Original Article

Awareness and Oral Self-Care Practices of Diabetic Patients at a Tertiary Hospital in Lagos, Nigeria

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Abstract

Background: Diabetes mellitus is a diverse group of metabolic disorders initiated by either a lack of insulin, resistance to its effects, or both. The oral cavity and its associated structures are also affected by the local and systemic effects of this condition. The aim of this study was thus to determine the oral health awareness and oral self-care practices of a group of patients registered for care at the diabetic clinic of the Lagos State University Teaching Hospital, Ikeja, Lagos State (Lasuth). **Methods:** This descriptive cross-sectional study was conducted at Lasuth. The study included 120 respondents. A structure interviewer administered questionnaire was used to assess the social background, medical history, utilization of dental services and the knowledge, values and attitude of the respondents towards oral health. **Results:** Pain or emergency treatment 64 (53.3%) was the main reason for dental attendance and the primary reason for not attending the dental clinic was perceived lack of need for dental care (22; 18.3%). Xerostomia or dry mouth (89; 74.2%) was the commonest dental complaints by the participants. There was a significant association between the age (p=0.000); educational qualification (p= 0.000); smoking status (p=0.000); duration of diabetes (p=0.000); diabetes type (p=0.000); blood sugar control (p=0.000); and the amount of oral health information received (p=0.000); with the number of dental complications experienced by the participants. **Conclusion:** This study revealed that the oral self-care behaviour of patients with diabetes was not consistent with their increased risk for oral diseases. Our findings suggest that there is a significant need for increased knowledge of the oral complications of diabetes mellitus and the adoption of preventive oral hygiene behaviours that would improve their oral health.

Keywords: Diabetes mellitus; Oral self-care; Oral health status; Dental services utilisation

Introduction

Diabetes mellitus is a diverse group of metabolic disorders initiated by either a lack of insulin, resistance to its effects, or both. [1] Patients with diabetes commonly experience hyperglycaemia as a result of the body's inability to maintain normal blood glucose levels through normal homeostatic mechanisms. Currently, diabetes mellitus is categorized into four main classes: Type 1 diabetes (formerly known as 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 definite disorders such as surgery, medications, infections, pancreatic disease and other illnesses. [2] The major burden of morbidity and mortality of Diabetes mellitus falls on the developing world. [3] Diabetes negatively impacts physical (development of short- and long-term complications), psychological (altered mood, frustration and anxiety) [4] and social (alteration in the quantity and the quality of patients relationships) functioning. Diabetes mellitus also has unfavourable effects on quality of life outcomes [5] and studies have shown significant negative associations for health related quality of life. [6]

Body tissues in diabetic patients are subject to biochemical disorders which result in impairment and loss of function. Patients with diabetes mellitus have a range of systemic complications from microvascular and macrovascular disease as well as an increased susceptibility to infection and poor wound healing. The oral cavity and its associated structures are also affected by the local and systemic effects of this condition. Hyperglycaemia increases the development of advanced glycation end-products (AGEs) and the increased exposure of oral tissue proteins and lipids to aldose sugars, which induces non-enzymatic glycation and oxidation. [7] Degenerative vascular changes associated with diabetes also impede nutrient and leukocyte migration to gingival tissues, thus reducing oxygen diffusion and removal of metabolic waste products thus increasing the severity of oral diseases. [8]

Several soft tissue abnormalities have been associated with diabetes mellitus in the oral cavity. These complications include periodontal diseases, oral fungal and bacterial infections and salivary dysfunction. They also have reduced salivary flow rates, altered salivary components and a higher salivary

How to Cite this Article: Oyapero A, et al. Awareness and Oral Self-Care Practices of Diabetic Patients at a Tertiary Hospital in Lagos. Ann Med Health Sci Res. 2017; 7: 36-43

glucose concentration.[9] Other oral mucosa lesions in diabetic patients are stomatitis, benign migratory glossitis, lichen planus, lichenoid reactions, fissured tongue, traumatic ulcer, and angular chelitis.[10,11] In addition, delayed mucosal wound healing, mucosal neuro-sensory disorders, dental caries and tooth loss have been reported in patients with diabetes.[12] The prevalence of oral mucosal lesions in patients with diabetes is higher compared to healthy controls.[13]

