International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Diabetes Type 2 and Oral Changes: A Comparison of Diabetic and Non-Diabetic Prosthodontic Patients

Berisha V[1], Kovacevska G[2]

Abstract: ***Background**: Patients with diabetes mellitus have been associated with several changes in the oral cavity, such as gingivitis, periodontitis, mucosal diseases, salivary dysfunction, altered taste, and burning mouth. **Objectives**: To determine the prevalence of oral mucosal lesions in prosthodontic patients with diabetes mellitus. **Methods**: This cross-sectional study involves 10 patients with diabetes and 10 nondiabetic subjects. Demographic information and data on the duration and type of diabetes, medical history, and current use of medication were obtained from medical records. A detailed oral examination was performed in accordance with international criteria, prosthodontic rehabilitation, and oral screening with the VEL scope VX® system. RESULTS: In the present study, the prevalence of OMLs was significantly higher in DM patients (70%) than in nondiabetic control subjects (40%). Patients with diabetes had a higher prevalence of denture stomatitis and angular cheilitis than controls. **Conclusion**: The prevalence of OMLs was significantly higher in diabetic patients than in control subjects.*

Keywords: diabetes, prevalence, mouth mucosa, oral pathology

1. Introduction

Diabetes mellitus (diabetes) is a complicated metabolic disorder characterized by altered carbohydrate, lipid, and protein metabolism, resulting in insulin insufficiency (type 1 diabetes) or insulin resistance in peripheral tissues (type 2 diabetes). Type 3 diabetes is characterized by carbohydrate intolerance during pregnancy.

Initial symptoms of diabetes include increased thirst and urination. Other symptoms can include unexplained weight loss, fatigue, blurred vision, increased hunger, and sores that do not heal. Chronic hyperglycemia leads to different complications in various regions of the body including the oral cavity, so blood glucose control is very critical.

Patients with diabetes tend to be more susceptible to periodontal disease [1], [2], fungal infections [3], and alterations in taste when they lack metabolic control. Other common oral manifestation includes median rhomboid glossitis, atrophic glossitis, denture stomatitis and angular chelitis [4].

Long term usage of complete dentures can further stimulate the proliferation of fungi especially with the prosthesis in poor condition. The majority of complete denture diabetic patients usually report an altered taste sensation with other neurosensory disorders like burning mouth syndrome.

The link between diabetes, oral lichen planus, and dental caries is less clear, with various research yielding wildly disparate outcomes. [5] [6] [7] [8]

The purpose of this study was to check which oral soft tissue manifestations were found in type 2 diabetes, and the correlation between these findings and this complex disease.

2. Materials and Methods

2.1 Research design

The present study was approved by the Ethical Committee of the School of Hospital and University Clinical Service of Kosovo-University Clinical Center of Kosovo.

The study was conducted in full accordance with the ethical principles of the World Medical Association Declaration of Helsinki. All volunteers were informed of the aims and methods of this study, and written consent was obtained.

This study involves 10 patients with diabetes and 10 non-diabetic control subjects. Diabetic patients were recruited from the endocrinology clinic of the University Hospital, which is situated in the same complex that houses the medical and dental schools. Non-diabetic control subjects, identified by their normal fasting blood glucose levels, were recruited from the outpatient department of the dental clinic.

