# Prevalence of oral mucosal lesions among patients with diabetes mellitus types 1 and 2*

Miguel Franklin Alves Silva[1]
Jozinete Vieira Pereira[2]
Gustavo Pina Godoy[2]
Kevan Guilherme Nóbrega Barbosa[2]
Patrícia Meira Bento[2]
Daliana Queiroga de Castro Gomes[2]

*DOI: http://dx.doi.org/10.1590/abd1806-4841.20153089*

**Abstract:** BACKGROUND: Patients with diabetes mellitus have been associated with a number of 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 patients with diabetes mellitus.
METHODS: A cross-sectional observational study between August and October 2012 with a convenience sampling was performed for 51 patients with diabetes mellitus (type 1 and type 2). The study consisted of two phases: 1) a questionnaire application; 2) intraoral clinical examination. For the analysis of data, we used descriptive statistics, Fisher's exact test in bivariate analysis (significance level of 0.05), and Poisson Regression.
RESULTS: The prevalence of oral lesions was 78.4%. Traumatic ulcers (16.4%) and actinic cheilitis (12.7%) were the most prevalent lesions. The lips (35.3%) and tongue (23.5%) were the most common location. The bivariate analysis showed an association with the type of diabetes, and two variables (age and comorbidity) were quite close to the significance level. In the Poisson Regression analysis, only diabetes type 2 remained significant after adjusting the model.
CONCLUSIONS: The results of this study show a high prevalence of oral mucosal lesions in diabetic patients. The oral mucosal lesions are mostly associated with diabetes type 2.
**Keywords:** Dentistry; Diabetes mellitus; Diabetes mellitus, Type 1; Diabetes mellitus, Type 2; Mouth diseases; Mouth mucosa

## INTRODUCTION

Diabetes mellitus is a metabolic syndrome considered to be caused by multiple factors resulting from a deficiency of insulin, which may be absolute due to pancreatic β-cell destruction (type 1) or relative due to an increased resistance of the tissues to insulin (type 2).[1] In Brazil, it is estimated that about 7.5 million people are diagnosed with diabetes, though the actual number is certainly larger, in view of the great number of individuals with the syndrome but without the diagnosis.[2]

A series of alterations in the oral mucosa in diabetic patients have been reported, including gingivitis, periodontitis, oral mucosal diseases that favor infections such as candidiasis, salivary gland dysfunction, altered taste, glossodynia, and stomatopyrosis.[3-12]

The presence of oral mucosal lesions such as lichen planus and recurrent aphthous ulceration has frequently been diagnosed in diabetic patients, although the actual prevalence is rarely addressed in clinical studies.[12,13] Some studies have shown a prevalence of 80% of oral mucosal lesions in patients with diabetes mellitus.

Thus, the aim of this study was to determine the prevalence of oral mucosal lesions among diabetic patients in a health center. We then described the type and location of these lesions, as well as investigating their possible association with socio-demographic factors, general health and oral health among patients.

## MATERIAL AND METHODS

We conducted a cross-sectional observation study with a convenience sampling of 51 diabetic patients (type 1 and type 2) from the Francisco Pinto Health Center in Campina Grande (Paraiba State, Brazil). Data were collected from August to October 2012. The patients included in this

Received on 28.05.2013.
Approved by the Advisory Board and accepted for publication on 18.02.2014.
* Work performed at the Centro de Saúde Dr Francisco Pinto – Campina Grande (PB), Brasil.
Conflict of interest: None
Financial funding: None

[1] Private clinic – João Pessoa (PB), Brazil.
[2] Universidade Estadual da Paraíba (UEPB) – Campina Grande (PB), Brazil.

study showed a medical certificate for diabetes mellitus. The convenience method was applied to obtain the sample, due to the small number of patients that accepted to participate.

The study comprised two stages. Stage one involved data collection through a questionnaire. Stage two involved intraoral clinical examination. Initially the data were collected via a questionnaire that featured the sample, overall health of the patients, and questions about their oral health. After data collection, intraoral examinations were performed by an experienced professional in an office at the Health Center.

During intraoral examinations, researchers wore lab coats, caps, masks, goggles, and gloves. For the clinical procedure, a wooden spatula, clinical mirror and gauze were used. In order to find the presence of lesions, all regions of the oral mucosa were evaluated in detail and in the following order: lips, labial mucosa, tongue, gingival mucosa, palate, floor of mouth, and mouth mucosa.

