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Hospital-Based Prevalence of Diabetic Retinopathy and Clinical Correlates among Diabetics Attending a Tertiary Eye Clinic in Makurdi Central Nigeria

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Abstract

Context: Diabetic retinopathy (DR) is the most common ocular complication seen in patients with diabetes mellitus. Periodic screening for DR in diabetics is recommended.
Objective: To determine the prevalence of diabetic retinopathy (DR) and clinical correlates of diabetic patients receiving care at the Benue State University Teaching Hospital (BSUTH), Makurdi, following screening for diabetic retinopathy.
Materials and Methods: A hospital- based analytic cross-sectional study was carried out among diabetic patients attending the endocrinology and general outpatient clinics at the BSUTH. Data was obtained using an interviewer-administered questionnaire. A comprehensive eye examination was conducted for all the participants. Descriptive analysis (frequencies and percentages for categorical data and mean with standard deviation for quantitative data) was done. The chi-square test and logistic regression were used to test the association between the outcome variable and independent variables at a level of significance of $p<0.05$.
Results: A total of 371 patients with an age range of 23-76 years (mean age 54.4 ± 11.6 years) were enrolled in the study. Majority (215, 58.0%) were females. About 144 (38.8%) of the patients had diabetic retinopathy. Macular oedema was detected in 64 (44.4%) of participants. The predictors of DR were duration of diabetes mellitus(AOR=1.29,$p<0.001$) poor glycaemic control with average FBS ≥7.0 mmol/L (AOR=2.87,$P<0.001$), systolic hypertension (AOR=2.31,$P=0.001$) and renal disease (AOR=3.27,$P<0.001$).
Conclusion: The hospital-based prevalence of DR in this study was high at 38.8% and the predictors of DR were duration of diabetes, poor glycaemic control, systemic hypertension and renal disease. Routine screening of diabetic patients (especially those with a longer history of DM) and early treatment of DR will reduce the risk of developing sight-threatening DR and blindness.

Keywords – Prevalence, Diabetic retinopathy, clinical correlates, Nigeria.

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Introduction

Diabetic retinopathy (DR) is the most common ocular complication seen in patients with diabetes mellitus (DM).[1] Chronic hyperglycaemia is a major factor in the onset and progression of DR because of its tissue damaging effects.[2] Hyperglycemia activates alternative pathways of glucose metabolism which

include the polyol pathway with advanced glycation end products (AGEs) formation, protein kinase C (PKC) activation and hexosamine pathway flux and Poly(ADP-ribose) polymerase activation.[3] These pathways lead to activation of cytokines and growth factors, leading to vascular endothelial dysfunction, increased vascular permeability, and eventual microvascular occlusion. Microvascular occlusion then leads to retinal ischemia, which promotes neovascularization and the formation of intraretinal vascular abnormalities.[1] Inflammatory cytokines are significantly up-regulated in diabetes, and as a result, chronic inflammation and endothelial damage lead to increased vascular permeability of blood vessels.[4] These retinal changes would ultimately lead to blindness if vascular leakages result in diabetic macular oedema (DMO). Blindness could also occur when ischaemia-induced neovascularization results in vitreous haemorrhage, tractional retinal detachment or neovascular glaucoma or when capillary occlusion results in macular ischaemia or papillopathy.[2]

Diabetic retinopathy is the leading cause of blindness globally among adults aged 50 years and above, accounting for 0.9% of blindness among the same age group in Sub-Saharan Africa.[5] It is a leading cause of blindness among the working-age group.[6] This has a significant impact on the life of the affected individual, the individual's family, and society at large. This is regrettably so because blindness from DR is preventable. Early detection through screening and early treatment with follow-up goes a long way in preventing blindness from DR.[7,8]

The global prevalence of diabetic retinopathy among diabetics was estimated at 27.0% between 2015 and 2018.[9] Both clinic-based studies and population-based studies in parts of Africa have reported different prevalence rates for DR. The former reported a rage of 7.0 – 62.4% in different clinics across Africa.[10] Previous population-based studies in Egypt, and Kenya reported a prevalence of 17.9% and 35.9% respectively.[11,12] A systematic review that determined the epidemiology of DR and Diabetic maculopathy in Africa between 1990 and 2011 reported a prevalence of 30.2–31.6% for DR, 0.9 – 1.3% for PDR and 1.2 – 4.5% for diabetic maculopathy.[10]

