

Prevalence of oral lesions and evaluation of the periodontal status among diabetic females attending Princess Nourah Bint Abdulrahman University (PNU)

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ABSTRACT

Objective: To evaluate the prevalence of different oral lesions and periodontal status among diabetic Saudi female patients in the College of Dentistry, PNU University. **Materials and Method:** A retrospective study was performed by reviewing the files of all patients who visited the College of Dentistry, PNU University, during the last 5 years. We selected diabetic 20–40-year-old Saudi female patients. Ethical approval was obtained from the Institutional Review Board of PNU University. Data collection sheets were used to gather information on demographics, education, medical and dental history, and extra and intra-oral findings. Data on the duration of diabetes, any major complications, and type of diabetes therapy were retrieved from medical records. The data were entered into an Excel sheet, and descriptive statistics were performed. The analytical phase proceeded to correlate oral lesions with patient age, type of diabetes, and periodontal status. **Result:** A total of 226 diabetic patients were found after reviewing the records. The most common oral mucosal lesions were traumatic ulcers (10.2%), cheek biting (8.8%), and fissured tongue (8.4%). Furthermore, 81.86% of them had periodontitis, and 18.14% had a healthy periodontal status. **Conclusion:** The prevalence of periodontitis among diabetic female patients is higher than that of oral lesions. Stage III periodontitis showed the strongest association to oral lesion.

Keywords: Diabetes, oral lesions, periodontitis

Introduction

Diabetes mellitus (DM) is a growing public health concern and represents a group of metabolic diseases that are characterized by hyperglycemia due to either a deficiency of insulin secretion caused by pancreatic β -cell dysfunction (type I) or resistance to the action of insulin in the liver and muscles (type II), or both. Type I (also known as insulin-dependent) usually starts before the age of 30, and the patient is totally dependent on the supply of

insulin. Type II (also known as non-insulin-dependent) develops later in life, and it can be controlled by diet modification in combination with hypoglycemic agents. It is the most common disease of the endocrine system, characterized by alteration in the metabolism of carbohydrates, lipids, and proteins.^[1] The general signs and symptoms of diabetes are polyuria, polydipsia, polyphagia, weakness, fatigue, and pruritus.^[2]

The incidence and prevalence of diabetes mellitus are intensifying; the global diabetes prevalence in patients with the age range 20–79 years in 2021 was estimated to be 10.5% (536.6 million people).^[3] According to the International Diabetes Federation (IDF) report, the number of people with diabetes was

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462 million in 2017 and is expected to increase to 642 million in 2040.^[4] The prevalence of diabetes differs depending on geography, age, gender, and race/ethnicity status. Assessing the prevalence of diabetes mellitus can be complicated by changes in population demographics over time and changing diagnostic criteria.^[3] The World Health Organization (WHO) has reported that Saudi Arabia is considered the second highest in the Middle East and is the seventh in the rate of diabetes among the world. It is predicted that around 7 million of the Saudi population are diabetic and almost about 3 million have pre-diabetes.^[5]

Diabetes mellitus (DM) leads to different complications in different body systems including the oral cavity. Consequently, blood glucose control is very critical. The potential mechanisms that may be related to oral complications of diabetes include impaired neutrophil function, increased collagenase activity, inhibit collagen synthesis, microangiopathy, and neuropathy.^[6] There are multiple studies reported conclusive evidence that the prevalence, severity, and progression of oral and periodontal disease are significantly increased in patients with diabetes.^[7-9] The most common oral feature of diabetes is decreased salivary flow that may or may not include symptoms of a burning sensation in the mouth or tongue and enlargement of the parotid salivary glands. Gingivitis and periodontitis are common oral health complications associated with diabetes.^[10] Periodontal diseases have been recorded with increased incidence and prevalence in patients with type 1 and 2 diabetes.^[11]

Oral fungal and bacterial infections have also been reported in patients with diabetes.^[12] Some oral changes such as coated tongue, geographic tongue, recurrent aphthous stomatitis, and lichen planus can be associated with diabetes. The pathogenesis of these oral changes in diabetic patients is still controversial, but inadequate control of diabetes, immuno-logical alteration, microcirculatory alterations with decline of blood supply, xerostomia, alteration in salivary express and composition, and smoking have been advocated.^[6]

The aim of this study is to identify the prevalence of oral lesions and the periodontal disease of diabetic Saudi female patients attending Princess Nourah Bint Abdulrahman University (PNU) during the last 5 years and to correlate these parameters.

