Knowledge of Diabetic Complications and Practice of Routine Medical Check-up among Type 2 Diabetics in Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Awareness about possible complications and regular medical check-up are essential for prevention, early detection and treatment of diabetic complications. Data on a pattern of health check among individuals with diabetes mellitus (DM) is scarce; thus we aimed to assess the practice of routine medical check-up.

Methods: A total of 105 individuals with type 2 DM attending a diabetic clinic at the State Specialist Hospital Ondo, Ondo state, Nigeria, participated in this descriptive, cross-sectional study. Participants were interviewed using a pre-tested structured questionnaire to assess knowledge and self-declared practice of routine medical check-up. Data analysed using SPSS version 21, were significant at $p<0.05$.

Results: Participants were aged 56 ± 9.9 years with a male to female ratio of 1:1.5 and DM 6.7 ± 7.1 years. 90.5% of the participants were aware of possible DM complications.

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Specific knowledge about the diabetic foot was highest with 90.5% having good knowledge. 84.8%, 79.0%, and 61.9% of participants also demonstrated good understanding of retinopathy, neuropathy and cardiac complications while participants' knowledge of cerebral damage, erectile dysfunction and nephropathy were inadequate in 61.9%, 63.8% and 60% respectively.
All participants had their blood pressure checked regularly while only 36.2% (38) ever had other routine medical check-ups. Among these, 25.7% (27) tested their eyes, while 11.4% (12) have checked kidney functions at least once, out of which only 7.6% (8) verified within the last one year. Neither duration nor participants' knowledge of DM complications correlated with routine check-up (p=0.313).
Conclusion: The practice of regular medical check-up was poor among type 2 DM, and this may be associated with inadequate knowledge about specific diabetic complications. Awareness should be increased on diabetic complications and need for routine evaluation among type2 DM patients.

1. INTRODUCTION

Diabetes mellitus (DM) is a group of metabolic diseases and a major growing health problem in developing countries including Nigeria. It is a chronic and progressive disease associated with some micro-vascular and macro-vascular complications. It represents an essential non-communicable disease burden with about 4million people reportedly living with it in Nigeria, representing a fifth of all cases in Sub-Saharan Africa [1].

Diabetes mellitus is associated with significant reduction in life expectancy and morbidity due to specific diabetes-related micro-vascular complications which include retinopathy, nephropathy and neuropathy. It is also associated with increased risk of macro-vascular complications which include ischaemic heart disease, stroke, diabetic encephalopathy, diabetic foot, peripheral vascular disease and coronary artery disease (CAD)- this may lead to angina or myocardial infarction (MI) [2,3].

Though DM is reported to be associated with diminished quality of life, knowledge of possible complications among DM patients has been shown to be associated with improved treatment outcome, patients' compliance to treatment and self-care and reduced incidence of complications [4,5,6]. Conflicting reports exist regarding gender difference in patients' knowledge of DM and its complications. A specific report suggested that females demonstrated superior experience,[7] some reported that men exhibited a better understanding of DM complication [8,9] while another found no significant difference [10]. A routine medical check is vital towards prevention, early detection and effective treatment of diabetic complications.

A routine medical check-up is a form of preventive medicine that involves physical and medical evaluation of asymptomatic individuals for specific health challenges [11]. Systematic examination of DM patients requires screening for early markers of microvascular and macro-vascular complications to ensure early detection. It has been reported to be associated with early detection of diseases, reduced morbidity and mortality.

It is recommended that blood pressure is measured at every routine diabetes visit, adult patients should test for lipid disorders at least annually and more often if a goal is to be achieved. Evaluation for microalbuminuria is also advised at least once a year starting at diagnosis. Patients should have an initial dilated and comprehensive eye examination by an ophthalmologist or optometrist shortly after the diagnosis of diabetes, and subsequent analyses should be repeated annually. Reviews will be required more frequently if retinopathy is detected [12,13]. Routine evaluation is considered adequate in early diagnosis of illness, reduction of health care cost and reducing morbidity and mortality [14].

