

Awareness of Diabetic Eye Diseases and Eye Care Practices Among Diabetic Outpatients in Onitsha, South-Eastern Nigeria

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ABSTRACT

Background: Diabetic eye diseases comprise a range of ocular complications resulting from diabetes mellitus (DM) and are a significant global health concern due to their high prevalence and potential for vision loss. **Objectives:** This study assessed the level of awareness, prevalence, and patterns of diabetic eye diseases, as well as eye care practices among individuals living with type 2 diabetes mellitus (T2DM). **Materials and Methods:** A descriptive cross-sectional study was conducted among 128 consenting individuals with T2DM attending the diabetes clinic of a private specialist hospital in Onitsha, South-eastern Nigeria. Data were collected using a structured, interviewer-administered questionnaire capturing relevant socio-clinical information. Laboratory assessments included glycated haemoglobin (HbA1c) and fasting plasma glucose levels. Clinical evaluations involved fundoscopy, anthropometric measurements, and blood pressure assessment. Data were analysed using SPSS version 25. **Results:** Among the 128 participants, 52 (40.6%) were male and 76 (59.4%) were female, with a mean age of 59.41 ± 12.32 years and a mean DM duration of 9.80 ± 8.14 years. Overall, 87.5% were aware that diabetes could affect the eyes. Diabetic eye disease was present in 59% of participants, with 52% reporting cloudy vision, 10% cataract, and 3% retinal haemorrhage. Ophthalmologic evaluation had been done by 66.4% of participants, although only 35.2% underwent eye examinations more than once per year. **Conclusion:** The study revealed a high prevalence of diabetic eye complications among T2DM patients, with suboptimal frequency of ophthalmologic evaluations. Strengthening patient education and routine eye screening is essential to improve early detection and prevent vision-threatening complications.

Keywords: Awareness, care, diabetic eye disease, Onitsha, practices.

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INTRODUCTION

Diabetes (DM) is a metabolic disorder with attendant complications that are multi-systemic, visual complications inclusive. Diabetes has assumed a pandemic proportion and as such is a major public health challenge.[1] The long-term morbidity and mortality from DM result from its macrovascular and microvascular complications. The microvascular complications include diabetic eye diseases, especially diabetic retinopathy (DR). Others are diabetic peripheral neuropathy and nephropathy, while the macrovascular complications comprise cerebrovascular disease (stroke), coronary artery disease and peripheral artery disease.[2]

Diabetic eye diseases are a group of eye disorders that could develop as a complication of DM and these include retinopathy, cataract and glaucoma, any of which could pose different degrees of threat to sight including causing total blindness. [3,4] Diabetic eye diseases are very prevalent. Globally the prevalence of DR was estimated to be 27.0% and led to about 0.4 million cases of blindness in the world. [5] In East Africa, Zegeye et al and Merisha et al found that the prevalence rate of DR among T2DM patients was 36.3% and 34.1% respectively. [6,7]

In Nigeria, a nationally-representative study found that the prevalence rate of DR among diabetic subjects was 20.5% and that persons living with diabetes had 3 times greater odds of blindness. [8] Also, a systematic review and meta-analysis found the pooled prevalence rate of DR in Nigeria of 21.5%, the common risk factors for DR being duration of diabetes, poor glycaemic control, and hypertension. [9] In Southern Nigeria, the prevalence rate of DR was 26.5%. [10]

The high prevalence rate of diabetic eye diseases requires a good knowledge of the cause, the symptoms and the complications as well as the correct eye care practices by the diabetic patients so as to be able to take preventive measures against the development of these eye diseases as well as take proactive actions by way of early treatment. These actions would retard the progression of diabetic eye

diseases and equally improve the cure rate for these eye diseases when they occur. A recent systematic review and meta-analysis done on eye care service utilization among diabetic patients in Africa found that the pooled prevalence rate of eye care service utilization among diabetic patients in Africa was very poor (40.92%). [11] This shows that a high population of the people living with diabetes in the African continent failed to use eye care services. [11] In South-eastern Nigeria, only 40.79% of DM subjects knew that DM could affect the eyes and only 31.1% of them had undergone eye examination. [12] In Western Nigeria about 77.7% of the DM patients were aware that DM could affect the eyes, only 29.3% of these knew that poor DM control is the cause, while 33.1% did not know that routine eye check was necessary for DM patients.[3] In Jos, North-central Nigeria, almost all (98.9%) of the DM respondents knew that DM could affect the eyes, but only about 10.7% had heard about DR, 64.0% knew that regular eye check was necessary for people living with DM, but only 3.1% believed that eye check should be done yearly and almost half (47.2%) of the DM patients had never undergone eye check. [13]

