Periodontal Status and Oral Health Related Quality of Life among Diabetic Patients in

Lagos State University Teaching Hospital, Ikeja

Oyapero A[1] Adeniyi AA[1] Ogunbanjo BO[2] Ogbera AO[3]

[1]Preventive Unit,
Dental Department,
Lagos State University Teaching Hospital,
Ikeja, Lagos

[2]Orthodontic Unit,
Dental Department,
Lagos State University Teaching Hospital,
Ikeja, Lagos

[3]Endocrinology Unit
Dept. of Medicine,
Lagos State University Teaching Hospital,
Ikeja, Lagos

Correspondence: Dr. A. Oyapero
Email: fola_ba@yahoo.com

Abstract

Objectives: The aim of the study was to evaluate the periodontal status of diabetic patients receiving care at the Lagos State University Teaching Hospital (LASUTH), Ikeja. In addition, an assessment of their oral health related quality of life was done using the Oral Health Impact Profile (OHIP)

Materials and methods: A cross sectional survey was conducted at the LASUTH Diabetic Clinic with an interviewer administered questionnaire. The impact of oral health on quality of life was measured using the OHIP-14.

Results: Using the OHIP-14 scale the respondents opined that oral health status had an impact on patients' lives by causing pain or handicap. There was a correlation between the glycaemic control and periodontal status of the respondents. A total of 53 persons (43.3%) reported that their lives were less satisfying because of problems with their teeth or dentures while 49 (40.2%) perceived that their poor oral health status affected them in their daily life functions.

Conclusions: The oral health status has an impact on the quality of life in patients with diabetes. These findings underscore the importance of proactive dental management of the oral manifestations of diabetes.

Key words: Oral Health Impact Profile (OHIP-14), Community Periodontal Index of Treatment Needs (CPITN), Oral Hygiene Index-Simplex (OHI-S), periodontal status, diabetic patients, quality of life.

Introduction

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Presently, diabetes is classified into four major classes: **Type 1 diabetes** (insulin-dependent diabetes mellitus -IDDM); **Type 2 diabetes** (non-insulin-dependent diabetes mellitus -NIDDM); **Gestational diabetes** (a form of glucose intolerance diagnosed during pregnancy) and **other types** of diabetes caused by specific conditions such as surgery, medications, infections, pancreatic disease and other illnesses.[1] The prevalence of diabetes varies in each country. In the United States of America, it is 7.8%[2] while the prevalence in Nigeria ranges from 2.2% to 7.9%.[3,4] The chronic hyperglycemia of diabetes is associated with long-term damage of various organs, including the eyes, kidneys, nerves, heart, blood vessels and the mouth. In the oral cavity, complications of diabetes mellitus include xerostomia, increased susceptibility of oral tissues to trauma, opportunistic infections (e.g., candidiasis) and periodontal disease.[5]

Research shows a higher prevalence and extent of periodontal pockets in uncontrolled diabetic patients.[6] Periodontal disease often contributes to morbidity because of the decreased oral function and increased risk of tooth loss and may thus have an impact on the quality of life. Symptoms of periodontal diseases are generally insidious, but as the destructive inflammation progresses, gingival discomfort or tenderness, tooth mobility, gingival abscesses, and/or tooth loss often occur.[7] Recently, periodontal disease has been recognized as one of the complication of diabetes mellitus.[8]

Patients with uncontrolled or poorly controlled diabetes are susceptible to periodontal diseases because they have a poor immune response from impaired polymorphonuclear

leukocyte function. They also have enhanced expression of inflammatory mediators such as cytokines and an increased production of oxygen free radicals.[9] In addition, periodontal disease in diabetics may affect glycaemic control because of the production of pro-inflammatory mediators which mediate insulin resistance and reduce insulin action.

Research shows that periodontal treatment directed at elimination of pathogenic species and controlling inflammation may have a positive impact on glycaemic control.[10] Periodontal treatment aimed at improving insulin sensitivity in poorly controlled diabetic patients, resulted in reduction of periodontal inflammation. Thus, prevention of periodontal diseases and control of established periodontal diseases should be considered an integral part of diabetes control.[11] Furthermore, a number of studies are beginning to show that oral disorders can have a significant impact on the functional, social and psychological well-being of older adults.[12] The level of awareness of periodontal disease is quite low amongst Nigerian patients.[13] The greatest barrier to the dental clinic attendance of diabetic patients is lack of perceived need for dental care.[14] The aim of this study therefore, was to evaluate the periodontal status of diabetic patients receiving care at the Lagos State University Teaching Hospital (LASUTH) and their oral health related quality of life using the Oral Health Impact Profile (OHIP).[15] This would be useful in assessing the need for routine oral screening among the study population.