Rationale and significance: To emphasize the relation between oral lesions and/or periodontal status and diabetes as a systemic risk factor.

Objectives

1. To evaluate the prevalence of different oral lesions among diabetic Saudi female patients.
2. To determine the association between periodontal status and diabetes in Saudi female patients.

Materials and Methods

A retrospective study was performed by review the records of all PNU patients recruited to the outpatient clinic in Faculty

of Dentistry, PNU University, during the last 5 years (2017 to 2022).

Inclusion criteria: Diabetic type II Saudi female patients of age ranging from 20 to 40 years old.

Exclusion criteria: 1—pregnant and lactating females, 2—patients with immunosuppressive diseases, 3—smoking and alcohol consumption, 4—tobacco and betel nut, 5—any systemic diseases other than diabetes, and 6—type I diabetic patients.

All selected patient records had written consent obtained from the patient before receiving any treatments according to PNU rules. Data collection sheets were used to gather demographic data, education level, medical and dental history, and full extra and intra-oral examination. Data on the duration of disease, glycosylated hemoglobin (HbA1c) values, any major complications, and type of diabetes therapy were retrieved from medical records.

Statistical analysis

All data were collected, tabulated, and statistically analyzed using SPSS version 25 (Armonk, NY: IBM Corp. USA). Descriptive statistics are presented as the number (n) and percentage (%), mean, standard deviation (SD), and inferential statistics were performed using Pearson Chi-square tests were used for the association between oral lesions with patients' age and periodontitis. Finally, logistic regression was performed to find the effect of patients' age and periodontitis on oral lesion. For all tests, probability (p) was categorized as follows: non-significant if ≥ 0.05 ; significant if < 0.05 ; highly significant if < 0.01 ; and very highly significant if < 0.001 .

Results

Two hundred and twenty-six patients were included in the study. 72.1% of the total patients (163 patients) were 36 to 40 years old, 13.7% were ranging from 20 to 25, 8.8% were from 31 to 35, while the least percentage (5.3%) were ranging from 26 to 30 years.

81.86% of the total sample size (185 patients) were diagnosed with periodontitis, while 18.14% (41 patients) had a healthy periodontal status.

Patients diagnosed with periodontitis showed the following severity, 36.8% Stage I periodontitis with horizontal bone loss $< 15\%$ [Figure 1], 20.5% Stage II periodontitis with horizontal bone loss ranging between 15 and 33% [Figure 2], the highest percentage 42.7% as Stage III periodontitis with horizontal bone loss $> 33\%$ [Figure 3], and no patients were detected with Stage IV periodontitis [Table 1].

Descriptive statistics

The highest percentage for oral lesions in our total sample was traumatic ulcers 10.2%, while the least was fibroma 2.7% of the