The knowledge of the ocular complications of DM as well as the eye care practices among DM subjects were still very poor in Africa, especially in Nigeria. Equally there is a dearth of published data on this very vital topic in Nigeria, especially the South-Eastern, Nigeria. These, coupled with the trending geometric rise in the prevalence of DM and by extension, the rising rate of visual loss resulting from DM necessitated this study.

MATERIALS & METHODS

Study site

This study was carried out at the diabetes out-patient clinic of St Charles Borromeo Specialist Hospital, Onitsha.

Study population

The study population consisted of consenting 128 diabetic subjects aged 18 years and above.

Study duration

The study was carried out from January to August, 2024.

Inclusion criteria

Consenting diabetic subjects aged 18 years and above

Exclusion criteria

Patients were excluded if they were less than 18 years of age, were very sick or refused to give consent.

Study design

This was a cross-sectional study that evaluated 128 DM subjects. A simple random sampling method was used. Each patient seen during clinic consultations who gave an informed consent and met the inclusion criteria was enrolled to participate in the study.

The study was carried out in two phases with the researcher meeting each of the subjects twice. At the first meeting, the study-subjects were recruited for the study after the aims, scope and procedures for the research were explained to them and a signed informed consent gotten. The next meeting was at the next clinic appointment between 8 – 9 a.m, following an earlier instruction to observe a 10 – 12 hours fast.

Laboratory procedures

At the second contact, 5 ml of venous blood sample was taken via venipuncture of the antecubital vein, following strict aseptic procedure, for laboratory tests that included glycated haemoglobin (HbA1c) and fasting plasma glucose (FPG). Two (2) ml of blood sample for HbA1c was collected from each of the subjects, stored in EDTA bottles and measured with automated CLOVER A1c Analyzer (Infopia, Korea) and CLOVER A1c Self-Test Cartridge using the boronate affinity method.[14] Similarly, 3ml of the blood sample for FPG was collected from each of the subjects, stored in fluoride oxalate bottles and measured by the Trinder glucose oxidase method.[15]

Clinical procedures

A focused examination that included fundoscopy, blood pressure and anthropometric measurements was done. Weight and height were measured using Stadiometer (RGZ-120), waist and hip circumference measured with a measuring tape and blood pressure measured using Accoson mercury sphygmomanometer, all in line with the WHO STEPS instruments. Subjects with diabetes duration of less than 5 years were classified as having short duration of DM, while those with DM duration of 5 years and above were classified as having long duration of diabetes

Definition of Terms and Criteria

Hypertension was defined as systolic blood pressure (BP) ≥ 140 mmHg and or diastolic BP ≥ 90 mmHg, measured on at least 2 separate occasions or if a patient is already on anti-hypertensive medications.[16]

Diabetes mellitus was defined by fasting plasma glucose (FPG) of ≥ 7.0 mmol/l (126 mg/dl) measured on at least 2 separate occasions or the patient is already on glucose lowering agents.[17]

Type 1 diabetes mellitus (DM) was defined as subjects with DM who are dependent on insulin for survival and are at risk for ketoacidosis.[17]

Type 2 DM was defined as patients with DM on diet therapy either alone or in combination with oral glucose lowering agent(s) for glycaemic control.[17] Gestational diabetes mellitus (GDM) was defined as glucose intolerance of variable degrees with onset or first recognition during pregnancy [17]

Young age was taken as 18-44 years, middle age as 45-64 years and older adults as 65 years and above [18]

Poor glycaemic control was taken as glycated haemoglobin (HbA_{1c}) $\geq 7.0\%$.[17]

Global obesity was defined by body mass index (BMI) >30 (kg/M²).[17]

Central obesity (abdominal obesity) was defined as waist circumference (WC) > 102 cm in men and 88 cm in women.[19]

Data Analysis

Data collected was entered into a spreadsheet using Microsoft Office Excel, and then analyzed using Statistical Package for Social Sciences (SPSS) version 25. Results of categorical variables were presented in tables as frequencies and percentages. The mean values and standard deviation for the continuous variables were calculated.

