
Chronic Periodontitis	37(37%)	63 (63%)
Mobility of teeth		
Male	6 (46%)	87(87%)
Female	7 (54%)	
Ulcers in oral cavity	2 (2%)	98 (98%)

**DISCUSSION**

Diabetes mellitus is a group of metabolic disorders which affects almost all parts of the body. It is known to produce a variety of adverse effects in oral mucosa. It may trigger infectious processes in the mucosal lining and may also interfere with the healing process. Diabetes mellitus is reported to adversely affect the morphology of oral mucosa which compromise the tissue functions and results in oral infections and oral premalignant lesions. In diabetic patients, atrophy of oral mucosa occurs due to a decreased rate of salivary secretion and low pH of saliva, increasing the likelihood of lesions<sup>6</sup>.

In our study, mean age of the patients was 52.21±8.39 years with a range of 40-70 years. Bastos and co-workers from Brazil reported the mean age of type 2 diabetic patients as 53.10 years<sup>17</sup>. These reports are in accordance with our study. In another study from Karachi, Ahmed and colleagues reported the mean age of 51.3 years in type 2 diabetic patients with similar age range of 40-70 years<sup>9</sup>. Evaluation of the gender of the patients with type 2 diabetes mellitus revealed that n=35 were males and n=65 were females with a male to female ratio of 1:1.8. Nearly similar male to female ratio was found by Bastos and colleagues from Brazil<sup>10</sup> and by Ahmed and Garib from Iraq in 2012<sup>11</sup>.

In the present study, family history of type 2 DM was present in 53% patients. Abou-Gamel and colleagues documented from Saudi Arabia that most of the patients (78.5%) in their study had a positive family history of type 2 diabetes mellitus<sup>12</sup>.

On clinical examination, oral hygiene was found to be poor in 76% patients, moderate in 22% patients and good only in 2% patients. Tanwir and Tariq from Pakistan reported in 2012 that oral hygiene was found to be poor (calculus index >0.75) in 71.1% type 2 diabetic patients while it was moderate (calculus index ≤0.75) in 28.9% patients<sup>13</sup>. Our findings are consistent with their results. However, Western studies have shown very different results. Vasconcelos and colleagues reported from Brazil in 2008, that most of the patients (90%) with diabetes mellitus presented with fair oral hygiene. While 6.7% patients had good and only 3.3% had poor oral hygiene<sup>14</sup>. These variations in the status of oral hygiene between our and Western patients may be the result of lack of awareness of oral hygiene measures in our population.

Regarding clinical variables, xerostomia was found to be the most prevalent clinical symptom in type 2 diabetic patients. In our study, it was found that 25% patients with type 2 diabetes mellitus were

suffering from xerostomia. Amro and Al-Attas from Kingdom of Saudi Arabia reported in 2009 that the prevalence of dry mouth (xerostomia) was 23.8% in type 2 diabetic patients<sup>22</sup>. The results of our study are in concordance with their findings. On the other hand, Sandberg and Wikblad from Sweden reported in 2000 the prevalence of xerostomia in type 2 diabetic patients to be 53.5%, which is twice higher in frequency than our study findings<sup>15</sup>.

In the current study, chronic periodontitis was found to be present in 37% cases of which 22% were males and 15% were females. De Silva and colleagues from Sri Lanka reported in 2006 the prevalence of chronic periodontitis being 34% in patients with type 2 diabetes mellitus<sup>17</sup>. Our findings are consistent with their study. Mobility of teeth (>2mm) was present in 13% patients. Demmer and colleagues from United States of America reported in 2008 that 13% type 2 diabetic patients exhibited mobility of teeth with loss of masticatory functions<sup>18</sup>.

## CONCLUSION

Type 2 diabetes mellitus may produce many clinical changes in the oral cavity. Routine screening and early detection of such changes through regular dental visits may help to improve oral health, compliance to drug therapy and prevent complications in these patients.