In this study, the independent variables were age, sex, educational level, race, type of diabetes, comorbidity, dentist monitoring, "the patient said to the dentist he was diabetic", and self-rated oral health. The age variable was initially collected as a numeric variable, and then dichotomized by the median (Median = 66). The dependent variable analyzed in this study was the presence of lesions on the oral mucosa.

This research was approved by the Research Ethics Committee of the University of Paraiba under number 5275.0.133.000-10. According to Resolution 196/96 of the National Health Council, the study followed ethical principles and considerations for the conduct of research involving humans.

The data analysis consisted, firstly, of a descriptive analysis, followed by the analytical phase. Data were expressed as a function of their frequency and prevalence ratio (PR), with their respective confidence intervals of 95% (95% CI). The bivariate association between variables was performed using Fisher's exact test. Variables with $p < 0.10$ in the bivariate analysis were then adjusted in a Poisson Regression. In all analyses, we adopted the significance level of 0.05 ($p < 0.05$ was considered significant) and used the SPSS 13.0 program.

## RESULTS

The prevalence of oral mucosal lesions among patients with diabetes mellitus was 78.4% (n = 40; CI 95%: 65.4-87.5), and their average age was 64.1 years (SD = 12.18). There was a predominance of ulcerative lesions, while oral mucosal lesions occurred mainly in the lip mucosa. Table 1 shows the lesion types as well as their anatomical localization in the oral mucosa.

Table 2 displays the results of a bivariate data analysis, showing statistical significance only for patients with diabetes mellitus type 2 ($p < 0.05$). Table 3 presents the results of Poisson Regression analysis with only one significant remained variable, type of diabetes ($p = 0.01$).

## DISCUSSION

This research identified a high prevalence of oral mucosal lesions among patients with diabetes mellitus. In the literature, a preliminary study with diabetic patients reported a prevalence of 80%.[14] This finding, which is close to that found in the present study, highlights the importance of dentists monitoring the oral health of patients with diabetes mellitus, since a high incidence of lesions indicates a need for urgent treatment.

In this study, the most common lesions in the oral mucosa were ulcerative lesions. We found a prevalence of 24.6% of both types of ulcers (traumatic and aphtous). A case-control study, similar to the present study, reported a prevalence of 22% for ulcerative lesions in the oral cavity among patients with diabetes type 2.[15] The literature shows that alterations in oral mucosa related to diabetes cause symptoms such as glossodynia, stomatopyrosis, and changes in taste.[9,13,16] Thus, the occurrence of oral ulcers causes pain, discomfort and burning, which damages the oral health of patients, and, in some cases, may prevent them from undertaking professional activities.[17]

The second most frequent type of lesion found in this study was actinic cheilitis, along with the cases of melanin pigmentation (Figure 1 and 2). This is an important finding because of the malignant potential of actinic cheilitis, mostly found in the elderly population.[18,19] Furthermore, other lesions (angular cheilitis, fissured tongue, and hairy tongue) found in the study facilitate the emergence of opportunistic infections such as candidiasis.[9]

The sociodemographic characteristics of the population such as age, gender, education, and skin color were not statistically associated with the presence of oral lesions among diabetics. The literature describes no striking differences between these variables, especially between genders.[20] Brazilian clinical studies have also not shown significant differences as regards age, gender, and skin color among diabetic patients with oral lesions.[21] It is more likely that other factors such as obesity are associated more with diabetes, especially diabetes type 2.[1]

Other factors such as monitoring by dentists, family history of diabetes, informing a dentist of one's diabetic condition, and self-perception of oral health, were not associated with the presence of oral lesions (Table 2). This highlights the need for close checks, as