Figure 1: Panoramic and bite-wings radiographs for Stage I periodontitis case

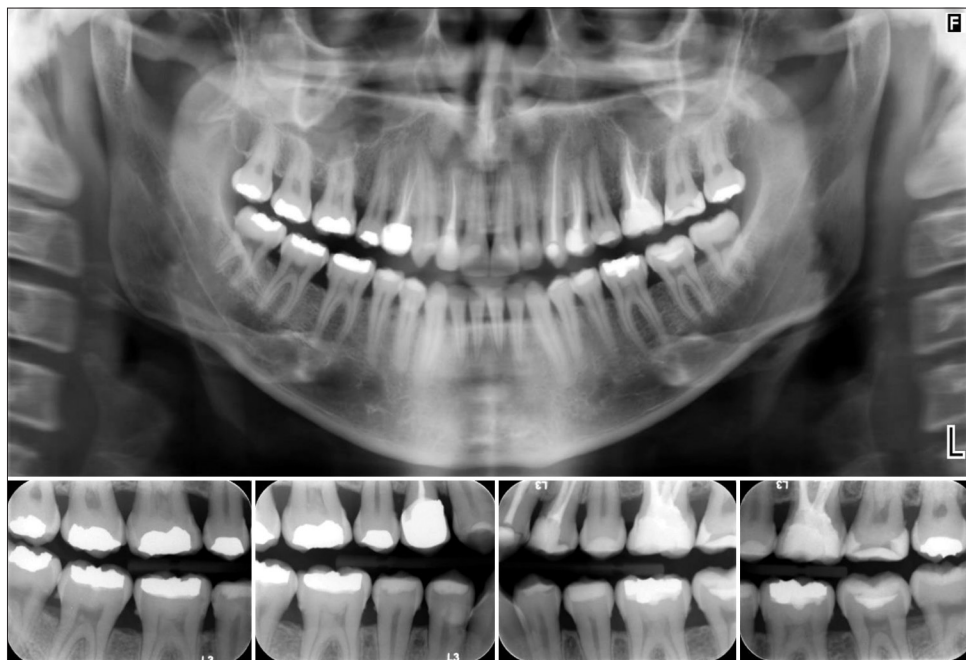


Figure 2: Panoramic and bite-wings radiographs for Stage II periodontitis case

total patients. All detected oral lesions with their percentages are presented in Table 2 and Figure 4.

Correlation between periodontitis group and those with oral lesions

The patients who had periodontitis (N = 185) were classified into two groups: group 1 (Yes) and group 2 (No). Group 1: the patients who had oral lesion and Group 2: the patients who had no oral lesion. Results showed that 38.9% of the periodontitis patients suffered also from oral lesions [Table 3 and Figure 5].

Association between severity of periodontitis and oral lesion

Pearson Chi-square results show that there is an association between periodontitis and oral lesion; P -value < 0.05 . The patients diagnosed with Stage III periodontitis showed the strongest association to oral lesion. Among the patients suffering from Stage III periodontitis, nearly half of them (49.4%) showed oral lesions, while 28.9% of the patients suffering from Stage II periodontitis showed oral lesions. Patients diagnosed with Stage I periodontitis patients showed 32.4% with oral lesions [Table 4 and Figure 6].