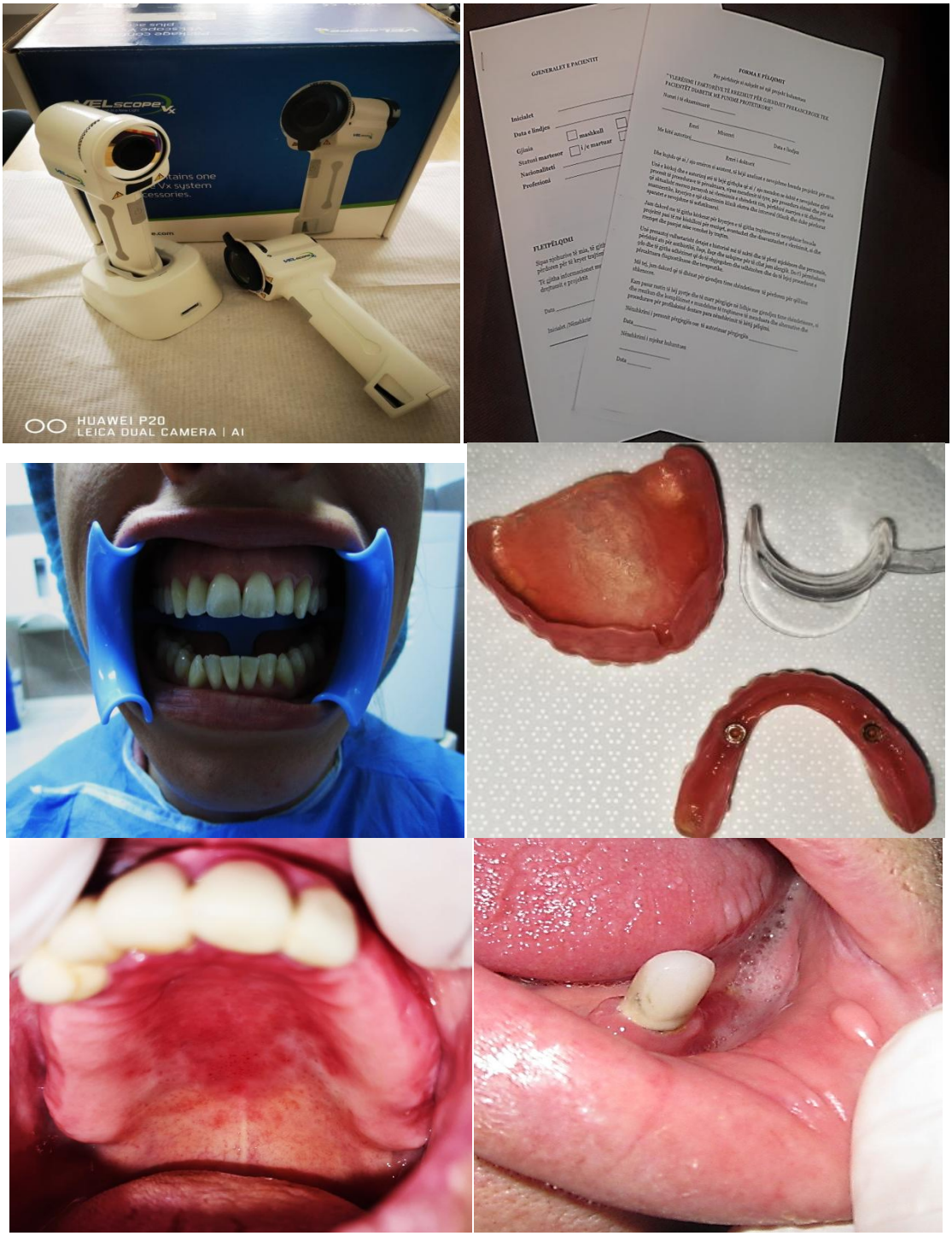
Data collection sheets were used to gather demographic data, education level, medical and dental history, subjective xerostomia, and past and current use of medications. Data on the duration of disease, type of diabetes, any major complications, and type of diabetes therapy were retrieved from medical records.

2.2 Oral examination

Extraoral and intraoral examination was performed under electrical overhead lights using a mouth mirror, tweezers, gauze, and a wooden tongue depressor. Oral screening was preformed with VELscope VX® system.

Diagnostic criteria for abnormalities of the oral mucosa were in accordance with World Health Organization (WHO) guidelines.

The number of natural teeth and presence of dentures, either partial or complete, were also recorded. After the oral examination, patients who presented with diabetes-associated lesions were referred for appropriate treatment.



3. Results

A total of 10 diabetic patients and 10 nondiabetic control subjects participated in this study. There were 65%women and 35%men in total. . The mean age of the diabetic patients was years and that of the control subjects was 58.3 years.
The demographic characteristics are presented in Table 1.

Table 1: Demographic data and characteristics of the study groups

Variables	Diabetics (n = 10) Mean (SD) n (%)	Controls (n = 10) Mean (SD) n (%)
Gender		
Male	3 (30%)	4 (40%)
Female	7 (70%)	6 (60%)
Age	67.1 (8.84)	58.3 (14.56)
<40 years	0 (0%)	1 (10%)
40-60 years	2 (20%)	5 (50%) `
>60 years	8 (80%)	4 (40%)

Diabetes-related variables among Diabetic patients are presented in Table 2.

The mean duration of Diabetes was 10.6 years from the time of diagnosis. Most patients (60%) were prescribed oral hypoglycemic drugs, while 20% were prescribed a combination of insulin and oral drugs, 10% of patients were prescribed insulin and 10% diet alone. Diabetic complications including retinopathy, nephropathy, neuropathy, cardiovascular diseases, and amputations of the lower limbs were observed in 60% of diabetic patients.

