Prevalence of Oral Mucosal Changes in Type 2 Diabetic Patients Attending Diabetes Mellitus Center in Sulaimani City

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Abstract

Objective: Find the prevalence of possible changes seen in the oral mucosa of type 2 diabetes mellitus patients.

Methods: Three hundred type 2 DM patients included in this study after taking their medical history and glycemic control level. Patients were asked for symptoms of dry mouth, burning sensation, pain and paresthesia and they were subjected to full oral mucosal examination.

Results: Most patients had one or more subjective oral complain (83%). The predominant symptom was the feeling of dry mouth (80%) with no sex difference (P= 0.772). The mucosal pain reported in (12.7%) and significantly in males (P= 0.000). Gingival redness reported in (33.3%) and paresthesia in (8%). Nine (3%) patients had white buccal patches and six of them revealed lichenoid drug reaction. Dry mouth and oral burning sensation were shown to be unrelated to the glycemic control. Gingival redness was the most common lesion and correlated with poor glycemic control. Tongue was the second most commonly affected site in both sexes; however, the type of changes was sex and age-dependent. Denture stomatitis was seen in 4% and more frequent in females and in old age patients but did not relate to glycemic status. Lichenoid drug reaction was more prevalent among patients with poor glycemic control (6.3%) and who were above 50 years old. Buccal mucosal white patches were related to the glycemic control (P = 0.014).

Conclusions: Dry mouth was the most common complaints of a diabetic patient in all levels of glycemic control. Gingival redness was frequent in diabetic patients and correlated with poor glycemic control. Buccal white patches were more prevalent in patients with poor glycemic control and who were above 50 years old.

Keywords: *Mucosal lesions, Type 2 diabetes mellitus, Dry mouth, Gingivitis, Glycemic control.*

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Introduction

Diabetes mellitus (DM) is a metabolic disorder characterized by persistent hyperglycemia which is a result of defects in insulin secretion, insulin action or both[1]. According to International Diabetes Federation in 2015[2], the prevalence of diabetes mellitus in Iraq was 7.2% with a reported prevalence of 6.8% in Sulaimani city, Iraq[3].

Diabetes diagnosis based on plasma glucose level estimated either by fasting plasma glucose or oral glucose tolerance test or glycated hemoglobin (A1C) [4]. A one-third of cases of type 2 DM detected incidentally. Since the disease develops slow, its diagnosis often delayed, therefore, the patient present with many complications such as peripheral neuropathy or diabetic retinopathy, or with recurrent infections. Only about half of the patients present with the classic symptoms of thirst, polydipsia, polyuria, and tiredness secondary to hyperglycemia. Weight loss is an unusual feature at presentation[1]. Diabetes is associated with acute complication (hypoglycemic coma) and long-term (microvascular and macrovascular) complications. The latter complication causes premature cardiovascular disease, renal and retinal complications and debilitating as gangrene of toes[5].

There are no specific oral manifestations of DM but the prevalence of oral mucosal lesions is more compared to non-diabetics. Even well-controlled patients are predisposed to infections and have more severe periodontal disease. In poorly controlled patient, oral candidiasis, denture stomatitis[6] and mucormycosis are seen[5]. Type 2 DM associated with coated tongue[6-8], fissured tongue, migratory glossitis[6] and oral leukoplakia[9].

Neuropathy may occasionally cause cranial nerve deficits and occasionally there is swelling of the salivary glands (sialosis) due to autonomic neuropathy. Burning mouth sensation in the absence of physical changes may be possible. Dry mouth may result from dehydration. The 'Grinspan syndrome' (diabetes, lichen planus, and hypertension) may be the result of purely coincidental associations of common disorders probably related to drug use[10]. Periodontal disease is more severe and may be more prevalent, in patients with DM than in those without[11,12].

The present study aims to find the prevalence of all possible signs and symptoms related to oral mucosal in type 2 DM patients**.**

Patients and methods

This study included 300 patients previously diagnosed with type 2 DM attending Sulaimani diabetic center from December 2016 to April 2017. An informed consent was taken verbally from all participants. Ethical approval was obtained from the Medical Ethics Committee, College of Dentistry/ University of Sulaimani.

Demographic information, medical history, and glycemic control (A1C) level were recorded. The patients grouped according to their A1C into; well-controlled <7.5, moderately-controlled = 7.6-8.9, and poorly-controlled ≥9) groups[4]. Each patient was asked for symptoms of dry mouth, burning sensation, painful mucosa (excluding reasons related to dental pain), and paresthesia after the specialist had clarified the meaning of these terms to them. Then, a full intra-oral examination was performed and recorded.