Dental plaque and plaque retentive factors such as calculus and overhanging margins of restorations are required for periodontal diseases to develop even in patients with diabetes mellitus.[14] Personal and professional plaque control measures[15,16] and oral self-care practices are critical factors in the prevention and treatment of periodontal diseases. Syrjälä et al.[17] observed that diabetic patients that had a better tooth brushing effectiveness with lower levels of plaque deposit had better glycated haemoglobin (HbA1c) levels. Regular dental visits are also an opportunity for professional help in the prevention, early detection, and treatment of oral conditions associated with diabetes mellitus. Similarly, adequate glycaemic control is also indispensable for the prevention of other oral complications associated with diabetes mellitus. However, in spite of the predisposition to oral complications among patients with diabetes mellitus, very few studies have explores the knowledge and oral self-care practices among patients with diabetes in Nigeria.

The aim of this study was thus to determine the oral health awareness and oral self-care practices of a group of patients registered for care at the diabetic clinic of the Lagos State University Teaching Hospital, Ikeja, Lagos State (LASUTH).

Materials and Methods

Study design

This descriptive cross-sectional study was conducted at the Lagos State University Teaching Hospital, Ikeja, Lagos, Nigeria.

Study setting and location

This study was conducted at the Diabetic Clinic (Department of Medicine) of the Lagos State University Teaching Hospital, (LASUTH), Ikeja, Lagos, Nigeria. Lagos State University Teaching Hospital is a tertiary health facility situated in the capital of Lagos State. It is a multi-specialist hospital with a bed complement of 741. The diabetic Clinic in the Department of Medicine at LASUTH is a specialist facility with Consultant Endocrinologists that attend to over 50 diabetic patients on the clinic days on Tuesdays and Thursdays.

Sample selection

A simple random probability sampling method was utilised to enlist participants for the study with the attendance register for each clinic day serving as the sampling frame. Diabetic patients who were willing to give their informed consent were included in the study after checking them with set inclusion and exclusion criteria.

Sample size determination

The estimated sample size was computed using an equation for Cross-sectional studies. Using a prevalence of 10.8% for accessing dental care from a previous study[18] among diabetic patients, a sample size of 77 was calculated. One hundred and twenty questionnaires were however administered during the study period.

Inclusion/exclusion criteria

Subjects included in the study were 18 years or older and diagnosed as having had type 1 or 2 diabetes for at least one year before the study commenced. Patients that were excluded from the study included those who were those that had commenced dental/periodontal treatment recently and those that recently had a session of oral health education by a dental professional.

Ethical aspects

The study was questionnaire based and did not involve oral examination nor any form of dental intervention. All participants completed a written informed consent. The informed consent form contained the names and affiliation of investigators, a plain language description of the study.

Data collection

Questionnaires: Selected subjects completed an interviewer administered questionnaire designed to obtain information on the subjects' bio-data and dental history. The questions were closed-ended and mostly multiple choice with alternative statements. They were grouped into five categories and the questions covered 1) social background, 2) medical history, 3) self-treatment, -prevention and -diagnosis of oral diseases, 4) utilization of dental services and 5) knowledge, values and attitude towards oral health.

Medical history/Behavioural factors: Diabetes was categorized as type 1 or 2 and HbA1c levels were classified as follows: <7.5% as good glycaemic control, 7.5-8.5% as moderate control, 8.6-10.0% as poor control while behavioural factors included questions about smoking habit. Smoking habit was dichotomized as smoking and no smoking.

Oral self-care practices and awareness: Oral hygiene habits such as tooth brushing frequency, interdental cleaning, self-reported condition of oral health status and awareness of the oral complications was recorded.

Utilization of dental services: The frequency of utilization of dental services, the type of dental facility accessed and the type of dental condition that the participants had was also recorded in the questionnaire.

Knowledge, values and attitudes towards oral health: The questionnaire explored cognitive aspects about knowledge of the participants on the relationship between diabetes and periodontal diseases and affective domains on the importance of oral health which were answered in a Likert scale with responses

such as fully agree, somewhat agree, I do not know, somewhat disagree, and fully disagree.