Materials and Methods

This was a cross-sectional study carried out in the Diabetic Clinic at the Lagos State University Teaching Hospital.

Sample

The sample included all patients enrolled for care at the Diabetic Clinic at the Lagos State University Teaching Hospital during the period of study. The estimated sample size (n=84) was computed using results from a similar study in Brazil with a prevalence value of 13%.[14]

Sample selection.

A systematic sampling technique was employed in selecting the study participants. The inclusion criteria was patients who had been diagnosed to be diabetic and were attending the diabetic clinic in LASUTH as outpatients. Patients excluded from the study were those that were attending the diabetic clinic for the first time, patients that were simultaneously registered at the dental clinic and had commenced periodontal therapy and those that had significant oral pathology. The sampling frame was the list of clinic attendees for each data collection day. A total of 10 patients were examined during each Diabetic clinic from an appointment list of 30 patients. Every third patient was included in the survey and the starting point was determined by the simple random technique (balloting). The subjects were included in the study after explaining the nature of the study to them and obtaining their informed consent. A total of 122 participants were recruited into the study during the period January to April 2009. The respondents most recent fasting blood sugar and post-prandial readings was obtained as each patient registered in the clinic was required to have a new test done on each

appointment day. The glycated haemoglobin level (HbA1) could not be carried out in the patients due to the cost of the test.

Data collection

An interviewer administered questionnaire was employed in obtaining information on the respondents' socioeconomic status. Information obtained included gender, age, marital status, level of education and religion. The OHIP-14[16](an instrument for evaluating oral health related quality of life) form was used to evaluate the impact of periodontal disease on the respondents' quality of life. Thereafter, each patient received an oral examination in the clinic to determine their periodontal status using the OHI-S and Community Periodontal Index of Treatment Needs (CPITN) indices.[17]

The patients' fasting and 2-hr post-prandial blood sugar readings were obtained on the at the LASUTH diabetic clinic. The fasting blood sugar results were grouped into 3 categories: hypoglycemia (0-45mg/dl), acceptable sugar level (46-130mg/dl) and poorly controlled sugar level (131 and above). The 2 hours postprandial blood sugar was grouped into 2 categories: subjects within acceptable limits (<180mg/dl) and poorly controlled subjects (>180md/dl).

Data Analysis

Data were entered using Microsoft Excel software and analyzed using Epi-info version 3.5. Frequency distribution tables were generated for all variables and measures of central tendency was computed for numerical variables. The Chi squared test was used to determine the level of association between the variables. A 95% confidence interval and a 5% level of significance were adopted.

Results

Socio-Demographic Features

One hundred and twenty two persons previously diagnosed with diabetes and receiving care at the LASUTH were included in the study. The age range was between 24 and 80 years with a mean of 60.54±11.38 years. There were more females 92 (75.4%) in the study population, and almost half (49.2%) of the respondents were either illiterates or had only primary education (table 1).There was a significant relationship between the level of education and CPITN scores with a P value of 0.015.(Table 5). Type 2 diabetes was the commonest form observed among the respondents 118(96.7%). Only 48 (39.3%) respondents were diagnosed with diabetes less than 5 years prior to our study. More than three-quarters of the respondents were taking oral hypoglycemic agents while only 22 (%) respondents were taking insulin.

Glycaemic Control

The fasting blood sugar levels in the study population ranged from 46 to 447mg/dl. The mean FBS reading was 147.83±78.13 mg/dl. 56 (45.9%) of the study participants had poor glycaemic control with FBS more than 130mg/dl. The results of the two hour post prandial sugar level ranged from 57 to 557mg/dl and the mean post-prandial blood sugar reading was 183.08±103.30mg/dl. Only 38 (36.9%) respondents had abnormal results for the 2 hour tests.

