Original Research Article

Periodontal status of type II diabetic and non-diabetic individuals in Lagos, Nigeria: A comparative study

Abstract

Background: Diabetes mellitus is a systemic disease that exerts a general effect on the body including the oral cavity and it can influence how periodontal diseases are expressed.

Objective: The aim of the study was to assess and compare the prevalence, periodontal status of 25 to 85year old diabetic and non-diabetic population in Lagos State.

Methods: A cross sectional comparative study was conducted among >25 years old, 150 diabetic and 150 non -diabetic subjects in Lagos state. Relevant and required information regarding demographic characteristics and diabetic status was obtained. Community Periodontal Index (CPI) and Loss of Attachment Index (LOA) were used to assess the periodontal status. Chi-Square test and T-test were used for statistical analysis and statistical significance set at $p \leq 0.05$.

Results: There was a high significant association between diabetic status and periodontal status ($p<0.001$). Severity of periodontal disease (Community Periodontal Index codes 3 and '4' and Loss of attachment codes '1, 2, 3') was high among diabetics compared to non-diabetics ($p<0.001$).

Conclusion: The prevalence of periodontal disease is high, and periodontal status is poor with increased severity in diabetics compared to non-diabetics. There is the need to educate diabetics on assessing preventive oral care regularly so as to improve their quality of life.

Keywords: Prevalence, periodontal status, diabetics, non-diabetics

1. INTRODUCTION

Periodontal disease is the most prevalent oral complication encountered among Diabetics and has been labeled the "Sixth complication of Diabetes Mellitus". [1] Periodontitis is a chronic inflammatory disease of the supporting tissues of the teeth caused by specific microorganisms or groups of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with pocket formation, recession, or both, eventually leading to tooth loss. [2]

Currently, diabetes ranks fourth as a cause of death in most developed countries and has reached epidemic proportions in many developing countries, [3] It is a metabolic disorder characterized by hyperglycemia, resulting in damage to the insulin secretion system, the actions of insulin, or both.[4] Periodontitis is seen in both type 1 and type 2 diabetics. [5] It has been reported that about 90%–95% of all cases of diabetes mellitus are of the Type 2, or noninsulin-dependent diabetes. [6]

Several studies reported that patients with uncontrolled diabetes have an increased risk and severity of periodontal diseases, [7, 8, 9] however, only a few studies compared the periodontal diseases' occurrence and severity among patients with diabetes mellitus with that of non-diabetics

Hence, this study was done to comprehensively assess and compare the prevalence and severity of periodontal disease status of diabetic and non-diabetic in Lagos, Nigeria.

2. MATERIALS AND METHODS

The present study was a comparative study conducted to assess and compare the periodontal status of 150 diabetic and 150 non- diabetic subjects residing in Lagos state, Nigeria. Patients attending the diabetic clinic and who fulfilled the inclusion criteria were randomly selected for the study. Non-diabetics (control group) were selected from the individuals accompanying the patients (i.e., attendants, relatives, friends, spouses, etc.) and were matched by age and sex. The non-diabetics were tested for random blood sugar level using a glucometer (AcuCheck Active).

Individuals with type 2 diabetes (on medication or diagnosed on fasting blood glucose ≥126 mg/dl), aged >25years were included for the diabetic group and individuals without diabetes aged >25years were included in the non-diabetic group

Participants who had <10 teeth currently or those who had undergone any periodontal treatment within the past 1 year were excluded from the study. Patients with other immune compromising conditions like HIV and patients on immunosuppressive drugs were excluded from this study.
A self-administered questionnaire was used to obtain information regarding their demographic details such as age, sex, level of education, occupation oral hygiene practices and periodontal status. A clinical examination was done under natural daylight using mouth mirror and explorer. Oral hygiene status was assessed using Simplified Oral Hygiene Index by Loe and Stilness. [10] The periodontal status was assessed by the Community Periodontal Index (CPI), [11] using

Community Periodontal Index Treatment Need (CPITN) C probes and loss of attachment calculated by adding periodontal pocket depth and gingival recession measurements.