Data analysis

The data was analysed using SPSS (Statistical package for social sciences) for Windows (version 20, Chicago, IL) statistical software package. Frequency tables were generated for all variables and measures of central tendency and dispersion were computed for numerical variables. Since the data were normally distributed, descriptive statistics including means, standard deviations, and percentages were used to present the demographic variables and health-related behavior of the study sample. The Chi square test was used to determine the level of association between variables. The Student's paired t tests and Anova tests were used to compare means. A 95% confidence interval and a 5% level of significance was adopted.

Results

A total of 120 patients were included in the study: 75 (62.5%) men and 45 (37.5%) women. The age range of patients was 38-72 years. When participants were subdivided into three age groups, those aged 46-65 years made up the majority 107 (89.2%). The sample consisted mainly of the Yoruba tribe 91 (75.8%) and majority had a secondary level of education 49(40.8%) [Table 1].

Table 1: Socio-demographic characteristics of respondents.

Variable		Frequency
Age group (Years)		
≤ 45	10	8.3
46-65	107	89.2
≥ 66	3	2.5
Gender		
Female	75	62.5
Male	45	37.5
Ethnic group		
Yoruba	91	75.8
Igbo	12	10.0
Hausa	4	3.3
Others	13	10.8
Religion		
Christianity	53	44.2
Islam	62	51.7
Traditional	5	4.2
Marital status		
Married	84	70.0
Divorced	5	4.2
Separated	16	13.3
Widow	15	12.5
Educational Qualification		
None	11	9.2
Primary	23	19.2
Secondary	37	30.8
Tertiary	49	40.8

Only 3 (2.5%) of the participants were current smokers while 11 (9.2%) of them had a history of tobacco smoking. Majority of the participants 101 (85.8%) had Type 2 diabetes with most of them 47 (39.2%) were diagnosed 6-10 years previously. Most of the respondents 51 (42.5%) also rated their glycaemic control as fair and had a diabetes related complication 113 (94.2%). The commonest diabetic complication was numbness of the feet 77 (64.2%) [Table 2].

Only 18 (15.0%) of the respondents had a recent dental appointment within 1 year and the General Hospital was the preferred clinic for those that attended for a dental appointment 42 (46.7%). Pain or emergency treatment 64 (53.3%) was the main reason for dental attendance and the primary reason for not attending the dental clinic was perceived lack of need for dental care (22; 18.3%). Xerostomia or dry mouth (89; 74.2%); Bleeding gums (74; 61.7%) and a loose denture (65; 54.2%) were the commonest dental complaints by the participants and most of them (52; 43.3%) felt that their oral health status was average [Table 3].

Table 2: Clinical Characteristics of the participants.

Variable		Frequency
Smoking status		
Every now and then	3	2.5
I have smoked but stopped	11	9.2
Not at all	106	88.3
Diabetes type		
Type 1	8	6.7
Type 2	101	85.8
Don't know	9	7.5
When were you diagnosed with diabetes?		
Less than 5 year ago	22	18.3
6-10 year ago	47	39.2
above 10 year ago	39	32.5
Can't remember	12	10.0
How would you describe the balance of your blood sugar at this moment?		
Good	38	31.7
Fair	51	42.5
Bad	31	25.8
Complication due to diabetes		
Yes	113	94.2
No	7	5.8
Which one?		
Numbness in feet	77	64.2
Regular albuminuria	15	12.5
Retinopathy	49	40.8
Other forms of neuropathy	33	27.5
Nephropathy	19	15.8
Coronary disease or infarct of the heart	12	10.0

Table 3: Oral health status and use of dental services by participants (multiple responses).