Diabetic complications have been associated with organ and tissue diseases; it is considered a leading cause of vision impairment and blindness worldwide [15], the leading cause of end-stage renal disease (ESRD) [16] and approximately half of individuals with type 2 DM have some forms of neuropathy [17]. DM has been reported to be associated with higher risk of cardiovascular diseases [18], an independent risk factor for stroke [19] and diabetic foot.

These complications, if detected early can be managed to delay progression, reduce

socioeconomic burden, reduce morbidity and mortality thus emphasising the need for routine check among this group. Data regarding the practice of regular medical check-up and knowledge of diabetic complications among people with diabetes is scarce. To the best of our knowledge, this is the first publication on the practice of routine check-up among type 2 DM patients in Nigeria. We, therefore, set out to evaluate the method of routine check-up and knowledge of DM complications among type 2 DM patients.

2. METHODS

This was a cross-sectional descriptive study among individuals with type 2 DM attending the outpatients Diabetic Clinic of State Specialist Hospital Ondo, Ondo state. Nigeria. The study was carried out between Aug., 2016 and Jan., 2017. Sample size was determined using formula $n=4pq/d^2$ where p is the prevalence of diabetic complications which according to a study in Nigeria equals 65% [20] and d is the level of precision. Taking a 15% precision, n= 96.

A total of 105 individuals with type 2 diabetes who have been attending Diabetic Clinic for a minimum of 6months were recruited into this study. Ethical approval was obtained from the State Health Research Ethics committee (SHREC) (under the auspices of Ondo state Ministry of Health). The format of patient's Diabetes Knowledge Questionnaire (DKQ-24) described by Garcial *et al* [21]*,* was adopted and adjusted to meet the focus of this study following the International Diabetes Federation (IDF) guideline. The questionnaire was thereafter validated and pretested, reliability check using SPSS 21 showed Cronbach's Alpha=0.804. All participants gave written consent for the study and were interviewed using the pre-tested structured questionnaire. The questionnaire had three sections; Section A involved questions on socio-demography, section B involved closed-ended questions to assess the knowledge of diabetic complications while section C involved questions on practice of routine medical check-up. Participants were asked to answer "Yes", "No" or "I don't Know" for sections B and C. Those who answered the questions correctly about each aspect of complications were scored as having good knowledge while those who gave wrong answers or answered "I don't know" were scored as having poor knowledge.

Inclusion criteria were strictly for participants with clinical diagnosis of type 2 DM who had been attending the Clinic for a minimum of 6months while individuals with type 1 DM and those with type 2 whose diagnosis were less than 6 months were excluded from this study. The questionnaire was written in English but translated to the patient's language. Data were analysed using SPSS 21.0 and numerical variable expressed as Mean±SD. Pearson's correlation and Chi-square tests were used to know significant differences among categorical variables with a 5% level of significance.

3. RESULTS

The participants were 42 (40.0%) males and 63 (60.0%) females, between ages 41 to 80years with the Mean±SD age of 56±9.9 years. Duration of DM ranged between 6months to 30years with a mean (+SD) of 6.7±7.1 years. Table 1 showed the characteristics of the participants with 51.4% of them being 61 years and above, 54.3% reported a duration of DM less than 5years.

Table 1. Characteristics of the participants

Age	Frequency (%)
40 – 50	15 (14.3%)
51 – 60	36 (34.3%)
61 years and above	54 (51.4%)
Duration of DM	**Frequency (%)**
<5 years	57 (54.3%)
5-9 years	25 (23.8)
10 years and above	23 (21.9%)
Gender	
Male	42 (40.0%)
Female	63 (60.0%)

Knowledge about diabetic foot was highest followed by retinopathy and neuropathy with 90.5%, 84.8% and 79.0% respectively. Knowledge of possible DM-associated erectile dysfunction, cerebral complications and nephropathy were poor in 62.8%, 61.9% and 60.0% of the participants respectively (Table 2).

Overall awareness about diabetic complications was 90.5% and was not different between the genders. However, specific awareness about DM-associated retinopathy and erectile dysfunction showed statistically significant difference. Female participants showed better knowledge of retinopathy while males showed better knowledge of erectile dysfunction (p<0.05) (Table 3).

The population of participants below 61 years of age compared with those 61 years and

above were similar. The population of participants with DM duration below 5 years and those above 5 years were also similar (p=0.214).