The prevalence of diabetes in Africa was 4.7% in the year 2015 and is projected to increase to 5.2% by the year 2045 in persons aged 20-79 years. Africa is also known to have the highest proportion of undiagnosed diabetics (59.7%) in the world.[13] In Nigeria, the pooled prevalence of diabetes in Nigeria was found to be 5.77%, with an estimated 11.2 million individuals (one out of every 17 adults) living with the disease.[14] The National Blindness and Visual impairment survey reported that almost half (48.1%)of the people found with DM were not aware of the diagnosis.[15] In the same survey, 20.5% of the diabetic population had DR. In the diabetic population, 10.8% had sight threatening PDR while 51.4% were found with macular oedema. Akaraiwe et in found a prevalence of 32.1% among diabetics at a DR screening centre in South- Eastern Nigeria.[16] This prevalence was close to the prevalence of 36% found among diabetic patients attending a hospital on Northern Nigeria.[17] The prevalence of DR and macular oedema in North-central Nigeria as found in a hospital-based study among diabetics in Jos Plateau state was 18.5% and 14.3% respectively.[18] There are no published findings on the prevalence of DR in Benue state.

The International Clinical Diabetic Retinopathy Disease Severity Scale,[19] classified DR based on clinical retinal findings into Non-proliferative DR (NPDR) and proliferative DR (PDR). It is classified as Mild NPDR when only microaneurysms are present, Moderate NPDR when more than just microaneurysms are present (but less than severe NPDR) and Severe NPDR when any one or more of severe haemorrhages in all 4 quadrants, significant venous beading in 2 or more quadrants, moderate IRMA in 1 or more quadrants - the 4-2-1 rule) is present. This carries a risk of PDR up to 50% within a year.

PDR is when one or more of, neovascularization, vitreous/pre-retinal haemorrhage or tractional retinal detachment occurs.[19] Diabetic retinopathy usually progresses through these stages, ultimately resulting in vision loss without an intervention.

Diabetic macular oedema (DMO) can run an independent course and occur at any stage of retinopathy.[20] It is classified by the International Clinical Diabetic Macular Oedema Severity Scale as follows: Diabetic macular oedema absent (No retinal thickening or hard exudates in the posterior pole) and Diabetic macular oedema present (Some retinal thickening or hard exudates in the posterior pole). Vision-threatening DR (VTDR) is the stage of DR that would soon result in blindness if left untreated.

This includes severe NPDR, PDR, and DMO.[21]
Interventions and follow-up schedules for diabetic patients following DR screening, depend on the grade of DR identified on clinical examination of diabetics.[22] Diabetic retinopathy screening which guarantees early detection and intervention for people living with DM has been shown to reduce the incidence of blindness from diabetic retinopathy.[7]
Various screening approaches and guidelines have been adopted by health systems across the world. The American Academy of Ophthalmology's (AAO) preferred practice pattern for DR recommends primary eye examinations for type 1 diabetics within 5 years after diagnosis, while type 2 diabetics should be screened at the time of diagnosis. Follow up should be yearly if no DR or mild NPDR is detected.[23]
The national guideline for DR screening in Nigeria recommends screening patients with Type 1 DM annually, from 12 years of age and annually from diagnosis for patients with type 2 DM.[24]
Risk factors for DR include duration of DM, Urban residence, overweight/obesity, lower high-density lipoprotein (HDL) cholesterol, and moderate triglyceride HDL cholesterol ratio.[15,25]
The purpose of this study was to determine the prevalence of diabetic retinopathy and clinical correlates of diabetic patients receiving care at the Benue State University Teaching Hospital Makurdi, following screening for DR. This will provide data for policy and interventions in Makurdi and its environs. It will be an advocacy tool that will encourage stakeholders to key into the national guidelines for diabetic retinopathy screening outlined by Nigeria's National Eye Health Program (NEHP).