Table 2: Description of diabetes variables among diabetic patients

Variables	(n = 10) n (%)
Type of diabetes	
Type I	0 (0%)
Type II	10 (100%)
Duration of diabetes (years)	
<1 year	1 (10%)
1-10 year	4 (40%)
11-20 years	3 (30%)
>20 years	2 (20%)
Treatment of diabetes	
Oral agents	5 (50%)
Insulin	1 (10%)
Insulin +oral agent	3 (30%)
Diet	1 (10%)
Diabetes complication	
Yes	6 (60%)
No	4 (40%)

The dentition status for both groups is presented in Table 3.

Table 3: Prosthodontic rehabilitation types in diabetics and controls

Variables	Diabetics (n = 10) n (%)	Controls (n = 10) n (%)
Prosthodontic rehabilitation		
Yes	8 (80%)	8 (80%)
No	2 (20%)	2 (20%)
Prosthodontic rehabilitation types		
None	2 (20%)	2 (20%)
Bridge	2 (20%)	2 (20%)
Complet denture	3 (30%)	3 (30%)
Fix-mobile combination	3 (30%)	3 (30%)

The OMLs observed in Diabetic patients and control subjects are shown in Table 4

The most common lesions in Diabetic patients were denture stomatitis (50%) and Angular cheilitis (20%). The prevalence of traumatic ulcers was similar in both groups.

OMLs were present in a significantly higher percentage of diabetic patients (70%) than control subjects (40%).

Table 4: Comparison of the prevalence of oral mucosal lesions in diabetics and controls

Variables	Diabetics (n = 10) n (%)	Controls (n = 10) n (%)
One or more oral lesions	7 (70%)	4 (40%)
Denture stomatitis	5 (50%)	0 (0%)
Traumatic ulcera	1 (10%)	1 (10%)
Fibroma	2 (20%)	0 (0%)
Angular cheilitis	2 (20%)	0 (0%)
Fissured tongue	2 (20%)	3 (30%)
Coated tongue	3 (30%)	1 (10%)
Xerostomia	9 (90%)	5 (50%)

4. Discussion

A number of specific oral mucosa alterations have been associated with DM. [9]

In the present study, the prevalence of OMLs was significantly higher in DM2 patients (70%) than in nondiabetic control subjects (40%). A similar study of 146 patients with DM2 and 111 non-diabetic control subjects showed that nearly twice the number of diabetic patients (88%) had one or more oral soft tissue lesions as compared to non-diabetic control subjects (45.0%), and the difference was statistically significant ($P < 0.001$). [10] Similarly, Guggenheimer et al.[15] investigated the prevalence of OMLs in 405 patients with type 1 diabetes and 268 control subjects and found that 44% of diabetic patients had one or more oral soft tissue lesions as compared to 25% of control subjects; again, the difference was significant.

Collin et al. [11] investigated the occurrence of diabetic neuropathy in elderly patients with DM2 and examined the mucosal diseases, tooth loss, and temporomandibular joint dysfunction in 45 long-term DM patients and 77 control subjects. They showed that 42% of patients with DM had two or more mucosal lesions, as compared to 20% of control subjects ($P = 0.008$). This higher point prevalence rate of mucosal lesions observed in diabetic patients may be due to slower healing rates observed in these patients, leading to a longer duration of a given lesion, and not be due to an increase in the incidence. In other words, if a lesion takes two months to heal in a diabetic patient and one month to heal in healthy control subject, the prevalence will be higher in patients with DM at a given point of time.

Like many other studies, [12] [13] [14] [15] xerostomia was one of the most prevalent conditions among diabetics in this study also.

A number of specific oral mucosal alterations have been associated with type 2 DM, [12] [16] [17] which included coated tongue, fissured tongue, angular cheilitis and denture stomatitis

A highly significant association was observed between coated tongue and type 2 diabetes in this study, which was in accordance with other studies. [18] [19]

Prevalence of denture stomatitis was also higher among diabetes (50%) when compared to control group

A literature search revealed conflicting reports about the association of denture stomatitis with DM. [20] [21]

Prevalence of angular cheilitis in the present study was found to be significantly higher in diabetic patients (7.8%) than in control subjects (0%).

This study did not find any significant association of geographic tongue with diabetes, the same as other studies. [17] [18] [22]

5. Conclusion

The findings of this study were related to the presence of type 2 diabetes; there are several factors that may give rise to these changes in the oral cavity, one of them being the use of dental prosthetic appliances.