RESULTS

A total of 128 diabetic subjects were evaluated. The age of the subjects varied from 18 to 86 years with the mean determined as 59.41 ± 12.32 years. Majority of subjects were of middle age (58.6%) and old age (32.0%). There were more female subjects (59.4%) than male subjects (40.6%). About 32.0% of the subjects had primary or no formal education combined while 40.0% of the subjects had at least tertiary education. With respect to occupation, 41.4% were into business/trading, 29.7% were retired while 17.2% were public servants. 9.4% were single; 4.7% widowed while others were married (details in Table 1).

A total of 98.4% of the subjects had type 2 diabetes mellitus (T2DM) while 1.6% had type 1 diabetes mellitus (T1DM). Also 69.5% and 30.5% of the subjects had long and short duration of DM respectively while the mean duration of diabetes was 9.80 ± 8.14 years. The mean values of the body mass index (BMI) were 29.99 ± 5.65 kg/m², waist circumference (WC): 99.84 ± 14.3 cm, waist to hip ratio (W/H): 1.01 ± 0.10 , systolic blood pressure (SBP): 130.31 ± 18.67 mmHg, diastolic blood pressure (DBP): 78.67 ± 11.32 mmHg, fasting blood glucose (FBG): 9.25 ± 4.26 mmol/L and HbA1c: 8.80 ± 2.88 %.

Among the subjects, 23.4%, 71.9%, 63.3% and 46.1% had hypertension, poor glycaemic control, central obesity and global obesity respectively (details in Table 2).

Pie chart showing the prevalence of eye complications of diabetes mellitus

Amongst the subjects, 59.0 % had eye complications of diabetes while 41.0% had not (see Fig. 1).

Bar chart showing the pattern of eye complications of diabetes mellitus among the subjects

A total of 52.0% of the subjects had cloudy vision, 10.0% cataract, 3.0% had retinal bleeding, while 45.0% had none of these complications (see Fig. 2).

A total of 87.5% of the subjects were aware that DM could affect the eye, 78.1% that it could cause cataract and 7.8% that it could cause blindness. 24.2% of the subjects got their information from healthcare providers while 29.7% got theirs from friends and family members. 67.2% knew that good blood glucose control could prevent development of the eye disorders while 3.1% of the subjects believed that diabetes treatment (oral anti diabetic drugs) could cause eye disorders (details in Table 3).

Among the subjects, 66.4% had their eyes checked by an ophthalmologist, 35.2% had their eyes checked more than once yearly while 33.6% have never had eye check for mainly two reasons; 18.8% never thought it was necessary while 13.3% never had any eye problem or complaint.

Also, 44.5% of the subjects have received treatment for diabetes eye disease. The most common eye disorder necessitating treatment was cloudy vision (33.6%). The treatments received included eye glasses (24.2%), medications (11.7%) and surgery (8.6%). Only 21.1% of the subjects were still receiving treatment for diabetes eye disorder as at the time of the study.

Additionally, 60.2% of the subjects had not received any diabetes eye education from their diabetes doctors. 82.8% had never complained of any eye symptom to their diabetes doctors. Also, 96.1% responded that their diabetes doctors had never checked their eyes, while 89.1% said their diabetes doctor had never referred them to consult an ophthalmologist (details in Table 4).