Methods and materials

Study Area: The study was conducted in the General out patient department (GOPD), Endocrinology and Ophthalmology clinics, of the Benue State University Teaching Hospital (BSUTH), Makurdi, Benue State, Nigeria. The hospital is a tertiary care centre located in the state capital with a capacity of over 350 beds.
The GOPD attends to patients of different ages with varying health problems on an outpatient basis. The Endocrinology unit is a sub-specialty unit that caters to the needs of patients with endocrine system disorders, one of which is diabetes. The ophthalmology department offers general ophthalmology care, with sub-specialty services in oculoplasty, glaucoma, and paediatric ophthalmology. The departments served as the main faculty for this study.
Study Population: This includes all consenting adult diabetic patients attending the endocrinology and general out-patient clinics at the BSUTH.
Inclusion and exclusion criteria: Those included in the study were clinically stable diabetics, 18 years and above. While those too sick (physically and mentally) or in-patients were excluded.
Study Design: This was an analytic cross-sectional, hospital- based study conducted over an eight month period (November 2020 - June 2021).
Sample size determination: A minimum sample size of 371 study participants was calculated (after accounting for 10% attrition) using the Leslie-Kish formula.[26] $n = Z^2 \times P(1-p)/D^2$. Where n = desired sample size, Z = The standard normal deviate set at 1.96, which corresponds to the 95% confidence level, p stands for the prevalence of 32.1% in an existing study, and d = degree of accuracy desired = 0.05 and Z = The standard normal deviate set at 1.96, which corresponds to the 95% confidence level
Sampling Technique: Diabetic patients were selected for the study as they attended the endocrinology clinic during the study period. Patients who gave their consent and met the inclusion criteria were included in the study through a systematic random sampling technique. The sampling frame was the register of patients with diabetes attending the general outpatient and endocrinology clinics. The first patient was selected by simple random sampling (balloting). Thereafter, a sampling interval of 2 was used to select subsequent participants. If for any reason, the patient to be selected declines or has already been sampled, the next patient in the sampling frame was selected. Systematic random sampling continued until the sample size was attained.
Study Instruments: A semi-structured interviewer-administered questionnaire was used for data collection. It was translated to native languages by translation specialists and then back-translated to English for consistency and to ensure the questions retained their original meaning. The questionnaire was divided into four sections: A to D which were biodata, past medical history, diabetic retinopathy awareness/ practices and clinical data (ocular and systemic examination data). The questionnaire was

developed and standardized by review of previous literature. Content validation was done by experienced supervisors.

Other materials used for the study include illuminated Snellen's visual acuity chart, weighing scale, stadiometer, mercury sphygmomanometer (for measuring blood pressure), slit-lamp biomicroscope (to examine the anterior segment of the eye), a Goldman applanation tonometer (to measure intraocular pressure - IOP), 0.5% amethocaine drops to anaesthetize the cornea for IOP and gonioscopy, a Goldman 2-mirror gonio lens with methyl cellulose as a coupling agent (to examine the anterior chamber angle), a binocular indirect ophthalmoscope (Welch Allyn 12500) (to examine the fundus of the eye), a 78D Volk lens was (to examine the optic disc and macula), 0.8% Tropicamide and 5% Phenylephrine combination (for pupillary dilation) and a Canon CR-2 plus AF digital fundal camera (to take fundal photographs for grading of DR).

Study Procedure: Each of the enrolled participants had their biodata and history captured on an interviewer-administered questionnaire in the appropriate language. A retrospective clinical record review was also carried out to clarify the type. duration of DM, treatment, co-morbidities and to determine the patient's average fasting blood glucose (FBG) over the preceeding 3 to 6 months. In this study, any diagnosis of DM before age 30 was classified as type 1 while a DM diagnosis after 30 years of age was classified as type 2.[27,28] This was done by the principal researcher and research assistants.

The blood pressure and the anthropometric measurements (height, weight) were obtained, and the body mass index (BMI) was calculated using these parameters and classified as Underweight ($<18.5 Kg/m^2$), Normal (18.5 to 24.9 Kg/m^2), Overweight (25 to 29.9 Kg/m^2) and Obese ($\geq$ 30 Kg/m^2).[29]

Hypertension was regarded as an average systolic blood pressure of ≥140mmHg, average diastolic blood pressure of ≥90mmHg or use of antihypertensive medication.[30]

The presenting (unaided) and aided visual acuities (VA) were obtained in either eye using an illuminated Snellen's chart which was read at six meters (6M)

'External eye examination (lid and ocular adnexa, ocular alignment and extraocular motility) of each patient was done with a pen torch, and the findings documented. Other examinations conducted using a slit lamp bio-microscope were anterior segment examination, IOP measurement, and gonioscopy with a Goldman 2- mirror gonio-lens, in a dimly lit room. Dilated fundoscopy was carried out with the binocular indirect ophthalmoscope and 78D volk lens'.