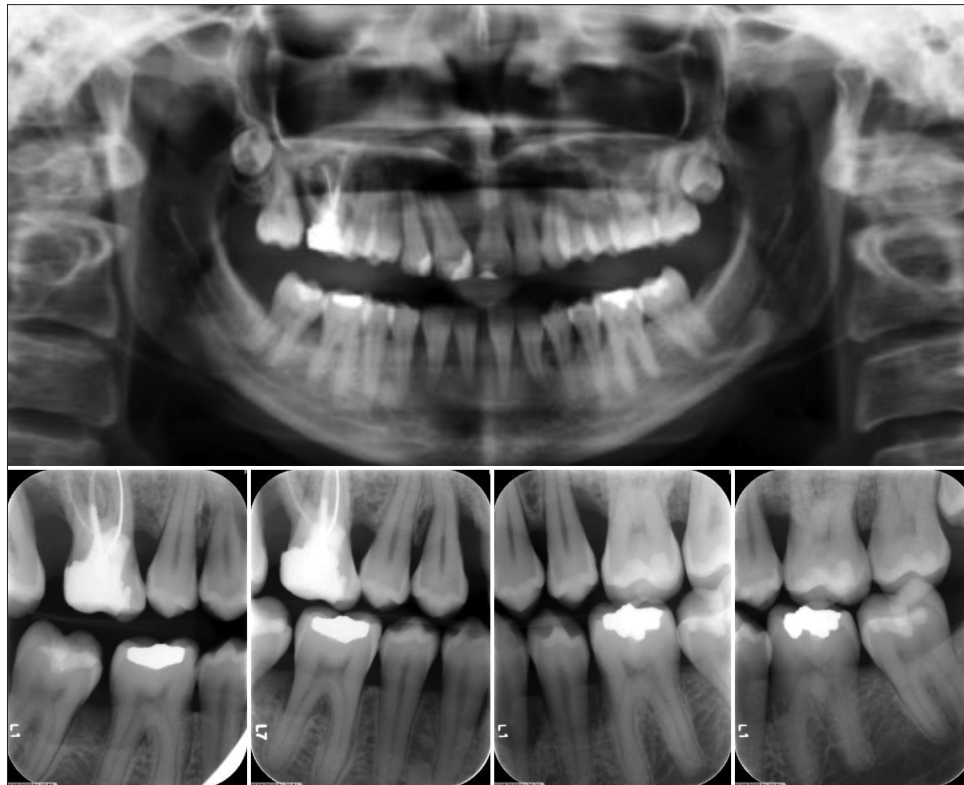


Figure 3: Panoramic and bite-wings radiographs for Stage III periodontitis case

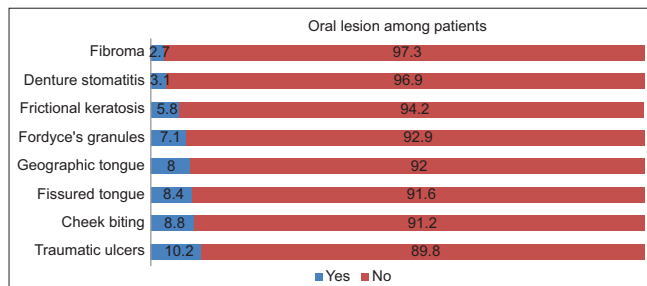


Figure 4: Oral lesion among patients

Association between age and oral lesions

Pearson Chi-square results showed that there is no association between patients' age and oral lesion; P value >0.05 . Although no significant relation, the older patients' (36–40) had the highest oral lesion percentage with 40.7% [Table 5 and Figure 7].

Logistic regression results

Logistic regression was performed to find the effect of age and periodontitis on oral lesions. Periodontitis had a significant effect on oral lesions ($P < 0.05$) for each increase in the level of periodontitis; the oral lesion will increase, while age had no significant effect on oral lesion ($P > 0.05$) [Table 6].

Discussion

Diabetes mellitus is a group of metabolic disorders manifested by abnormally high levels of glucose in the blood. There are many

Table 1: Distribution of the studied sample by age and periodontitis

	<i>n</i>	%
Age groups (226)		
20–25	31	13.7
26–30	12	5.3
31–35	20	8.8
36–40	163	72.1
Periodontitis (185)		
Stage I	68	36.8
Stage II	38	20.5
Stage III	79	42.7
Stage IV	0	0

reports in the literature concerning the influence of diabetes on oral health.^[6] Therefore, this study was conducted to assess the percentage of different oral lesions and periodontal disease among diabetic Saudi female patients at Princess Nourah Bint Abdulrahman University (PNU) during the last 5 years.

In the present study, the oldest age group ranging from 36 to 40 years old showed the highest percentage (72.1%) within the studied sample.

This finding is in accordance with Corriere *et al.*^[13] who reported that due to the likely prolonged duration of the disease, vulnerable older persons with diabetes may be disproportionately more susceptible to microvascular and macrovascular problems. Due to aging and co-occurring diseases, these older patients with