Statistical analysis: Data tabulated in excel worksheet and then analyzed using a statistical software package (SPSS). Frequency, percentage, parametric and non-parametric test applied to determine differences between groups.

Results

The sample consisted of 46.7% males and 53.3% females with a mean of 52.43± 11.7 years old. The duration of illness since diagnosis ranged from 1-25 years. 42% of the patients were in the poorly-controlled group and 33.3% of the patients had associated systemic diseases. There were no significant sex differences regarding the age, the duration of illness, the A1C control level, and types of the associated systemic diseases (Table 1). However, 63 (21%) of total patients did not take their drugs regularly and significantly in female (42 females vs 21males, P=0.017).

The majority of the patients (83%) had one or more subjective oral complaint. Dry mouth was the predominant symptom (80%) with no significant sex difference (P= 0.772). It was followed by painful mucosa (12.7%) and significantly in males (31 males versus 7 females, P= 0. 000). Burning sensation was found in (8.3%) of the patients with no significant sex difference (P=0.125). Paresthesia was the least subjective complaint (8%) that mainly affect the lip (6.7%) and significantly more in females (17 females versus 3 males, P=0.019), (Table 2).

During the extraoral examination, 9.3% of patients showed changes in their lips (6% angular stomatitis

and 3.3% crusted lips with no significant sex (P=0.416) or age (P=0.677) differences. Intraoral examination showed that 12.7% of the patients had tongue changes related to sex variation (P= 0.001). The coated tongue was seen only in females (3%); geographic tongue (2%) and fissured tongue (1.3%) were predominately in males. Patients above 50 years had significantly (P=0.012) more coated and geographical tongue. Gingival redness was seen in 33.3% of patients and white patch on buccal mucosa was seen in 3%. Three of those patients reported continuous cheek biting and the remaining 6 patients were histopathologically confirmed having lichenoid drug reaction. Finally, 4% of patients had denture stomatitis. There were no sex or age significant differences concerning changes in the mucosa of gingiva, cheek, and palate (Table 3).

Concerning glycemic control, the results showed that patients in the three glycemic-controlled groups (well, moderate, and poor) had a nearly similar complaint of dry mouth (76.3%, 79.6%, and 82.5% respectively). While paresthesia was less common in the well-controlled group (7.9%). The frequency of registering burning sensation was decreased as the hyperglycemia increased (6.6% poorly-controlled versus 10% good-controlled). For pain sensation, the largest percentage was seen in the moderately-controlled group (18.4%). In a poorly-controlled group, the lips, tongue and palatal mucosal alteration were the least affected site while the buccal mucosa was a predominantly affected site (6.3%) in comparison to the other groups (P = 0.014). Angular stomatitis and crusted lips were seen more frequently in a moderately-controlled group than poor-controlled group (9.2% versus 3.2% and 4.1% versus 2.4%, respectively). Tongue examination revealed that geographic tongue (4, 4.1%) and fissured tongue (3,3.1%) were frequent in the moderately controlled group while coated tongue was seen more in poorly-control (5, 4%). Gingival redness and denture stomatitis were predominant in both moderately and poorly-controlled group (Table 4).

Table 1: The mean value of patients' age, duration of illness, A1C control level, and associated systemic diseases in the studied samples.

		Total		Male		Female		P value
		Mean± SD		Mean ± SD		Mean ± SD		
Age		52.43±11.7		52.66±11.88		52.22±11.57		0.746
Duration		5.68±3.17		5.63±2.70		5.73±3.54		0.792
		No,	%	No	%	No	%	p value
A1C groups	Well	76	25.3	38	27.1	38	23.8	0.724
	Moderate	98	32.7	43	30.7	55	34.4	
	Poor	126	42	59	42.1	67	41.9	
Associated systemic disease	Htn	84	28.0	43	30.7	41	25.6	0.3
	Tg	14	4.7	7	5.0	7	4.4	
	Htn+Tg	2	0.7	2	1.4	0	0	
	total	100	33.4	52	37.1	48	30	

Htn= hypertension, Tg= triglyceride

Table 2: Frequency distribution of 51 patients according to patients' subjective complaints.