**Table 1**: Description of type of oral mucosal lesion and anatomical site among patients with diabetes mellitus. Total of 51 patients

| Type of lesion | Number of patients | % of patients | Type of lesion | Number of lesions | % of lesions |
|---|---|---|---|---|---|
| Traumatic ulcer | 13 | 25.5 | Traumatic ulcer | 18 | 16.4 |
| Lingual varicosities | 10 | 19.6 | Actinic cheilitis* | 14 | 12.7 |
| Actinic cheilitis* | 7 | 13.7 | Melanin pigmentation | 14 | 12.7 |
| Melanin pigmentation | 7 | 13.7 | Lingual varicosities | 10 | 9.1 |
| Angular cheilitis | 6 | 11.7 | Recurrent aphthous ulceration | 9 | 8.2 |
| Fissured tongue | 6 | 11.7 | Angular cheilitis | 6 | 5.5 |
| Recurrent aphthous ulceration | 5 | 9.8 | Fissured tongue | 6 | 5.5 |
| Nevus | 5 | 9.8 | Nevus | 5 | 4.5 |
| Hairy tongue | 4 | 7.8 | Hairy tongue | 4 | 3.6 |
| Hyperplasia | 4 | 7.8 | Hyperplasia | 4 | 3.6 |
| Leukoplakia* | 4 | 7.8 | Leukoplakia* | 4 | 3.6 |
| Papule | 4 | 7.8 | Papule | 4 | 3.6 |
| Benign migratory glossitis | 1 | 1.9 | Benign migratory glossitis | 1 | 1.0 |
| No lesions | 11 | 21.6 | No lesions | 11 | 10.0 |
| TOTAL PATIENTS | 51† | 100.0† | TOTAL LESIONS | 99† | 100.0 |
| Anatomical site | | | Anatomical site | | |
| Lip | 22 | 43.13 | Lip | 24 | 35.3 |
| Tongue | 14 | 27.4 | Tongue | 16 | 23.5 |
| Mouth mucosa | 10 | 19.6 | Mouth mucosa | 12 | 17.7 |
| Alveolar ridge | 6 | 11.7 | Alveolar ridge | 6 | 8.8 |
| Palate | 6 | 11.7 | Palate | 6 | 8.8 |
| Mouth floor | 3 | 5.9 | Mouth floor | 3 | 4.4 |
| Lingual frenum | 1 | 1.9 | Lingual frenum | 1 | 1.5 |
| No lesions | 11 | 21.6 | | | |
| TOTAL PATIENTS | 51† | 100.0† | TOTAL LESIONS | 68‡ | 100.0 |

*Potentially malignant oral lesions. †The patients could have more than one lesion. ‡Some data on anatomical site were lost.

**Figure 1:** Clinical aspects of actinic cheilitis

**Figure 2:** Clinical aspects of melanin pigmentation

even patients who are monitored by dental surgeons present oral mucosa lesions.

Among the variables included in the multivariate analysis, only type 2 diabetes revealed significance when compared to age and comorbidity (Table 3), indicating an association between diabetes type 2 and the presence of an oral mucosa lesion. Type 2 diabetes has been associated more with the occurrence of oral manifestations than type 1.[14,22,23] In addition, oral lesions may also be present in type 1 diabetes patients, though to a lesser extent.[8]

Despite the limitations of the present study, namely the inability to establish cause-effect relations, the results highlight dentists must monitor closely diabetic patients, especially patients with type 2 diabetes, who are more prone to lesions in the oral mucosa, such as ulcers and actinic cheilitis. The occurrence of oral lesions in patients with diabetes represents an opportunity for joint care offered by physicians and dentists. Increasing referrals to dental professionals can help to improve the oral health status of these patients. [24]