Table 1: Socio-demographic characteristics of the study subjects

Variable	Frequency	Percentage (%)
Age		
Young age	12	9.4
Middle age	75	58.6
Old age	41	32.0
Mean = 59.41 ± 12.32 years		
Gender		
Male	52	40.6
Female	76	59.4
Educational level		
No formal	5	3.9
Primary	36	28.1
Secondary	36	28.1
Tertiary	46	35.9
Postgraduate	5	3.9
Occupation		
Business/trading	53	41.4
Public servant	22	17.2
Clergy	8	6.3
Farmer	2	1.6
Retired	38	29.7
Artisan	5	3.9
Marital status		
Single	12	9.4
Married	110	85.9
Widowed	6	4.7

Table 2: Clinical characteristics of the study subjects

Parameter	Mean/Frequency	SD/%
Body mass index (kg/m ²)	29.99	5.65
Waist circumference (cm)	99.84	14.31
Waist to hip ratio	1.01	0.10
Systolic blood pressure (mm Hg)	130.31	18.67
Diastolic blood pressure (mm Hg)	78.67	11.32
Fasting blood sugar (mmol/L)	9.25	4.26
HbA1c (%)	8.80	2.88
Duration of Diabetes (years)	9.80	8.14
Hypertension		
Present	30	23.4
Absent	98	76.6
Glycemic control		
Good	36	28.1
Poor	92	71.9
Central obesity		
Present	81	63.3
Absent	47	36.7
Global obesity		
Present	59	46.1
Absent	69	53.9
Type of DM		
Type 1	0	0
Type 2	126	98.4
GDM	2	1.6
Duration of DM		
Short	39	30.5
Long	89	69.5
Treatment for Diabetes		
1 oral antidiabetic drug (OAD)	88	68.8
2 or more OADs	11	8.6
Insulin only	2	1.6
OADs + Insulin	27	21.1

DM = diabetes mellitus; GDM = gestational diabetes mellitus; OADs = oral antidiabetic drugs

Table 3: Awareness of eye complications of diabetes mellitus among the subjects

Variable	Frequency	Percentage (%)
Eye complications		
Cloudy/blurred vision	100	78.1
Bleed in the eye (retinal & vitreous)	24	18.8
Cataract	19	14.8
Blindness	10	7.8
Don't know	17	13.3
Source of information on eye complications		
Healthcare professional	31	24.2
Internet	2	1.6
Mass media	4	3.1
Social media	1	0.8
Friends/family members	38	29.7
Personal experience & others	31	24.2
Good blood glucose control can prevent the development of eye complications		
Yes	86	67.2
No	13	10.2
Don't know	29	22.7
Diabetes treatment causes eye complications		
Yes	4	3.1
No	26	20.3
Don't know	98	76.6
Diabetes treatment thought to cause eye complications		
Insulin and other injectable antidiabetics	0	0
Oral antidiabetic drugs	4	3.1

Table 4: Routine eye care practices among the subjects

Variable	Frequency	Percentage (%)
Have you ever undergone eye check by an ophthalmologist?		
Yes	85	66.4
No	43	33.6
Frequency of eye check		
More than once a year	45	35.2
Once a year	15	11.7
Every 2 to 5 years	19	14.8
Every 6 to 9 years	6	4.7
More than 10 years	0	0
Reasons for not undergoing eye check		
Never thought it was necessary	24	18.8
Never had any eyes problem or complaint	17	13.3
Eyes check is expensive/No money	1	0.8
No time for eye check	1	0.8
Diabetes doctor has never referred for eye check	0	0
Have you received treatment for Diabetes eye disease?		
Yes	57	44.5
No	71	55.5
Eye disorder for which treatment was received		
Cloudy vision	43	33.6
Retinal haemorrhage	2	1.6
Cataract	12	9.4
Blindness	0	0
Kind of treatment received		
Surgery	11	8.6
Medications	15	11.7
Laser	0	0
Eye glasses	31	24.2
Are you currently receiving treatment for diabetes eye complications?		