Parameters		Total		Male		Female		P value
		No.	%	No.	%	No.	%	
Oral pain		38	12.7	31	22.1	7	4.4	0.000
Burning sensation		25	8.3	132	94.3	143	89.4	0.125
Dry mouth		240	80.0	111	79.3	129	80.6	0.772
Paresthesia (n=24, 8%)	tongue	3	1.0	1	0.7	2	1.2	0.019
	lip	20	6.7	3	2.1	17	10.6	
	both	1	0.3	0	0	1	0.6	

Table 3: Frequency distribution and percentages for the clinical findings in 300 type 2 DM patients.

Site of oral mucosa	Site	Total		Sex				P value	Age group				P value
				male		female			<50		>50		
		No.	%	No.	%	No.	%		No.	%	No.	%	
Lips (n=28, 9.3%)	Angular Stomatitis	18	6	9	6.4	9	5.6	0.416	7	5.6	11	6.3	0.677
	Crustations	10	3.3	4	2.9	6	3.8		6	4.8	4	2.3	
Tongue (n=19, 6.3%)	Coated	9	3	0	0	9	5.6	0.001	3	2.4	6	3.4	0.012
	Fissured	4	1.3	4	2.9	0	0		3	2.4	1	0.6	
	Geographic	6	2.0	5	3.6	1	0.6		2	1.6	4	2.3	
Gingiva (n=102, 34%)	Redness+ Calculus	2	0.7	1	0.7	1	0.6	0.519	0	0	2	1.1	0.674
	Redness	100	33.3	42	30	58	36.3		43	34.7	57	32.4	
Buccal mucosa (n=9, 3%)	White patch	9	3	2	1.4	7	4.4	0.136	2	1.6	7	4	0.080
Palate (n=12, 4%)	Denture stomatitis	12	4	3	2.1	6	3.8	0.416	1	0.8	8	4.5	0.210

Table 4: Frequency distribution and percentages of patient's symptoms according to glycemic grouping.

Studied parameters			Glycemic control (A1C) groups						
			Well/ n=76		Moderate/ n=98		poor/ n=126		P value
			No.	%	No.	%	No.	%	
Symptome	Dry mouth	240	58	76.3	78	79.6	104	82.5	0.559
	Paresthesia	24	6	7.9	9	9.2	9	7.2	0.910
	Burning sensation	25	7	9.2	10	10.2	8	6.3	0.556
	Pain	38	7	9.2	18	18.4	13	10.3	0.115
Clinical findings	Lips	28	8	10.5	13	13.3	7	5.6	0.361
	Tongue	19	5	6.5	8	8.2	6	4.8	0.115
	Gingiva	102	26	34.2	35	35.7	41	32.5	0.796
	Palate	9	4	5.3	4	4.1	1	0.8	0.147
	Buccal mucosa	9	0	0	1	1	8	6.3	0.014

Discussion

Diabetes mellitus is characterized by abnormalities in carbohydrate, lipid, and protein metabolism resulting from either a relative or an absolute deficiency of insulin. Chronic hyperglycemia leads to several events that promote structural changes in tissues and are associated with impaired wound healing, higher susceptibility to infections and micro and macrovascular dysfunctions[13].

Alterations that are more frequently observed in the oral cavity in DM patients include increased rate of dental caries, higher prevalence, and severity of periodontal disease, impaired healing, burning mouth syndrome, salivary flow dysfunction and opportunistic infections[14,15]. A high prevalence of oral mucosa alterations in patients with diabetes has been discussed in the literature[15,16]. Some authors believe that certain oral manifestations are related to inadequate metabolic control of diabetes. Others believe that it might be due to immunological response, which makes the diabetic patients more prone to infections and alterations in the oral cavity[14]. Oral health care workers are often the first to detect undiagnosed or untreated DM because of its oral manifestations.

Hb A1C control groups distribution in our study were unlike those in Malaysia, the largest percentage of our sample (42%) was in the poorly-controlled group while (43.5%) of their patients were well metabolic control patients.[7]. Less than one-fourth (21%) of our patients did not take their drugs regularly and being twice more frequent in females.

Dry mouth was the major complaint of our patients (80%) and was higher than that reported in previous studies 25%[17] and 30.4%[7]. Among them, 33% of

those patients had one or more associated systemic disease for which they were taking the relevant medicine/s that is responsible for xerostomia. The prevalence of xerostomia increased as the metabolic status deteriorated[7]. However, in the present study, this increase was not significant.