Respondent's Perceptions of their Oral Health Related Quality of Life

Using the OHIP-14 scale the respondents opined that their oral health had a great impact on their quality of life. Pain was the most consistent complaint by most of the respondents with a mean OHIP-14 score of 7.07. This was followed by the interference of their dental needs with

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their life functions (Score 6.34), discomfort (Score 6.23), self consciousness (Score 5.39) , poor diet (Score 4.69) and alteration of taste (Score 4.20).Speech was the least reported function to have been impacted by the oral health of the respondents with a mean OHIP-14 score of 2.97. – (Table 2)

Oral Hygiene Status

The mean OHI score for the study participants was 1.52 ± 0.784. 40 (32.8%) respondents had a CPITN score of 1, 47 (38.5%) had a score of 2 while 35 (28.7%) had a CPITN score of 3 or 4.The mean oral hygiene score of respondents whose fasting blood sugar levels were within normal limits (score 1.45) was better than those of respondents with hyperglycemia.(score 1.61)-Table 3. However, the difference was not statistically significant ($p>0.05$).

Similarly, the mean OHI score of the respondents whose fasting blood sugar level was within normal limits after the two hour post-prandial reading was 1.43 while that of respondents with hyperglycaemia was 1.53. (Table 4) Respondents with normal sugar levels will require less advanced periodontal therapy than those whose sugar exceeded the normal limits Majority of the respondents will require regular oral hygiene instructions and prophylaxis (Score 1); sub-gingival scaling and correction of plaque retentive margins (Score 2); and comprehensive periodontal examination with appropriate periodontal treatment planning (Scores 3 and 4).There was no significant difference in the result obtained between 2 hour post prandial sugar level and CPITN score. (See Table 4.)

Discussion

Research has shown that diabetes is a risk factor for impaired oral health. Diabetic patients have higher rates of tooth loss, periodontal disease and soft-tissue diseases than non-diabetic patients.[7] In addition, epidemiological studies have consistently shown increased frequency, extent and severity of periodontitis among diabetic adults. Consequently, the per capita medical expenses, for patients with diabetes in the United States of America are known to be two to ten times higher than those of non-diabetic patients[18] while the estimate cost for diabetic care in Nigeria is 3 billion naira. [19]This validates the need for preventive oral interventions in the management of diabetic patients.

The results obtained from this study indicate a high need for periodontal therapy among diabetic patients receiving care in LASUTH. We observed worse periodontal status among patients with poorly controlled diabetes. Respondents with poor glycaemic control generally displayed higher CPITN and OHI scores and greater need for advanced periodontal treatment.(Tables 3 and 4). This is similar to the results obtained by other researchers. [20, 21] These differences were not statistically significant. Perhaps a larger sample size would have been able to show a statistically significant difference.

The level of education of the respondents was also found to correlate with their periodontal status with the highly educated respondents having lower CPITN scores.[22] (Table 5).

The highest proportion of respondents perceived that dental problems affected two major domains i.e. causing pain and/or handicap. Very few people reported an impact on their psychological and social well being. These results are probably a reflection of the cultural perception of dental problems in the Nigerian society. [23] Dental problems are viewed as less important and many people do not seek care unless they experience pain. Inability to function

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at work was not significantly impacted possibly because most of the subjects were elderly and in the retirement age bracket. Many of the respondents indicated poor compliance with their medication use, a factor which explains the high blood glucose levels reported. This is probably responsible for the high occurrence of periodontal problems in the study population. There was a strong association between the patients level of education and glycaemic control. Level of education and oral health education have been known to have a positive effect on patients periodontal status. [24]

Conclusion

Prevention of poor oral health and its sequelae—tooth loss, periodontal disease and soft-tissue disease—depends on education and health promotion strategies such as early diagnosis, proper oral hygiene measures, diet and rigorous glycaemic control measures. Regular dental examinations will benefit these patients as it would improve the likelihood of early diagnosis of oral disease. Medical and Dental practitioners have a responsibility to educate diabetic patients about the oral complications of diabetes and to promote proper oral health behaviors that limit the risks of tooth loss, periodontal disease and oral soft-tissue pathologies.