Yes	27	21.1
No	101	78.9
Has your diabetes doctor ever told you that diabetes could affects the eyes?		
Yes	51	39.8
No	77	60.2
Have you ever complained of any eye symptom/blurring of vision to your diabetes doctor?		
Yes	22	17.2
No	106	82.8
Has your diabetes doctor ever examined/inspected your eyes?		
Yes	5	3.9
No	123	96.1
Has your diabetes doctor ever referred you to consult an eye specialist?		
Yes	14	10.9
No	114	89.1

Figure 1

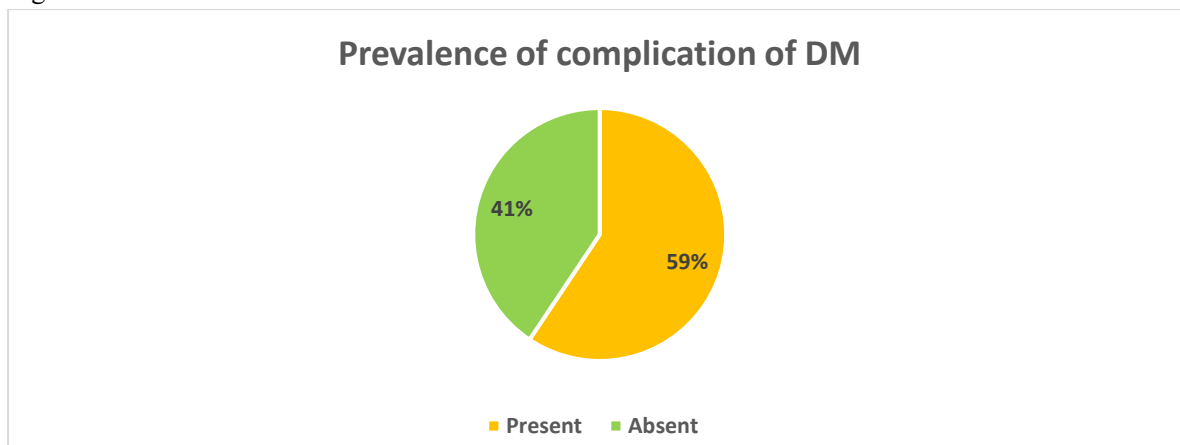
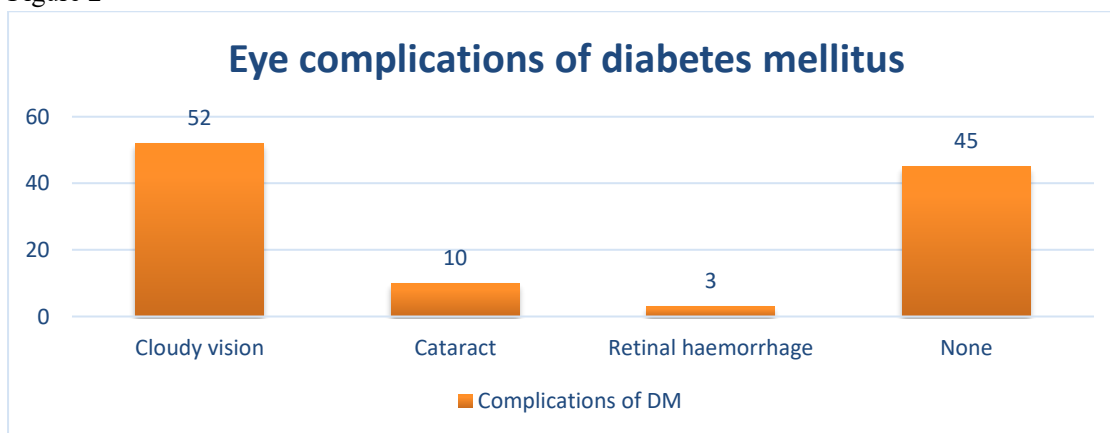