This study showed oral burning sensation nearly to be equally distributed among the three HbA1C groups. However, Ravindran et al.[18] found high percentage of burning mouth sensation in poorly-controlled. This superficial dissimilarity attributed to the difference in the sample size and method of grouping. They included 60 DM patients grouped as either controlled or uncontrolled. Accordingly, merging moderate and poor-controlled patients in one group will be larger than the well-controlled group. Besides, patients in our sample had other associated chronic systemic diseases and used medications to control hypertension and hypercholesterolemia that believed to predispose to burning sensation, and oral mucosal pain[19] despite they reach the controlled glycemic status. Type2 DM patients had symptoms other than burning sensation. They complain of painful and paresthetic oral mucosa. These findings emphasize the role of nerve, autonomic and cardiovascular alterations, especially at the level of the microcirculation of the oral mucosa[19]. The main site of paresthesia was the lips. This could be linked with the existence of lip frustration that was observed during clinical examination. Paresthesia and pain, which arise during the daytime or the evening, can lead to an obvious neurotic condition for those patients, Angular stomatitis was seen in both sexes equally and at a higher percentage than that reported in Malaysian (2.6%)[7] and Indian (2.2%)[20] studies. Although crusted lips were observed in a small percentage (3.3%), it seems to be slightly more in females (4 males vs. 6 females). This sign is seen in young and old DM patients, as well as in long and short disease duration. Thus it seems to be related to the habit of lip licking that associated with dry mouth, which is predominantly seen in those patients.

The second most commonly affected site was tongue, and the frequency of total tongue lesions did not relate to sex or age of the patient. However, the coated tongue was seen only in females and twice more in that patient above 50 years old. Our reported percentage (5.6%) was much lower than that of Indian type 2 DM patients (34.8%, in both sexes)[19] and (28.7%) in Brazilian patients[15]. Whereas, Gupta et al.[21] recorded the coated tongue in (40%) patients with uncontrolled DM. On the other hand, the geographic tongue was predominately seen in males and again twice frequency in older age group. The percentage was close to that reported in a Malaysian's study (3.6%, in both sexes)[7]. Furthermore, fissure tongue prevalence in our patients was in line with the overall reported population range (2%-5%)[22]. However, it was less than that reported in type 2 DM patients from South Africa (28%)[23], India (17%)[19] and Malaysia (26.9%)[7]. Fissure tongue was seen only in males and predominantly in patients aged less than 50 years.

In our study, about one-third of the patients had gingival redness unrelated to HbA1C level. In comparison to the high prevalence (65.8%) of gingivitis in the Indian type 2 DM patients[20].

Only (4%) of our patients showed denture stomatitis which is in contrast to (11.5%) reported in the Malaysian[7] and (0.8%) in the Indian type 2 DM patients[20]. We found denture stomatitis twice frequent in females and almost entirely (8 out of 9) in older age group and unlike Malaysian patients[7] it did not relate to the glycemic status or disease duration. Therefore, we attributed it to the habit of keeping the dentures inside the mouth for longer period especially in females due to aesthetic reasons.

The present results demonstrated a significant association between the metabolic monitoring and the occurrence of buccal mucosal white patches. They were predominantly seen in the poorly-controlled group who claimed taking their drugs regularly. It could be attributed to the side effects of the medications that these patients had taken because three out of the nine patients who had poorly controlled diabetes had another associated systemic disease. However, intraorally those patients had no other oral mucosal changes.

Uncontrolled DM may lead to many pathological changes which can increase the susceptibility of oral tissues to infection and local irritants[24]. It was reported that as the metabolic control decreased, the possibility of oral mucosal lesions increased. Our result was in agreement with Collin et al.[25] findings that patients with fewer than two oral mucosal lesions had a mean HbA1c of 8.3%, but we contradict them in case the DM patients suffered from three mucosal changes where the mean HbA1C (7.2±0.3) was less than their reported value (9.5%)[25]. Thus our study showed that the metabolic control did not have a significant impact on symptomatology and clinical findings of the patients.

Conclusions

Poorly-controlled DM patients constitute (42%) of the DM patients, with no significant sex difference. There was no significant association between the presenting complaint of the patient and the metabolic control. Dry

mouth was the most common subjective complaints in all levels of glycemic control. Oral burning sensation constitutes 8.3% and nearly equally distributed among the three HbA1C groups. Oral pain (12.7%) and paresthesia (8%) were reported in type 2 DM patients.

The first common mucosal lesion in type 2 DM was gingival redness that positively correlates with poor glycemic control. The second most commonly affected site was the tongue; it occurs in both sexes equally. However, the types of mucosal changes were sex and age-dependent. Four percent of the patients showed denture stomatitis, and it was twice frequent in females, almost in the old age group, and did not relate to glycemic status. The buccal mucosal white patches were associated with the glycemic control.

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