Table 1: Socio-demographic Characteristics of the Subjects

Variable	Frequency	Percentage
Age category		
21 – 40 years	8	6.6%
41 – 60 years	38	31.2%
61 years and above	76	62.2%
Total	122	100%
Gender		
Female	92	75.4%
Male	30	24.6%
Total	122	100%
Tribe		
Ibo	12	9.8%
Yoruba	102	83.6%
Others	8	6.6%
Total	122	100%
Religion		
Christian	94	77.1%
Muslim	28	22.9%
Total	122	100%
Educational status		
None	24	19.6%
Primary school only	36	29.5%
Secondary school	42	34.5%
Tertiary education	20	16.4%
Total	122	100%
Marital status		
Single	109	89.3%
Married	3	2.5%
Widowed	10	8.2%
Total	122	100%

TABLE 2: Respondents Oral Health Impact Profile

OHIP-E	OHIP-14	Never Band-0		Hardly ever Band-1		Occasionally Band-2		Frequently often Band-3		Very often Band-4		Mean OHIP
		N %		N	%	N	%	N	%	N	%	
Functional limitation	**Words**	42	34.4	64	52.5	6	4.9	8	6.6	2	1.6	2.97
	Taste	28	23.0	56	45.9	22	18	14	11.5	2	1.6	4.20
Physical pain	**Pain**	10	8.2	28	23.0	36	29.5	46	37.7	2	1.6	7.07
	Discomfort	16	13.1	40	32.8	24	19.7	40	32.8	2	1.6	6.23
Psychological discomfort	**Consciousness**	28	23.0	62	49.2	40	16.4	10	8.2	4	3.3	5.39
	Tense	30	24.4	61	50	18	14.8	13	10.7	0	0	3.92
Physical disability	**Diet**	26	21.3	53	43.4	24	19.7	13	10.7	6	4.9	4.69
	Interrupt	36	29.5	48	39.3	18	14.8	18	14.8	2	1.6	4.03
Psychological disability	**Not relaxed**	42	34.4	54	44.3	18	14.8	8	6.6	0	0	3.29
	Embarrassed	44	36.1	50	41.0	14	11.5	8	6.6	6	4.9	3.61
Social disability	**Irritable**	42	34.4	54	44.3	14	11.5	12	9.8	0	0	3.40
	Job	54	44.3	58	47.5	6	4.9	4	3.3	0	0	2.38
Handicap	**Life**	6	4.9	63	51.6	0	0	53	43.4	0	0	6.34
	Function	4	3.3	69	56.6	0	0	49	40.2	0	0	3.40

Table 3: Relationship between fasting blood sugar and CPITN Scores

Fasting sugar	CPITN SCORE			TOTAL	Mean OHI score
	Code 1 (%)	Code 2 (%)	Code 3and 4 (%)		
Within normal limits	26(39.4)	25 (37.9)	15(22.7)	66	1.45
Hyperglycaemia	14(25.0)	22 (39.3)	20(35.7)	56	1.61
Total	40	47	35	122	

Df = 2 $X^{2=}3.71$ p= 0.16   (not statistically significant)

*Code 1: Bleeding on gentle probing
*Code 2: Supra/sub-gingival calculus
*Code 3and 4: Pocket depth 3.5 to 5.5 mm and Pocket depth > 5.5 mm

Table 4: Relationship between 2 hours post prandial sugar and CPITN Scores

2hrs postprandial	CPITN SCORE			TOTAL	Mean OHI score
	Code 1 (%)	Code 2 (%)	Code 3and 4 (%)		
Within normal Limits	26(40.0)	24(36.9)	15(23.1)	65	1.43
Hyperglycaemia	12(21.1)	24(42.1)	21(36.8)	57	1.53
Total	38	48	36	122	

Df = 2 $X^{2=}$ 5.66   p= 0.06 (not statistically significant)

*Code 1: Bleeding on gentle probing
*Code 2: Supra/sub-gingival calculus
*Code 3and 4: Pocket depth 3.5 to 5.5 mm and Pocket depth > 5.5 mm

TABLE 5: Relationship between level of education and CPITN scores

Education	CPITN Score 1	CPITN Score 2	CPITN Score 3 and 4	Total
Illiterate	6	10	8	24
Primary	12	21	3	36
Secondary	14	12	16	42
Tertiary	8	4	8	20
Total	40	47	35	122

Df = 6 X^2 = 14.93   P =0.021 (statistically significant)

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