Figure 2



DISCUSSION

This study evaluated 128 DM subjects with a mean age of 59.41 ± 12.32 , 59.4% were female subjects and 40.6% were male subjects. Majority (58.6%) of the subjects were of middle age, 40.0% had at least tertiary education while 41.4% were businessmen by occupation. Equally, majority of the subjects had T2DM (98.4%), had poor glycaemic control (71.9%), central obesity (63.3%), long duration of DM (69.5%) and were on one OADs for the treatment of diabetes (68.8%). Also, 59.0% of the subjects had diabetic eye diseases while 41.0% had not. Among those that had DM eye diseases, 52.0%, 10.0% and 3.0% had cloudy vision, cataracts and retinal haemorrhage respectively. Comparable to the finding from this study, Abonyi et al equally in Southeastern Nigeria, studied 147 DM subjects of which the majority were of the female gender (63.3%), middle age (56.5%) and had T2DM (98.8%). [20] They also found that the majority (54.4% and 81.6%) of their subjects had central obesity and were on oral anti diabetic medications and this is equally similar to the findings from the index study that recorded 63.3% and 68.8% respectively. Contrasting to the index study that found that 59.0% and 69.5% of their study subjects had diabetic eye diseases and long duration of Diabetes respectively, Abonyi et al found that 47.7% and 18.7% of their study participants had long duration of DM and diabetic retinopathy (DR) respectively. [20] The reasons for the disparity could be linked to the facts that the index study evaluated a wider spectrum of diabetic eyes diseases, including cataracts. Secondly, both studies had different definitions for “long duration of diabetes”; for Abonyi et al, the subjects had a long duration of DM if they had DM for more than five years and for the index study, subjects who had long duration of DM had been diabetic for five years and above.

This study also found out that overall, 87.5% of the respondents were aware that DM caused eye diseases. Of this, the majority (78.1%) knew that DM could cause blurred vision, 18.8% that it could cause bleeding in the eye while 14.8% and 7.8% were aware it could cause cataract and blindness

respectively. The subjects’ sources of information on these were friends and family members (29.7%), healthcare professionals (24.2%) and from their personal experiences (24.2%). Also, over half (67.2%) of the respondents rightly agreed that good glycaemic control could prevent the development of diabetic eye complications, while 3.1% erroneously thought that the type of DM treatment the subject was receiving could cause diabetic eye diseases and pointed specifically at the oral anti diabetic drugs.

Bodunde et al found that 77.7% of their DM Subjects were aware that DM could affect the eyes. [3] This is similar to the 87.5% found by this study. Both studies enrolled participants with a comparable mean age: 58.53 ± 10.4 years by Bodunde et al and 59.41 ± 12.32 years by the index study.[3] On the other hand, Agwenye et al and Nathaniel et al, both in Southern Nigeria found that 88.0% and 56.9% of their diabetic subjects knew that DM could affect the eyes respectively.[10,21] Agwenye et al’s finding was very comparable to that of this study while Nathaniel et al’s figure was far below that of the index study. Agwenye et al studied a population of younger diabetics with a mean age of 53.8 ± 11.7 years compared to those of the index study.[10] Achigbu et al also in South-Eastern Nigeria also reported that 40.77% of their diabetic subjects knew that DM could cause ocular complications.[12]

The results of some other studies were comparable to that of the index study that found that 87.5% of DM subjects were aware that DM could cause eye diseases. In Ethiopia and Malaysia 79.1% and 86.0% DM subjects respectively were aware that DM could affect the eyes.[7,22] Contrasting to the finding from this study, a study done in Ghana found that only 3.8% of their diabetic patients were aware that DM could affect the eyes.[23].

The sources of information regarding the harmful effects of DM on the eyes reported by the subjects in this study included friends and family members (29.7%), healthcare professionals (24.2%) and personal experience (24.2%). Nathaniel et al contrastingly found that over half (79.2%) of their subjects were aware that DM could affect the eyes;

they got their information from health care personnel, a figure far more than that found by this study. The reason for this may be related to the unbalanced distribution of healthcare professionals in Nigeria, with higher numbers residing and working in the big cities. [21] Nathaniel *et al* did their study in Port Harcourt, a bigger city when compared to Onitsha where this study was done. Larger numbers of health care personnel increase the health care worker / patient ratio which invariably increases the rate and frequency of interaction between the health care workers and their patients. This allows more time for health education during consultations, with a resultant better positive impact on the patients' knowledge. Equally, Nathaniel *et al* reported that 16.1%, 9.0%, 8.2% and 5.7% of their respondents got their information about the effects of DM on the eyes from mass media (radio and television), internet, the print media and other sources respectively.[21] Notably also, these means of information dissemination are more readily available, efficient and accessible in big cities.