Statistical analysis was done using SPSS (Statistical Package for Social Sciences) Statistics for Windows, Version 20. SPSS Inc., Chicago. Statistical tests employed were Chi-square test and T-test. Significance level was fixed at $p \leq 0.05$

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3. RESULTS

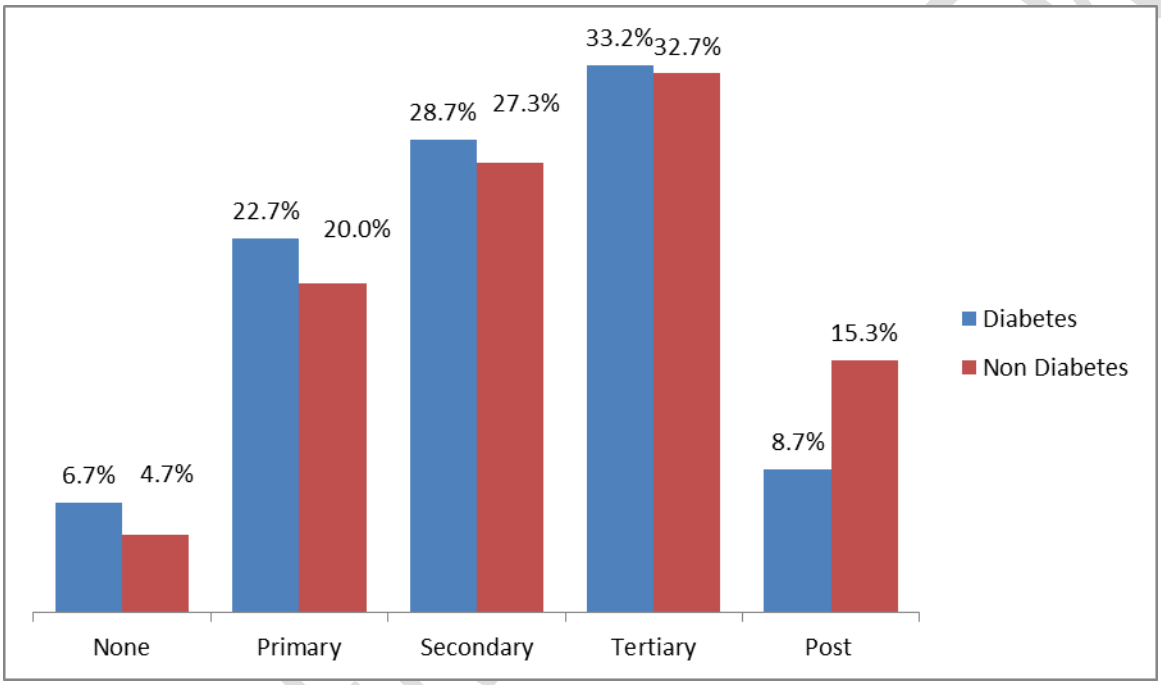
The study group consist of 300 participants, (150 Type 2 diabetics and 150 non-diabetics), age ranged between 25–85 years. There were70 males and 80 females in both the diabetic and non-diabetic groups. More non-diabetics 18.7% compared to diabetics 11.3% were in 25-45 age group while more diabetics 38.6% than non-diabetics 32.0% were in the 66-86 age group [Table 1].

Table 1 Distribution of study participants according to age and gender

Age Groups	Diabetics n%			Non-Diabetics		
	Female N (%)	Male N (%)	Total N (%)	Female N (%)	Male N (%)	Total N (%)
25- 45	12 (15.0)	5 (7.1)	17 (11.3)	16 (20.0)	12 (17.1)	28(18.7)
46-65	49 (50.0)	35 (50.0)	75 (50.0)	35(43.8)	39 (55.7)	74 (49.3)
66-85	28 (35.0)	30 (42.9)	58 (38.6)	29 (36.2)	19 (27.2)	48 (32.0)
Total	80 (100)	70 (100)	150 (100)	80 (100)	70 (100)	150(100)