Variable		Frequency
Last dental appointment		
less than 1 year ago	18	15.0
1-2 year ago	25	20.8
3-5 years ago	17	14.2
more than 5 years	30	25.0
I don't know	30	25.0
Where was your last dental appointment (n=90)		
Private dentist	13	14.4
General hospital	42	46.7
Teaching hospital	35	38.9
Reason for last dental treatment		
Pain or emergency treatment	64	53.3
Normal check up	20	16.7
Preparing for fixing denture	6	5.0
If you have not attended for 2 years, what was the reason?		
Dental care is too expensive	5	4.2
I have not had any problem with my teeth/ denture	22	18.3
It is difficult to make appointment because of my work	4	3.3

Present symptoms		
Pain in the jaw or difficult in opening mouth	54	45.0
A broken tooth or filling	44	36.7
Sensitivity when you bite your teeth together	27	22.5
Dry mouth	89	74.2
Unpleasant taste	15	12.5
Bad smelling breath	12	10.0
Painful tongue or mouth	17	14.2
Dry, painful or chapped lips	61	50.8
Burning mouth	21	17.5
Bleeding gum	74	61.7
Painful or sensitive gum	53	44.2
A loose denture	65	54.2
Calculus	31	25.8
Sensitive teeth	23	19.2
How would you describe the condition of mouth and teeth		
Good	17	14.2
Fairly good	37	30.8
Average	52	43.3
Fairly bad	8	6.7
Bad	6	5.0
Have you lost any permanent teeth		
No	8	6.7
Yes	112	93.3
Do you think you have any gum disease at the moment		
I have gum disease now	32	26.7
I do not have gum disease now, nor have I had gum disease earlier	11	9.2
I have gum disease earlier this year	1	0.8
I have gum disease more than one year ago	43	26.7
I have gum disease two or more year ago	44	36.7
Has your gum bled recently?		
My gum has bled recently	20	16.7
My gum have not bled recently or in the past	64	53.3
My gum has bled this year	22	18.3
My gum bled more than one year ago	14	11.7

Most of the participants (71; 59.2%) had received insufficient information about oral care and the diabetes nurse (46; 43.0%) was the primary source of this information. Most of them (87; 72.5%) had never received a physician's referral for oral care nor information on the diabetes on gum disease (87; 72.5%). Brushing once daily was practiced by majority of the respondent (107; 89.2%) but most of them (99; 82.5%) do not use any form of interdental cleaning aid [Table 4].

Table 4: Self-perceived problems and knowledge of relationship between diabetes and oral health.

	Variable	Frequency
How much information have you received about dental care and oral disease		
I have received sufficient information	36	30.0
I have received some information but not enough	71	59.2
I have not received information	13	10.8
Where did you received the information (n=107)		
The diabetes nurse	46	43.0
The doctor	37	34.6
The dentist or dental nurse	16	15.0
Somewhere else	8	7.5
Have you ever received a physician referral to dental care		
Yes	33	27.5
No	87	72.5
I don't know		
Have you received information about the influence of gum disease and diabetes		
Yes	33	27.5
No	87	72.5
If yes from where		
The diabetes nurse	1	
The dentist or dental nurse	32	
How often do you brush your teeth		
Almost everyday	7	5.8
Once a day	107	89.2
More than once a day	6	5.0
What do you use for cleaning the space between teeth?		
Dental floss	1	0.8
Toothpick	9	7.5
Chewing stick	11	9.2
Nothing	99	82.5
How often do you clean interdental space with dental floss		
Once a day	13	10.8
More than once a ay	3	2.5
Never	104	86.7
If you notice bleeding when cleaning your teeth, what do you do		
I stop cleaning the area that is bleeding	8	6.7
I clean he bleeding are very carefully	78	65.0
I contact my dentist	34	28.3
During the last dental visit my next appointment was recommended to the schedule		
3 months	20	16.7
six months	90	75.0
one year	5	4.2
Some other time	5	4.2

Most of the study participants (108;90%) knew that poor oral health can be injurious to general health and that regular dental cleaning is required even when gum disease is cured (111; 92.5%). Majority of them however had poor knowledge on bleeding associated with gum disease (24; 20%); the formation of calculus below the gum line (25; 20.8%); and the nature of an advanced periodontal disease (17; 14.2%) [Table 5].

Table 5: Knowledge of the respondents about periodontal health.