Lastly, Adriono *et al* reported that less than half (49.4%) of their diabetic patients were counselled on the need for eye examination by their physicians and this figure is very similar to the 38.9% reported by the index study.[24] The similarity in the finding of both studies could be related to the similarity in their methodology as both works had the same sampling technique and recruited subjects of similar age bracket, although Adriano *et al* studied a much larger population of diabetic subjects.

This study equally found that at least 59.4% of the subjects had an eye complication of DM and 66.4% had consulted an ophthalmologist for eye check. Also, 44.5% of the subjects had received one form of treatment or another from the ophthalmologist for diabetic eye diseases, the major form of treatment was prescription of eye glasses (24.2%) and the most outstanding reason for seeking treatment was cloudy vision. Of the 66.4% of the subjects that had consulted the ophthalmologist for eye check, 52.9% of them (35.2% of the entire subjects) had their eye check more than once per year and 17.6% (11.7% of the total subjects) could only manage yearly eye

check. 18.8% of the subjects never felt that routine eye check was necessary, 13.3% did not check their eyes because they never had eye complaints, while 0.8% felt that eye check was expensive.

These findings showed that eye check practices were poor among the subjects. As many as 33.6% of the subjects had never consulted the ophthalmologist, 11.7% could only manage yearly eye check while 18.8% of the subjects never felt that routine eye check was necessary. The finding from this index study was similar to that of Tassew *et al* that found that the pooled prevalence rate of eye care service utilization among diabetic patients in Africa was 40.92%. [11] Several reasons could account for these findings and they included poor education of the subjects by the attending physicians and other health care personnel, usually due to short consultation or contact time due to low physician to patient ratio occasioned by high brain drain of health care personnel in our setting. Also, a high percentage of diabetic patients in the sub-Saharan Africa patronize native doctors, faith healers and patent medicine dealers and a lot of other unorthodox health care practitioners for their diabetes treatment. Comparable to the index studies, two separate Nigerian studies equally found that 33.1% of DM subjects did not know that routine eye check was necessary for DM patients while only 3.1% of the subjects believed that eye check should be done yearly and 47.2% of the DM patients had never undergone eye check.[12,13] Similarly, in Ghana, 34.6% of the DM subjects had never had eye check since the diagnosis of their diabetes.[23] Equally, lack of proper diabetic education and resort to unorthodox means of diabetes management could be responsible for these short fall in diabetic eye checks and care found by these studies.

Tajunisah *et al* found that 43.8% of their DM subjects did not know how frequently they should undergo eye check. [22] AnulekhaMary *et al* found that 31.6% of their DM subjects felt that eye check was not necessary if they had no eye disease symptoms and this agrees quite well with result of this index study.[25]

Strengths and limitations

This study evaluated a broader spectrum of diabetic eye diseases that included cataracts and also eye care practices among diabetic subjects, compared to most other studies on this very important topic done in South Eastern Nigeria that focused mainly on diabetic retinopathy.

The eye examinations for the subjects were not done without dilating the pupils and that could limit visualization of the retina and the pathologies there. Also this study was carried out at a specialist diabetic clinic which is located in a semi-urban city and the findings may not reflect the true picture of diabetic eye diseases and diabetic eye care practices in the rural communities.

CONCLUSION

This study found that the prevalence rate of diabetic eye diseases among the subjects with T2DM was high and the awareness regarding the different diabetic eye diseases was equally poor. The contribution of the health care personnel regarding educating the DM patients on eye diseases and eye check practices is poor.

Health care personnel, especially consultant physicians should create more sensitization and empowerment of the diabetic subjects regarding eye complications of the disorder and the available management as early as possible following the diagnosis of DM, and the need for regular eye check. The government and policy makers should carry out their own sensitization via the mass and print media, by making conscious effort to improve the literacy levels of the people generally, training and employing more health personnel in the public hospital so as reduce the number of patients seen by the doctors and other health care personnel during clinic consultations. This will in turn give more room and time for more detailed interactions, patients' examination, education and necessary counseling.

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Data Availability: The data used to support the findings of this study would be made available by the corresponding author upon reasonable request.

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