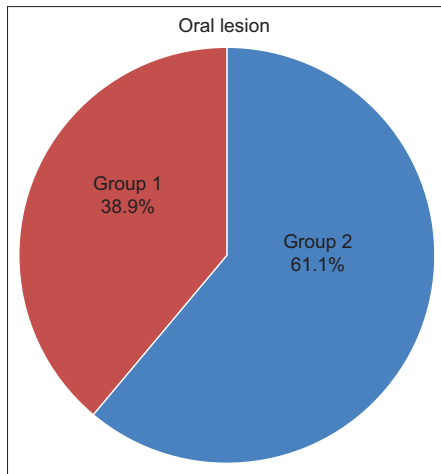


Figure 5: Oral lesion among periodontitis' patients

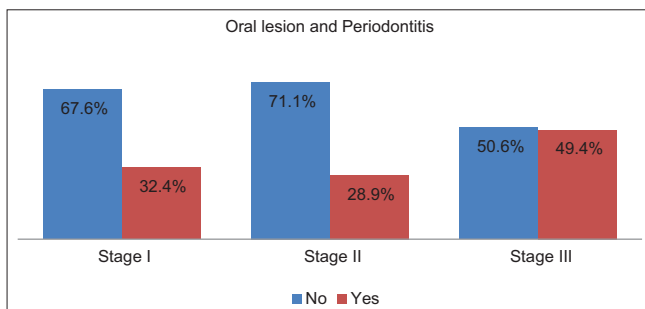


Figure 6: Association between Severity of Periodontitis and Oral Lesion

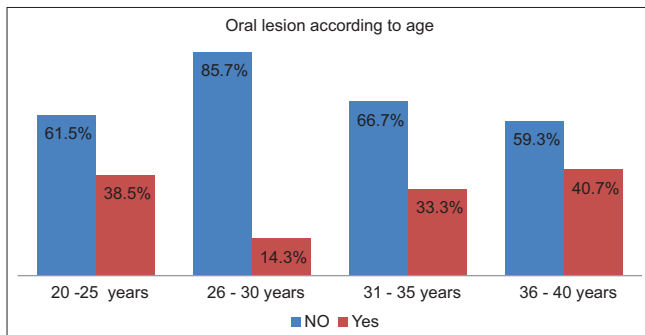


Figure 7: Oral lesion according to age

impaired glucose metabolism may have decreased end organ reserve. This could lead to end organ disease that manifests more suddenly and severely than it does in patients who are younger.

In the current study, the most common lesions in the oral mucosa were traumatic ulcers with a percentage of 10.2%. These findings agreed with Silva *et al.*^[14] who reported that ulcerative lesions including traumatic and aphthous ulcers are the most common oral lesions in diabetic patients. The second most frequent type of lesions found in this study was cheek biting 8.8%, and the third lesion is fissured tongue 8.4%. An association between diabetes and fissured tongue has been reported in previous studies by de Souza Bastos *et al.*,^[15] Dikshit *et al.*,^[16] and Mohsin *et al.*^[17] The present study showed a number of specific oral

Table 2: Oral lesion among patients (n=226)

	No		Yes	
	%	n	%	n
Fordyce's granules	92.9	210	7.1	16
Geographic tongue	92.0	208	8.0	18
Denture stomatitis	96.9	219	3.1	7
Frictional keratosis	94.2	213	5.8	13
Cheek biting	91.2	206	8.8	20
Fibroma	97.3	220	2.7	6
Traumatic ulcers	89.8	203	10.2	23
Fissured tongue	91.6	207	8.4	19

Table 3: Oral lesion among periodontitis' patients (n=185)

	n	%
Group 1	72	38.9
Group 2	113	61.1
Total	185	100.0

Table 4: Association between severity of periodontitis and oral lesion

	Oral Lesion		Total
	No	Yes	
Clinical attachment loss (Periodontitis)			
Stage I			
Count	46	22	68
% (periodontitis)	67.6%	32.4%	100.0%
Stage II			
Count	27	11	38
% (periodontitis)	71.1%	28.9%	100.0%
Stage III			
Count	40	39	79
% (periodontitis)	50.6%	49.4%	100.0%
Total			
Count	113	72	185
% (periodontitis)	61.1%	38.9%	100.0%

Pearson Chi-square=6.450, P=0.040<0.05

mucosal alterations associated with type 2 DM, which included Fordyce's granules, geographic tongue, denture stomatitis, frictional keratosis, cheek biting, and fibroma in agreement with previous studies.^[10,18]

Regarding age, the current study showed no significant difference between the percentages of incidence of oral lesions in different age groups. These findings were in accordance with previous studies^[10,19,20] though, the current results revealed that the highest percentage of oral lesions was detected in the highest age group (36–40) equal to 40.7%, while the lowest was detected in (26–30) and was equal to 14%.