	Correct Variable	Responses Frequency
During brushing bleeding gums are normal	24	20.0
The tooth is attached to the bone with very thin fibers	31	25.8
The symptoms of gum disease are swelling and red color	64	53.3
Poor oral health can be injurious to the general health	108	90.0
Calculus can also be found under the gum line.	25	20.8
Advance gum disease means an infection as big as the size of your palm	17	14.2
Calculus is caused by bacterial debris on teeth	50	41.7
Mouthwash and antibiotics are the most effective means to release and cure gum disease	89	74.2
Even when cured, gum disease requires regular cleaning of teeth	111	92.5
Poor Knowledge	68	56.7
Good Knowledge	52	43.3
	Mean	4.31 ± 2.46

Table 6 shows the association between the demographic/clinical characteristics of the respondents and their experience of dental complications related to diabetes mellitus. There was a significant association between the age (p=0.000); educational qualification (p= 0.000); smoking status (p=0.000); duration

Table 6: Association between demographic/ clinical characteristics of respondents and dental complications.

Variables		Dental Complications		
		0-7	8-14	
Age group (Years)	≤45	0	10	χ^2 =41.857
	46-65	89	18	p= 0.000
	≥66	0	3	
Gender	Female	52	23	χ^2 =3.571
	Male	37	8	p= 0.059
Educational Qualification	None	0	11	χ^2 =64.819
	Primary	0	8	p= 0.000
	Secondary	28	4	
	Tertiary	61	8	
Smoking Status	Every now and then	0	3	χ^2 =45.502
	I have smoked but stopped	0	11	p= 0.000
	Not at all	89	17	
When were you diagnosed with diabetes?	Less than 5 year ago	20	2	
	6-10 year ago	37	9	χ^2 =82.217
	above 10 year ago	20	20	p= 0.000
	Can't remember	12	0	
Diabetes type	Type 1	0	8	χ^2 =26.762
	Type 2	80	23	p= 0.000
	Don't know	9	0	
How would you describe the balance of your blood sugar at this moment?	Good	34	4	χ^2 =29.87
	Fair	37	14	p= 0.000
	Bad	18	13	
How much information have you received about dental care and oral disease	I have received sufficient information	31	5	χ^2 =97.52
	I have received some information but not enough	55	16	p= 0.000
	I have not received information	3	10	
Total (each subgroup)		89	31	

Table 7: Association between dental status and access to oral health information with the level of knowledge among the respondents.

		Poor knowledge	Good knowledge	
How would you describe the condition of mouth and teeth?	Good	0	17	
	Fairly good	21	16	χ^2 =32.447
	Average	33	19	p= 0.000
	Fairly bad	8	0	
	Bad	6	0	
Have you lost any permanent teeth?	No	0	8	χ^2 =11.209
	Yes	68	44	p= 0.001
How much information have you received about dental care and oral diseases?	I have received sufficient information	4	32	χ^2 =47.015
	I have received some information but not enough	51	20	p=0.000
	I have not received information	13	0	
Have you ever received a physician's referral for dental care	Yes	0	33	χ^2 =59.232
	No	68	19	p= 0.000
How often do you clean the interdental space with dental floss	Once day	0	3	χ^2 = 14.118
	More than once a day	2	11	p= 0.001
	Never	66	38	
Dental Complications	0-7	44	21	χ^2 =54.658
	8-14	24	7	p= 0.000
Total (each subgroup)		**68**	**52**	

of diabetes (p=0.000); diabetes type (p=0.000); blood sugar control (p=0.000); and the amount of oral health information received (p=0.000); with the number of dental complications experienced by the participants.

Table 7 displays the association between dental status and access to oral health information with level of knowledge among the respondents. Participants that had a good oral health status (p=0.000); those that had not lost any permanent

Table 8: Logistic regression for dependent variables oral hygiene, dental visits, dental complications and level of knowledge.