Table 5 showed proportion of participants who have had routine medical check-up. While all participants claimed to have checked their blood pressure on every clinic visit, only 11.4% had ever checked their renal functions among which 7.6% checked within the last 12months. Only about a quarter (25.7%) have had their eyes checked.

Practice of routine medical check-up did not show significant correlation with the duration of

DM, knowledge of DM complication or gender. Correlation between knowledge of DM complications and duration of DM were also not significant (Table 6).

4. DISCUSSION

Diabetes mellitus is a chronic disease affecting about 5-10% of the Nigerian population and associated with significant morbidity and mortality. Continuing medical care, patients' self-management education and routine medical check-up have been reported to be important in preventing or reducing the risk of acute and chronic complications [22]. Body of evidence exists to show the importance of complete

Table 2. Showing knowledge of diabetic complications among the participants

Complications	Good knowledge	Poor knowledge	
Diabetic foot	95 (90.5 %)	10 (9.5 %)	0.0000*
Cerebral damage	40 (38.1 %)	65(61.9 %)	0.0006*
Neuropathy	83 (79.0 %)	22 (21.0 %)	0.0000*
Erectile dysfunction	38 (36.2 %)	67 (62.8 %)	0.0000*
Retinopathy	89 (84.8 %)	16 (15.2 %)	0.0000*
Hypertension	65(61.9 %)	40 (38.1 %)	0.0006*
Nephropathy	42 (40.0 %)	63 (60.0 %)	0.0038*

significant at p<0.05

Table 3. Showing gender distribution of knowledge of DM complications

Complications	Good knowledge		x^2	p
Diabetic foot	Male	38 (90.5%)	0.000	1.000
	Female	57 (90.5%)		
Cerebral damage	Male	19 (45.2%)	1.499	0.2208
	Female	21 (33.3%)		
Neuropathy	Male	32 (76.2%)	0.348	0.5555
	Female	51 (81.0%)		
Erectile dysfunction	Male	21 (50.0%)	5.717	0.0168*
	Female	17 (27.0%)		
Retinopathy	Male	30 (71.4%)	9.619	0.0019*
	Female	59 (93.7%)		
Cardiac	Male	25 (59.5%)	0.169	0.6807
	Female	40 (63.5%)		
Nephropathy	Male	17 (40.5%)	0.007	0.9350
	Female	25 (39.7%)		

Chi square significant at p<0.05

Table 4. Showing association between participants' age and duration of DM with knowledge

Age	Total (n=105)	Good knowledge (n= 95)	Poor knowledge (n=10)	x^2	p
Below 61 years	51	47 (92.2%)	4 (7.8%)	0.329	0.566
61 yr and above	54	48 (88.9%)	6 (11.1%)		
Duration of DM					
Below 5yr	57	51 (89.5%)	6 (10.5%)	0.145	0.703
5 yr and above	48	44 (91.7%)	4 (8.3%)		

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Table 5. Showing pattern of routine medical check-up

Routine check-up	Distribution (%)	x^2	p
Blood pressure			
Checked	105 (100%)	209.000	0.00001*
Never checked	0 (0%)		
Eye check			
Checked	27 (25.7%)	49.365	0.00001*
Never checked	78 (74.3%)		
Renal function			
Checked	12 (11.4%)	124.561	0.00001*
Never checked	93 (88.6%)		
Renal function (<12 months)			
Checked	8 (7.6%)	150.293	0.00001*
Not checked	97 (92.4%)		

Table 6. Showing correlation between practice of routine medical check-up, knowledge of diabetic complications, duration, and gender

		Gender	Duration	Knowledge	Practice
		Correlations			
		Gender	**Duration**	**Knowledge**	**Practice**
Gender	Pearson Correlation	1	-.127	.000	.231
	Sig. (2-tailed)		.355	1.000	.089
	N	105	105	105	105
Duration	Pearson Correlation	-.127	1	.211	-.138
	Sig. (2-tailed)	.355		.122	.313
	N	105	105	105	105
Knowledge	Pearson Correlation	.000	.211	1	.108
	Sig. (2-tailed)	1.000	.122		.434
	N	105	105	105	105
Practice	Pearson Correlation	.231	-.138	.108	1
	Sig. (2-tailed)	.089	.313	.434	
	N	105	105	105	105

medical evaluation to classify the patient and detect the presence or absence of diabetes complications once diagnosis is made. Routine medical evaluation helps in formulating management plans and provides a basis for continuing care for type 2 DM patients [13].