Periodontitis is stated to be the sixth complication of diabetes. The majority of well-controlled studies revealed that diabetics had a higher prevalence and severity of periodontal disease than non-diabetics, along with similar local irritants such as greater loss of attachment, greater alveolar bone loss, increased bleeding

Table 5: Association between patients' age and oral lesion

	Oral Lesion		Total
	No	Yes	
Age			
20–25 years			
Count	8	5	13
% within age	61.5%	38.5%	100.0%
26–30 years			
Count	6	1	7
% within age	85.7%	14.3%	100.0%
31–35 years			
Count	10	5	15
% within age	66.7%	33.3%	100.0%
36–40 years			
Count	89	61	150
% within age	59.3%	40.7%	100.0%
Total			
Count	113	72	185
% within age	61.1%	38.9%	100.0%

Pearson Chi-square=2.178, P=0.536>0.05

Table 6: Logistic regression results for oral lesion

	Oral Lesion					P	Exp (B) (CI 95%) for Exp (B)
	No		Yes		Total		
	n	%	n	%	n %		
Age							
20–25 years	8	61.54	5	38.46	13	100	0.433 1.156 (0.805–1.659)
26–30 years	6	85.71	1	14.29	7	100	
31–35 years	10	66.67	5	33.33	15	100	
36–40 years	89	59.33	61	40.67	150	100	
Periodontitis							
Stage I	46	67.65	22	32.35	68	100	0.032* 1.450 (1.032–2.038)
Stage II	27	71.05	11	28.95	38	100	
Stage III	40	50.63	39	49.37	79	100	

*Significant at the level 0.05

upon probing, and increased tooth mobility leading to tooth loss.^[21] This is due to the underlying structural alterations in the diabetic periodontium which include tissue degradation and the presence of calcified bodies in and around tiny gingiva blood arteries.^[22] In the current study, a high percentage (42.7%) of diabetic patients with periodontitis showed at least 5-mm clinical attachment loss and more than 33% alveolar bone resorption, and thus, they were categorized as Stage III periodontitis. This is in concurrence with various studies which support a higher incidence and severity of periodontitis in patients with diabetes mellitus.^[23-25]

In the present study, the authors performed a correlation between periodontitis patients in the study sample to those with oral lesions. Oral lesions were observed in 38.9% of the periodontitis patients. Most of these lesions were detected in patients with severe periodontitis (nearly 50%) which demonstrates that periodontitis had a significant effect on oral lesions ($P < 0.05$) for each increase in the level of periodontitis as proved by the logistic regression performed in the current study. These results confirm Kudiyirickal MG *et al.*^[26] findings which summarize the

key elements of the pathophysiological connection between diabetes, periodontal disease, and oral lesions. It has been established that diabetes and periodontal disease have a reciprocal link and that both conditions might result in other oral illnesses. The pathophysiology of diabetes complications involves two processes. In the beginning, the polyol pathway changes glucose into the enzyme sorbitol by aldose reductase, which results in tissue damage and a variety of additional diabetes problems. In addition to altering structures and functions, the development of advanced glycosylation end products (AGE), which is brought on by the binding of glucose to proteins, lipids, and nucleic acids, also results in its accumulation in particular organs, which leads to many complications.^[27]

Conclusion

In the present study, the diabetic sample showed a high percentage of both oral lesions and periodontal disease, especially in the high age group. A strong correlation existed between patients with Stage III periodontitis and oral lesions. Thus, the effect of diabetes on the periodontium comprises a major issue. Extreme consideration should be directed to prevent and manage diabetic oral complications for dental practitioners.

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Conflicts of interest

There are no conflicts of interest.

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