References

[1] Oliver RC, Tervonen T: Periodontitis and tooth loss: comparing diabetes with the general population. J Am Dent Assoc 124: 71, 1993
[2] Tervonen T, Oliver RC: Long-term control of diabetes mellitus and periodontitis. J Clin Periodont 20:431–435, 1993
[3] Rodrigues, C.F.; Rodrigues, M.E.; Henriques, M. *Candida* sp. Infections in Patients with Diabetes Mellitus. *J. Clin. Med.* 2019, *8*, 76.
[4] Miko S, Ambrus SJ, Sahafian S, Dinya E, Tamas G, Albrecht MG. Dental caries and adolescents with type 1 diabetes. Br Dent J 2010;208:E12
[5] Lundström. I. M. C. Incidence of diabetes mellitus in patients with oral lichen planus. Int J Oral Surg.1983;12:147-52.
[6] Albrechet M, Bánóczyj de, Tamás GYJr. Ocorrence of oral leukoplakia and lichen planus in diabetes mellitus. J Oral Pathol Med.1992;21:364
[7] Petrou-Amerikanou C, Markopoulos K, Belazi M, Karamitsos D, Papanayatou P. Prevalence of oral liquen planus in diabetes mellitus according to the type of diabetes. Oral Dis.1998;4:37-40.
[8] Manfredi M, Mccullough MJ, Vescovi P, Al-kaarawi ZM, Porter SR. Update on diabetes mellitus and related on oral diseases. Oral Dis. 2004;10:187-200.
[9] Skamagas M, Breen TL, Leroith D. Update on diabetes mellitus: prevention, treatment, and association with oral diseases. *Oral Dis*. 2008;14(2):105–114.
[10] Bastos AS, Leite AR, Spin-Neto R, Nassar PO, Massucato EM, Orrico SR. Diabetes mellitus and oral mucosa alterations: Prevalence and risk factors. *Diabetes Res Clin Pract*. 2011;92(1):100–105.
[11] Collin HL, Niskanen L, Uusitupa M, Toyry J, Collin P, Koivisto AM, et al. Oral symptoms and signs in elderly patients with type 2 diabetes mellitus. A focus on diabetic neuropathy. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2000;90(3):299–305.
[12] Mohsin SF, Ahmed SA, Fawwad A, Basit A. Prevalence of oral mucosal alterations in type 2 diabetes mellitus patients attending a diabetic center. Pak J Med Sci. (2014) 30:716–9.
[13] Lessa LS, Pires PDS, Ceretta RA, Becker IRT, Ceretta LB, Tuon L, Simoes PW, Sonego FGF, *et al*. Meta-analysis of prevalence of xerostomia in diabetes mellitus. Int Arch Med 2015;8:1-13.
[14] Susanto H, Agustina D, Abbas F, Vissink A. Xerostomia, glucose regulation and serum inflammatory markers in Indonesians with type 2 diabetes mellitus. Oral Surg Oral Med Oral Pathol Oral Radiol 2015;3:e112.
[15] Bajaj S, Prasad S, Gupta A, Singh VB. Oral manifestations in type-2 diabetes and related complications. Indian J Endocrinol Metab 2012;16:777.
[16] Silva MFA, Barbosa KGN, Pereira JV, Bento PM, Godoy GP, Gomes DQdC. Prevalence of oral mucosal lesions among patients with diabetes mellitus types 1 and 2. An Bras Dermatol. (2015) 90:49–53.
[17] Al-Maweri SA, Ismail NM, Ismail AR, Al-Ghashm A. Prevalence of oral mucosal lesions in patients with type 2 diabetes attending hospital universiti sains malaysia. Malays J Med Sci. (2013) 20:39–46.
[18] de Souza Bastos A, Leite ARP, Spin-Neto R, Nassar PO, Massucato EMS, Orrico SRP. Diabetes mellitus and oral mucosa alterations: prevalence and risk factors. Diabetes Res Clin Pract. (2011) 92:100–5. 10.1016
[19] Tanwir F, Altamash M, Gustafsson A. Perception of oral health among adults in Karachi. Oral Health Prev Dent 2006;4:83-9
[20] Dorocka-Bobkowska B, Budtz-Jorgensen E, Wloch S. Noninsulin dependent diabetes mellitus as a risk factor for denture stomatitis. *J Oral Pathol Med*. 1996;25(8):411–415.
[21] Phelan JA, Levin SM. A prevalenc study of denture stomatitis in subjects with diabetes mellitus or elevated plasma glucose levels. *Oral Surg Oral Med Oral Pathol*. 1986;62(3):303–305.
[22] Saini R, Al-Maweri SA, Saini D, Ismail NM, Ismail AR. Oral mucosal lesions in non oral habit diabetic patients and association of diabetes mellitus with oral precancerous lesions. Diabetes Res Clin Pract. (2010) 89:320–6. 10.1016