**Table 2**: Oral mucosal lesions according to the factors analyzed among patients with diabetes mellitus

| | Oral lesions | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | TOTAL | | p-value | PR (CI 95%) |
| Variable | N | % | N | % | N | % | | |
| **Age** | | | | | | | | |
| < 67 years | 16 | 66.7 | 8 | 33.3 | 24 | 100.0 | | |
| 67 years or more | 24 | 88.9 | 3 | 11.1 | 27 | 100.0 | 0.088*(1) | 1.34 (0.98-1.83) |
| **Sex** | | | | | | | | |
| Female | 27 | 75.0 | 9 | 25.0 | 36 | 100.0 | | |
| Male | 13 | 86.7 | 2 | 13.3 | 15 | 100.0 | 0.472(1) | 1.16 (0.88-1.52) |
| **Schooling†** | | | | | | | | |
| < 8 years | 30 | 85.7 | 5 | 14.3 | 35 | 100.0 | | |
| 8 years or more | 8 | 66.7 | 4 | 33.3 | 12 | 100.0 | 0.205(1) | 0.78 (0.51-1.19) |
| **Skin color** | | | | | | | | |
| White | 20 | 71.4 | 8 | 28.6 | 28 | 100.0 | | |
| Nonwhite | 20 | 87.0 | 3 | 13.0 | 23 | 100.0 | 0.305(1) | 1.22 (0.92-1.62) |
| **Type of diabetes** | | | | | | | | |
| Type 1 | 6 | 54.5 | 5 | 45.5 | 11 | 100.0 | | |
| Type 2 | 34 | 85.0 | 6 | 15.0 | 40 | 100.0 | 0.044*(1) | 1.56 (0.90-2.72) |
| **Comorbidity** | | | | | | | | |
| Yes | 19 | 90.5 | 2 | 9.5 | 21 | 100.0 | | |
| No | 21 | 70.0 | 9 | 30.0 | 30 | 100.0 | 0.098*(1) | 0.77 (0.59-1.01) |
| **Dentist monitoring** | | | | | | | | |
| Yes | 5 | 62.5 | 3 | 37.5 | 8 | 100.0 | | |
| No | 35 | 81.4 | 8 | 18.6 | 43 | 100.0 | 0.346(1) | 1.30 (0.75-2.27) |
| **Family history of diabetes†** | | | | | | | | |
| Yes | 20 | 71.4 | 8 | 28.6 | 28 | 100.0 | 0.723(1) | |
| No | 11 | 78.6 | 3 | 21.4 | 14 | 100.0 | | 1.10 (0.77-1.58) |
| **The patient said to the dentist he was diabetic** | | | | | | | | |
| Yes | 13 | 76.5 | 4 | 23.5 | 17 | 100.0 | | |
| No | 27 | 79.4 | 7 | 20.6 | 34 | 100.0 | 1.000(1) | 1.04 (0.76-1.43) |
| **Self-perception of oral health†** | | | | | | | | |
| Satisfactory | 19 | 67.9 | 9 | 32.1 | 28 | 100.0 | | |
| Unsatisfactory | 17 | 89.5 | 2 | 10.5 | 19 | 100.0 | 0.159(1) | 1.31 (0.98-1.77) |
| **TOTAL** | **40** | **78.4** | **11** | **21.6** | **51** | **100.0** | | |

* Variables chosen for logistic regression; †Some data were lost. (1)Fisher's exact test.

**Table 3**: Poisson Regression with adjusted model

| | PR and CI 95% | | |
|---|---|---|---|
| | Bivariate analysis | Adjusted model | p-value |
| **Variable** | | | |
| **Age** | | | |
| < 67 years | | | |
| 67 years or more | 1.34 (0.98-1.83) | 1.47 (1.1-1.69) | 0.180 |
| **Comorbidity** | | | |
| Yes | | | |
| No | 0.77 (0.59-1.01) | 0.24 (0.15-0.89) | 0.08 |
| **Type of diabetes** | | | |
| Type 1 | | | |
| Type 2 | 1.56 (0.90-2.72) | 1.75 (1.10-1.87) | 0.01* |

(*) Significant difference at 5.0%.

## CONCLUSIONS

The results of the present study demonstrate that the prevalence of oral mucosal lesions was higher in patients with diabetes type 2 than in patients with diabetes type 1. The data emphasize the importance of dentists monitoring the oral health of patients with diabetes mellitus.❑