Dependent variables	Independent variable	p	OR	95% CI
Frequent tooth brushing	No education	0.047	0.185	0.009-0.338
	Sufficient information about dental care and oral disease.	0.006	0.302	0.048-0.478
Frequent interdental cleaning	No education	0.002	0.337	0.247-0.570
Frequency of dental visits	No education	0.002	0.516	0-209-1.426
	The condition of mouth and teeth is good.	0.001	0.109	0.091- 0.402
	What was the main reason for your last dental treatment	0.000	1.953	1.402- 2.543
	Sufficient information about dental care and oral disease.	0.000	1.000	0.102- 1.324
	I have received a physician's referral for dental care.	0.000	0.998	-0.124- 1.382
Dental complications	No education	0.003	0.348	-0.812- 1.385
	Age group (≤ 45years)	0.001	1.000	-0.171- 1.240
	Current Smoker	0.000	3.143	1.480- 3.312
	Diagnosed with diabetes over 10 years ago.	0.000	2.467	1.251- 2.632
	Good blood Sugar control	0.000	0.391	0.105- 0.528
	Sufficient information about dental care and oral disease.	0.000	0.355	-0.125- 0.420
	I have received a physician's referral for dental care.	0.001	0.234	0.121- 0.352
Level of knowledge	The condition of mouth and teeth is good.	0.000	0.326	0.148- 0.381
	I have not lost any permanent teeth.	0.001	2.000	1.657- 3.985
	I have received physician's referral for dental care.	0.000	1.336	0.923- 1.935
	I do not clean the interdental space with dental floss	0.001	0.420	0.253- 0.657
	7-14 Dental Complications	0.000	0.110	-0.520- 0.634

teeth (p=0.001); those that had received sufficient oral health information (p=0.000); those that had received a Physicians referral for oral care (p=0.000); and those that had few oral complications (p=0.000); had significantly better oral heath knowledge.

Table 8 displays the logistic regression for dependent variables oral hygiene, dental visits, dental complications and level of knowledge. Frequent tooth brushing was significantly associated with educational status and sufficient information about dental care and oral disease. Participants that had a good oral health status (p=0.000); those that had not lost any permanent teeth (p=0.001); those that had received sufficient oral health information (p=0.000); those that had received a physician's referral for oral care (p=0.000); and those that had few oral complications (p=0.000) had significantly better oral heath knowledge.

Discussion

Diabetes mellitus is a recognised risk factor for periodontal diseases and diabetic patients tend to have more periodontal destruction than age matched control subjects. [19] Similarly, a higher prevalence of dental caries has been observed in diabetic patients possibly due to alterations in saliva salivary flow rates and high salivary glucose levels. [20] Oral fungal and bacterial infections and oral mucosa lesions such as stomatitis, benign migratory glossitis, fissured tongue, traumatic ulcer, lichen planus, lichenoid reactions and angular chelitis are also more commonly seen in diabetic patients. Optimal control of blood sugar and appropriate oral hygiene measures in addition to regular dental visits has been observed to prevent the oral manifestations of diabetes mellitus. [21,22]

Majority of subjects in this sample were female and there was a preponderance of participants aged 46-65 years. Most of the respondents also had a secondary level of education. The larger representation of females in this sample may reflect the sex related differences in the risk of developing diabetes mellitus and as a result, the differences in the prevalence of the condition across different populations in Sub Saharan Africa. [23] Women also tend to present for their appointments at the diabetic clinic more regularly and tend to have a higher health seeking behaviour than men. Type 2 diabetic patients made up 85.8% of the study population which represents the prevalence in the general population which is close to 90% 1 and this may also reflect a general pattern of attendance as seen in studies with participants that had a similar age distribution. [24]

Most of the respondents rated their glycaemic control as fair or poor and over 90% of participants had a diabetes related complication with numbness in the feet being the most commonly observed complication. This high prevalence of complications may either be related to late presentation before a diagnosis of diabetes was made in the patients or a poor compliance with medication and other management modalities with associated inadequate glycaemic control. Over 11% of the respondents also had a history of current or past cigarette smoking. Cigarette smoking and alcohol consumption have been known to affect the oral microflora adversely. Smoking is also a recognised risk factor in the development of periodontal disease.

A history of past dental visits based on pain and the need for emergency treatment was observed in most of the participants. Only 15% of them reported a dental visit in the year preceding the study while the prevailing reasons for dental visits was toothache and dental emergencies. Over 93% of the respondents also had at least one missing permanent tooth. Xerostomia was observed to be the commonest oral complaint among the study participants. Diabetes induced neuropathy with increased sympathetic stimulation, hypovolaemia resulting from polyuria, and alterations in basement membrane of salivary blood vessels due to AGEs deposition have been implicated in reduced salivary flow in diabetics. It is of utmost significance to educate diabetic patients about the beneficial properties of saliva and its

role in the prevention of accumulation of oral biofilm and debris which are primary initiating factors in the development of periodontal disease and dental caries. Diabetic patients should be encouraged to frequently sip small quantities of water, chew xylitol containing chewing gum to stimulate salivary flow or to use artificial saliva substitutes.