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## REFERENCES

1. Carpenter, Griggs. and Loscalzo., 2004. Cecil Essentials of Medicine. 6<sup>th</sup> ed., Philadelphia, W.B. Saunders.
2. World Health Organization Diabetes Programme, 2010. [Online] Available at: <<http://www.who.int/diabetes/en>> [Last accessed on 12 April 2010].
3. Goldman, L. and Ausiello, D., 2004. Cecil Textbook of Medicine. 22<sup>nd</sup> ed., New Delhi, ELSEVIER INDIA.
4. Kasuga, M., 2006. Insulin resistance and pancreatic  $\beta$ -cell failure. *J Clin Invest.*, 116: 1756.
5. [5]. Mahima, V.G., Raina, A. and Patil, K., 2010. Mouth is the Mirror of the Human Body- Diabetes mellitus &

- the oral cavity. *International Journal of Clinical Cases and Investigations*, vol. 1: 5-12.
6. Hallikerimath, S., Sapra, G., Kale, A. and Malur, P.R., 2011. Cytomorphometric Analysis and Assessment of Periodic Acid Schiff Positivity of Exfoliated Cells from Apparently Normal Buccal Mucosa of Type 2 Diabetic Patients. *Acta Cytologica.*, 55: 197–202.
7. Pickup, J.C. and Crook, M.A., 1998. Is type 2 diabetes mellitus a disease of the innate immune system? *Diabetologia.*, 41: 1241–1248.
8. Greenberg, M.S. and Glick, M., 2003. *Burkitt's Oral Medicine*. 10<sup>th</sup> ed., New Delhi, ELSEVIER INDIA.
9. Ahmed, I., Nasreen, S., Jehangir, U. and Wahid, Z., 2012. Frequency of oral lichen planus in patients with noninsulin dependent diabetes mellitus. *J.P.A.D.*, 22: 30-34
10. Bastos, A., Leite, A.R.P., Spin-Neto, R., Nassar, P.O., Massucato, E.M. and Orrico, S.R.P., 2011. Diabetes mellitus and oral mucosa alterations: Prevalence and risk factors. *Diabetes Research and Clinical practice*, 92: 100–105.
11. Ahmed, M.T. and Garib, B.T., 2012. Cytological Features of Oral Cytobrush Smears in Type II Diabetes Mellitus Patients. *Tikrit Journal for Dental Sciences*, 1: 6-12.
12. Abou-Gamel, M., Abdul-Nassir, M., Rajeh, A., Makhdoom, A., Surrati, A., Kateb, A. and Albouq, F., 2014. The prevalence of diabetes mellitus among working personnel in the faculty of science, Taibah University, Almadinah Almunawwarah, KSA. *Journal of Taibah University Medical Sciences*, 9(1): 85–88.
13. Tanwir, F. and Tariq, A., 2012. Effect of Glycemic Control on Periodontal Status. *Journal of the College of Physicians and Surgeons Pakistan*, vol. 22(6): 371-374
14. Vasconcelos, B.C.E., Novaes, M., Sandrini, F.A.L., Maranhão Filho, A.W.A. and Coimbra, L.S., 2008. Prevalence of oral mucosa lesions in diabetic patients: a preliminary study. *Rev Bras Otorrinolaringol.*, 74(3): 423-8.
15. Amro, S.O. and Al-Attas, S., 2009. Hyperglycemia and Oral Mucosal Lesions Among Diabetic Patients in Jeddah City. *E.D.J.*, vol. 55: 1.
16. Sandberg, G.E. and Wikblad, K.F., 2003. Oral dryness and peripheral neuropathy in subjects with type 2 diabetes. *Journal of Diabetes and Its Complications*, 17: 192–198.
17. De Silva, N.T., Preshaw, P.M., Taylor, J.J., Jayaratne, S.D., Heasman, P.A. and Fernando, D.J.S., 2006. Periodontitis: A complication of type 2 diabetes in Sri Lankans. *Diabetes Research and Clinical Practice*, 74: 209–210.
18. Demmer, R.T., Jacobs, D.R. and Desvarieux, J.R.M., 2008. Periodontal Disease and Incident Type 2 Diabetes. *Diabetes Care*, vol. 31: 1373-1379.