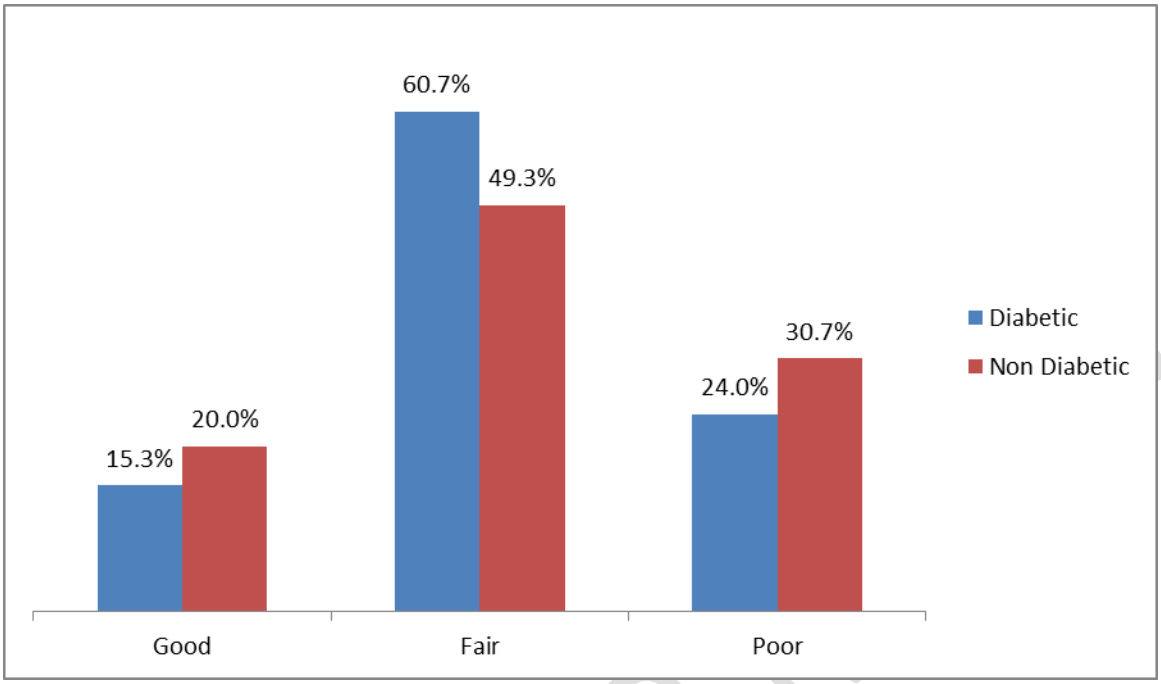
Figure 1 shows the educational status of the participants, more diabetics 6.7% compared to 4.7% non-diabetics had no formal education about equal number of diabetic 28.7% and 27.3% non-diabetic participants had secondary education. More 48.0% of non-diabetics than 41.9% of diabetics had tertiary education.

Figure 1. Educational Status of Participants



Among the diabetics; 15.3% had good oral hygiene, and 24.0% had poor oral hygiene. Among non-diabetics; 20.0% had good, and 30.7% had poor oral hygiene. [Figure 2]

Figure 2. Oral hygiene status of participants



The prevalence of periodontal disease was higher in diabetic patients 96.7% than in the non-diabetics 93.3%. The prevalence of CPI score of 2 (calculus) was higher in the non-diabetes 60.0% than 29.3% in the diabetics. The difference was statistically significant (P = 0.000). Approximately 37.4% and 23.3% of diabetics had periodontal pockets measuring 4-5mm and >6mm respectively, while 10.8% and 14% of non-diabetics had periodontal pocket measuring 4-5mm and >6mm. P-value was 0.00 and 0.038 respectively. [Table 2].

Table 2. Participants' periodontal status

CPI scores	Diabetic N (%)	Non- diabetic N (%)	Total N (%)	P value
Healthy (0)	5(3.3)	10(6.7)	15(5.0)	0.185
Bleeding (1)	10(6.7)	13(8.7)	23(7.7)	0.658

Calculus	(2)	44(29.3)	90(60.0)	134(44.7)	0.000*
Periodontal pocket 4-5mm	(3)	56(37.4)	16(10.8)	72(24.0)	0.000*
Periodontal pocket >6mm	(4)	35(23.3)	21(14.0)	56(18.6)	0.038*

*<0.05

The mean number of healthy sextants (CPI Code 0) affected per subject was more in non-diabetics than diabetics. The difference between mean number of sextants scoring calculus between diabetic and non-diabetic group was statistically highly significant ($p<0.0004$).