It is also noteworthy that even though most of the respondents had one or more dental complaints ranging from burning mouth to painful and sensitive gums, and rated the condition of their mouth and teeth as average or poor, majority of them did not attend the dental clinic and had not received a physician's referral for dental care. This shows that adequate attention is not given to oral care by diabetic patients and their attending physician. Previous researchers have similarly observed that diabetic patients with poor metabolic control or advanced complications visit the dentist less regularly [25] and are more likely to require emergency dental care than non-diabetic patients. [26] These observations highlight the significance of preventive interventions and oral health promotion for diabetic patients. Health care professionals should make more efforts to implement oral health programs in this group. [27] Oral health problems have a common risk factors with some systemic diseases and health related outcomes. The common risk approach identifies that chronic non-communicable diseases such as obesity, heart disease, stroke, cancer, diabetes, mental illness and oral disease have a set of common risk disorders and factors. [28] This approach can addresses similar aetiological factors or provide interventions that addresses unhealthy lifestyles and habits, thus improving periodontal health and diabetic outcomes.

Most of the participants moreover stated that they had not received sufficient information about oral care while the diabetes nurse was the primary source of oral health information. An assessment of the knowledge of the participants showed that majority of them had poor knowledge on the nature of periodontal disease and its association with diabetes. The findings were in agreement with the observation by Ayanbadejo et al. [29] who also observed a significant relationship between knowledge and educational level of their study subjects. Other researchers similarly observed that diabetic patient did not have adequate knowledge about the oral complications of the disease. [30,31] The amount of health information received by the respondents was also found to be significantly associated with their level of knowledge about oral health.

There was also a significant association between the age, educational qualification, smoking status, duration of diabetes, blood sugar control with the number of dental complications experienced by the participants. Patients below 45 years of age who had Type 1 diabetes and had possibly been diabetic for a longer period were observed to have more complications. There is strong relationship between the oral complications of diabetes and its age of onset. It is imperative that recently diagnosed diabetic patients are appropriately counselled on the association between diabetes and oral health and the need for periodic dental visits to moderate their risk of oral complications.

The American Diabetes Association has stated that all diabetic patients must have a dental referral for a comprehensive oral health assessment as part of the overall management of Diabetes Mellitus. [32] The referral of diabetes patients for dental care is however not yet included in the Clinical Practise Guideline for the management of diabetes patients in Nigeria. This may possibly be one of the contributory reasons for the low referral of diabetes patients for dental care by healthcare workers. It is also imperative that dental professionals are proactive in identifying patients to be screened for diabetes mellitus within the clinic setting and also collaborate with endocrinologist and other physicians to ensure that diabetics have appropriate recall dental visits. [33] Diabetic patients' self-efficacy and skills should also be improved to perform oral hygiene measures such as tooth brushing and interdental cleaning.

Limitations

The descriptive nature of this study will not permit conclusive inferences to be made from its observations. Another weakness in the method is the use of self-reporting for data collection, which could make some of the responses elicited from the participants subject to recall and "social desirability" bias. Additionally, since the study was conducted in only one centre, the findings may not be generalizable to all Nigerians with diabetes mellitus. The obtained data however provides baseline data for further research in Nigeria.

Conclusion

This study revealed that the oral self-care behaviour of patients with diabetes was not consistent with their increased risk for oral diseases. There was also a low referral of diabetes patients for oral healthcare by medical practitioners. The poor oral health seeking behaviour and low utilization of dental services indicates a need to establish a comprehensive oral health promotion program for the diabetics. Our findings suggest that there is a significant need for increased knowledge of the oral complications of diabetes mellitus and the adoption of preventive oral hygiene behaviours that would improve their oral health.

Conflict of Interest

All authors disclose that there was no conflict of interest.

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