In this study, there were more females (60%) than males (40%) suggestive of more women attending the Diabetic Clinic. 51.4% were above 60 years of age, this is in conformity with advanced age onset of type 2 DM. This is similar to a previous study in Ethiopia who reported a 44.8% of DM patients above the age of 61 [23], however a study in Abia, Nigeria described a 26.5% within the age bracket [24]. Advancement in age has been associated with increased risk of diabetes as the pancreas undergo aging, becomes weak and may be unable to produce sufficient insulin [25].

This study revealed that the general awareness about diabetic complications is high among patients attending Diabetic Clinic. Though not many studies have been done in Nigeria, results are comparable with studies in other developing countries. Diabetic foot is the most commonly known diabetic complication as majority of the participants (90.5%) demonstrated good knowledge of it. Studies by Fahim et al.,[3] and Obirikorang et al.,[8] also showed diabetic foot as the most common complication known to type2 DM patients.

In the current study, no significant difference was observed in general awareness of diabetic complications between the male and female participants. This is in agreement with a previous study [10]**,** however certain specific knowledge differ significantly in this study. Significant proportion of males showed good knowledge of erectile dysfunction than their female counterpart, while this may be associated with discussion among same gender and personal experience, female participants showed better knowledge of DM associated retinopathy.

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A significant proportion of the participants in this study- 84.8%, 79.0% and 61.9% demonstrated good knowledge of DM-associated retinopathy, neuropathy and cardiac complications respectively (p=0.0006). A similar study in Jordan reported 88.2% while Olokoba et al., reported that 79.2% in Ilorin, Nigeria had awareness of DM-retinopathy [26,27]. Another recent study revealed a relatively good knowledge of neuropathy (80%) among a similar group in Saudi Arabia [28] while 48.9% of participants in a study in Bangladesh were aware of DM-associated cardiac complication [10].

Despite the increasing burden of diabetic nephropathy [29], its awareness was poor among the participants in this study. About 60% were not aware that diabetes could cause renal impairment. This may be particularly important against the background that diabetes is the leading cause of chronic kidney disease in Nigeria [30]. Previous studies in other developing countries showed awareness ranging from 13.0% [10] to 5.4% [8] of diabetics. Poor awareness may also partly explain why majority of individuals with diabetic chronic kidney disease present late at the hospital when it might have progressed to advanced stage of the disease as reported by Adejumo *et al*[31]. This may also be related to poor practice of routine renal evaluation observed among the participants in this study as only 11.4% ever had renal function assessment.

Though, participants demonstrated good knowledge of DM-associated retinopathy, practice of routine eye check was poor among the participants in this study as only 25.4% reported to have had their eye checked. This is similar to a recent research by Bakkar et al*.,* who reported a total of 29.5% of participants in Jordan having had an eye examination [25].

An interesting yet important finding in this study was that level of knowledge about DM complications did not significantly correlate with practice of routine medical check-up, neither was gender. It was also observed that longer duration of DM did not correlate significantly with practice of routine check-up. Overall, general practice of routine medical check-up was poor among the participants and may be associated with inadequate knowledge of specific diabetic complications. This agrees with findings by Eke et al., [32] who reported poor practice of periodic medical check-up (31.6%) among apparently healthy traders in Southeast Nigeria.

5. CONCLUSION

A significant proportion of type 2 DM patients demonstrated excellent knowledge of diabetic foot, retinopathy, neuropathy and cardiac complication while expertise of DM-associated nephropathy, erectile dysfunction and cerebral complications were poor among them. The practice of routine medical evaluation was also poor these individuals. This may be associated with imperfect knowledge of the specific difficulties related to DM, awareness of DM-associated retinopathy, however, did not impact routine eye check. There is a need to emphasise patients' education and physicians should encourage patients on the need for systematic medical evaluation to classify patients and identify those with complications for early treatment.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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