Mean number of sextants of pockets with a depth of 4-5mm were significantly higher in diabetic group when compared to non-diabetic group ($p<0.0001$). [Table 3].

Table 3. Mean number of sextants affected by different periodontal conditions among the study participants

CPI scores		Mean number of sextants		
		Diabetic M ±SD	Non-Diabetic M ±SD	P value
Healthy	(0)	1.11 ± 1.49	1.19 ± 1.84	0.6100
Bleeding	(1)	0.93 ± 1.57	0.83 ± 1.56	0.3864
Calculus	(2)	2.43 ± 2.02	3.42 ± 2.37	0.0004*
Periodontal pockets 4-5mm	(3)	1.11 ±1.33	0.33 ± 0.92	0.0001*
Periodontal pockets >6mm	(4)	0.33 ±0.70	0.23 ± 0.68	0.1810
Excluded	(X)	0.09 ±0.33	0.00 0.00	

M± SD= mean and standard deviation

About 36.7% of diabetics and 82.0% of non-diabetics had LOA score of 0 (0–3 mm). The differences were statistically very highly significant (P< 0.0001). LOA scores 1, 2, 3 was higher in diabetes than non-diabetes and the differences were significant. [Table 4].

Table 4. Loss of Attachment (LOA) scores) among the study participants

LOA scores		Diabetic N (%)	Non-Diabetic N (%)	Total N (%)	P value
0-3mm	(0)	55(36.7)	123(82.0)	178(59.3)	0.000*
4-5mm	(1)	45(30.0)	10(6.7)	55(18.3)	0.000*
6-8mm	(2)	44(29.3)	12(8.0)	56(18.7)	0.000*
9-11mm	(3)	6(4.0)	5(3.3)	11(3.7)	0.759
>12mm	(4)	0(0)	0(0)	0(0)	-

*<0.05

The mean number of sextants per person affected with loss of attachment code '0' was significantly more in the non-diabetic group than diabetic group (p<0.001). Mean number of sextants affected by loss of attachment code '1' was significantly more in diabetic group when compared to non-diabetic group (P<0.001). The difference between mean number of sextants affected by loss of attachment code '2' among diabetic and non-diabetic group was highly significant (p<0.001). Difference between mean number of sextants affected by loss of attachment code '3' between diabetics and non-diabetics was not statistically significant (p=0.415). [Table 5].

Table 5. Mean number of sextants affected by different LOA scores among the study participants

LOA scores		Mean number of sextants		
		Diabetic M±SD	Non-Diabetic M±SD	P value
0-3mm	(0)	4.15 ± 1.76	5.69± 0.85	0.0001*
4-5mm	(1)	1.10 ±1.30	0.14± 0.46	0.0001*
6-8mm	(2)	0.61 ±1.07	0.14± 0.54	0.0001*
9-11mm	(3)	0.05± 0.24	0.03± 0.18	0.415
>12mm	(4)	0.00± 0.00	0.00± 0.00	-
Excluded sextant X		0.09 ± 0.33	0.00± 0.00	0.0009

4. DISCUSSION

In this study, the prevalence of periodontal disease was higher among the diabetics than the non-diabetic, and this is similar to other studies done among diabetics and non- diabetics. [2, 7, 12-14]

In the present study, the prevalence of CPI codes 0, 1 and 2 was significantly ($P < 0.05$) higher among the non-diabetics compared to the participants with diabetes mellitus. This was similar to the studies done by Oberoi et al among diabetics and non-diabetics in Bengaluru, India, and Kesavan et al in Chennai, India. [7, 12]

This study showed a higher prevalence of gingivitis of 68.7% among the non-diabetics compared to 30.6% in the diabetics as indicated by CPITN codes 1 and 2.