## REFERENCES


1. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care. 2005;28:S37-42.
2. Mendes Tde A, Goldbaum M, Segri NJ, Barros MB, Cesar CL, Carandina L, et al. Diabetes mellitus: factors associated with prevalence in the elderly, control measures and practices, and health services utilization in São Paulo, Brazil. Cad Saude Publica. 2011;27:1233-43.
3. Guimarães KB, Meireles SS, Marques SS, Costa LJ. Periodontal conditions in carriers of diabetes mellitus type 2 assisted in the Federal University of Paraíba. Rev Odonto Cienc. 2007;22:124-30.
4. Lalla E, Lamster IB, Feit M, Huang L, Spessot A, Qu W, et al. Blockade of RAGE suppresses periodontitis-associated bone loss in diabetic mice. J Clin Invest. 2000;105:1117-24.
5. Pontes Andersen CC, Flyvbjerg A, Buschard K, Holmstrup P. Relationship between periodontitis and diabetes: lessons from rodent studies. J Periodontol. 2007;78:1264-75.
6. Taylor GW, Borgnakke WS. Periodontal disease: associations with diabetes, glycemic control and complications. Oral Dis. 2008;14:191-203.
7. Tsai C, Hayes C, Taylor GW. Glycemic control of type 2 diabetes and severe periodontal disease in the US adult population. Community Dent Oral Epidemiol. 2002;30:182-92.
8. Guggenheimer J, Moore PA, Rossie K, Myers D, Mongelluzzo MB, Block HM, et al. Insulin-dependent diabetes mellitus and oral soft tissue pathologies, part I: prevalence and characteristics of non-candidal lesions. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2000;89:563-9.
9. Vernillo AT. Dental considerations for the treatment of patients with diabetes mellitus. J Am Dent Assoc. 2003;134:24S-33S.
10. Chavez EM, Borrell LN, Taylor GW, Ship JA. A longitudinal analysis of salivary flow in control subjects and older adults with type 2 diabetes. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2001;91:166-73.
11. Moore PA, Guggenheimer J, Etzel KR, Weyant RJ, Orchard T. Type 1 diabetes mellitus, xerostomia, and salivary flow rates. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2001;92:281-91.
12. Ship JA. Diabetes and oral health: an overview. J Am Dent Assoc. 2003;134:4S-10S.
13. Lamster IB, Lalla E, Borgnakke WS, Taylor GW. The relationship between oral health and diabetes mellitus. J Am Dent Assoc. 2008;139:19S-24S.
14. Vasconcelos BC, Novaes M, Sandrini FA, Maranhão Filho AW, Coimbra LS. Prevalence of oral mucosa lesions in diabetic patients: a preliminary study. Braz J Otorhinolaryngol. 2008;74:423-8.
15. Bajaj S, Prasad S, Gupta A, Singh VB. Oral manifestations in type-2 diabetes and related complications. Indian J Endocrinol Metab. 2012;16:777-9.
16. Lalla RV, D'Ambrosio JA. Dental management considerations for the patient with diabetes mellitus. J Am Dent Assoc. 2001;132:1425-32.
17. Fraiha PM, Bittencourt PG, Celestino LR. Recorrent aphthous stomatitis bibliografic review. Rev Bras Otorrinolaringol. 2002;68:571-8.
18. Silveira EJD, Lopes MFF, Silva LMM, Ribeiro BF, Lima KC, Queiroz MNG. Potentially malignant oral lesions: clinical and morphological analysis of 205 cases. J Bras Patol Med Lab. 2009;45:233-8.
19. Laws RA, Wilde JL, Grabski WJ. Comparison of electrodessication with CO2 laser for treatment of actinic cheilitis. Dermatol Surg. 2000;26:349-53.
20. Goldenberg P, Shenkman S, Franco LJ. Prevalence of diabetes mellitus: gender differences and sex equalities. Rev Bras Epidemiol. 2003;6:18-28.
21. Sousa MG, Costa Ade L, Roncalli AG. Clinical study of the oral manifestations and related factors in type 2 diabetics patients. Braz J Otorhinolaryngol. 2011;77:145-52.
22. Antunes FS, Graça MA, Nurkim NL, Oliveira RB. Periodontal disease and diabetes mellitus. Rev Odonto Cienc. 2003;18:107-11.
23. Ogunbodede EO, Fatusi OA, Akintomide A, Kolawole K, Ajayi A. Oral health status in a Nigerian diabetics. J Contemp Dent Pract. 2005;6:75-84.
24. Levin RP. How treating the patient with diabetes can enhance your practice: recommendations for practice management. J Am Dent Assoc. 2003;134:49S-53S.


*MAILING ADDRESS:*
*Kevan Guilherme Nóbrega Barbosa*
*Rua Paulo Pontes, 260 - Centenário*
*58428210 - Campina Grande - PB*
*Brazil*
*E-mail: kevanguilherme@gmail.com*

How to cite this article: Silva MFA, Barbosa KGN, Pereira JV, Godoy PG, Gomes DQC. Prevalence of oral mucosal lesions among patients with diabetes mellitus type 1 and 2. An Bras Dermatol. 2015:90(1):49-53.