CPI code of 3 and 4 was significantly higher with 60.7% among the diabetics when compared to the 14.8% in the non-diabetics. These findings were in agreement with other studies, [2, 7, 12-

14] and Ogunbodede et al [15] also reported that CPI code 4 was found to be higher in diabetics than among the non-diabetics.

Looking at the severity of periodontal disease the mean number of healthy sextants and sextants with calculus were more in non-diabetics compared to the diabetics, and this is similar to other studies. [7, 12, 16]

Mean number of sextants with bleeding on probing on the other hand was more common among the diabetics compared to non-diabetics, and is similar to the study done by Kesavan et al.[12] .

The mean CPI codes 3 and 4 (1.11 ±1.33 and 0.33 ±0.70 respectively) were significantly ($P < 0.05$) more among the patients with diabetes mellitus than the non-diabetics. This was similar to the reports of the studies of Oberio et al, [7] Kesavan et al, [12] and Yavagal et al, [16] which agree that increased severity and prevalence of destructive periodontal disease is more in diabetic individuals than in non-diabetic ones

The mean number of excluded sextants per person was found to be significantly higher in diabetics than in non-diabetics. Similar findings were observed in other studies. [12, 16] This finding might be attributed to increase in the severity of the destructive periodontitis culminating in loss of teeth. [16] [19]

In our study, diabetics (1.48±2.29) had more number and mean of missing teeth compared with non-diabetics (0.99±1.50), and is similar to the studies by Oberio et al. [7] and Ikimi et al. [17] This is not surprising as Apoova et al reported that tooth mortality or the number of missing teeth has been a good indicator of past periodontal disease. [18]

Similar to other studies, participants, with no LOA (code 0) and the mean number of sextants with LOA code of 0 were more among non-diabetics when compared to diabetics.[12,13,16]

The distribution of LOA code of 1 (4–5 mm) 2, 3, 4, X and the mean number of sextants with LOA codes 1, 2, 3 was higher among the diabetics. This study shows that the prevalence and severity of loss of attachment was more among diabetics than non-diabetics. This is comparable to the reports from studies done by Kesavan et al, [12] Pavani et al, [13] and Yavagal et al. [16]

The oral hygiene status was better among non- diabetics when compared to diabetics. Only 15.3% of diabetics had good oral hygiene compared to 20.0 % among the non-diabetics. The difference was highly significant. This was similar to the study of Kesavan et al. [12] The oral hygiene status was poor in both the diabetics and non-diabetic participants. Previous researches have already established that poor oral hygiene increases the risk of periodontitis between two to five times among those with diabetes. [19, 20] Oral hygiene maintenance is an important preventive measure that needs to be emphasized universally in order to reduce the burden of periodontal disease among the periodontics. [12,13]

Thaper et al, [21] stated that DM affects all periodontal parameters, including bleeding on probing (BOP), periodontal pocket depth (PPD), clinical attachment level (CAL), and tooth loss. This was corroborated by the findings of the present research, especially regarding the diabetic participants who presented with higher prevalence and severity of periodontal disease, more sextants with gingivitis and periodontitis, lower number of sextants with periodontal health, higher rates of tooth loss and lower levels of oral hygiene status when compared to non-diabetic patients.

This study was conducted in only one centre and the findings may not be generalized to all the diabetic mellitus patients in Lagos, Nigerian.

CONCLUSION

Prevalence and severity of periodontal disease was higher in the diabetics when compared to non-diabetic. More diabetic participants were affected by severe periodontal disease manifested as deep periodontal pockets, excluded sextants and loss of attachment while among non-diabetics, the periodontal status showed high deposits of calculus**.** Incidentally, the oral hygiene status was poor in both the diabetic and non-diabetic participants in this study.

CONSENT

The purpose and nature of the study was explained to the participants. After which an informed consent was obtained from every subject participating in the study

ETHICAL APPROVAL

Ethical clearance was obtained from the Research and Ethics Committee of Lagos State University Teaching Hospital. LASUTH, Ikeja. Lagos.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

DISCLAIMER:

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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