The participants then had their fundal photographs taken using a Canon CR-2 plus AF digital fundal camera. A 2-field (one centered on the disc and another centered on the macula) digital fundal photograph of the fundus was taken using the Canon CR-2 plus AF digital fundal camera with a 45° field of view.

The photographs were assessed by two independent graders by viewing 'full screen' images on a 21.5-inch monitor and a final interpretation recorded. In cases where there were conflicting interpretations, that senior ophthalmologist was recorded.

The presence or absence of DR was documented, and DR was graded if present. A patient was diagnosed as having DR if features of DR or DMO were noted in either eye. Features which included the presence of one or more of retinal microaneurysms, haemorrhages, exudates, cotton wool spots, venous beading, intraretinal vascular abnormalities, neovascularisation, macular oedema, tractional retinal detachment or vitreous haemorrhage.[19] Diabetic retinopathy was classified into non-proliferative diabetic retinopathy (NPDR) which could be mild, moderate or severe or proliferative diabetic retinopathy (PDR) using the International Clinical Diabetic Retinopathy Disease and Macular Oedema Severity Scale classification of DR.[31]

The eye with the higher DR grade was used for analysis. Patients with Severe NPDR, PDR or clinically significant/ symptomatic macula oedema were referred for further specialised management.

Data management and analysis: The data obtained was entered and analysed using the International Business Machines (IBM) statistical package for social sciences (SPSS) version 23.

Independent variables such as age, gender, and sex were inputted, and descriptive analysis (mean and standard deviation for quantitative variables and frequencies and percentages for categorical variables) was done and presented as tables and charts. Bivariate analysis was carried out using chi-square for categorical variables to test the association between the outcome variable and independent

variables. Multivariate analysis (logistic regression) was then used to control confounders. A p-value < 0.05 was accepted as statistically significant.

Ethical consideration: The study adhered to the tenets of the Helsinki declaration.[32] Ethical approval was obtained for the study from the Ethics and Research Committee of the hospital (BSUTH/CMAC/HREC/2020/008). Written informed consent was obtained from all participants. Participants were assured of strict confidentiality of information and their liberty to withdraw from the study at any time they did not feel comfortable to continue in the study.

Table 1: Sociodemographic Characteristics of Participants

Variable	Male		Female		Total	
	Frequency	Percent (%)	Frequency	Percent (%)	Frequency	Percent (%)
Age (years)						
<30	3	0.8	0	0.0	3	0.8
30 – 39	26	7.0	21	5.7	47	12.7
40 – 49	18	4.8	46	12.4	64	17.2
50 – 59	45	12.1	72	19.4	117	31.5
60 – 69	34	9.2	62	16.7	96	25.9
≥70	30	8.1	14	3.8	44	11.9
Total	**156**	**42.0**	**215**	**58.0**	**371**	**100.0**
Educational Status						
None	6	1.6	43	11.6	49	13.2
Primary	16	4.3	39	10.5	55	14.8
Secondary	37	10.0	45	12.1	82	22.1
Tertiary	97	26.1	88	23.8	185	49.9
Total	**156**	**42.0**	**215**	**58.0**	**371**	**100.0**

Table 2: Disease Characteristics of Participants

Variables	Frequency(n=371)	Percent (%)
Duration of Diabetes Mellitus (years)		
<5	106	28.6
5 – 9	121	32.6
10 – 14	60	16.2
15 – 19	51	13.7
≥20	33	8.9
Type of DM		
1	21	5.7
2	350	94.3
Type of Treatment		
Oral hypoglycaemics	306	82.5
Insulin	37	10.0
Insulin and Oral Hypoglycaemics	28	7.5
Co-existing Hypertension		
Yes	257	69.3
No	114	30.7
Fasting Plasma Glucose (mmol/L)		
<7.0	128	34.5
≥7.0	243	65.5
Co-existing renal disease		
Yes	63	17.0
No	308	83.0
Last HBA1c (mmol/L) (n=21)		
<7.0	3	14.3
≥7.0	18	85.7
Treatment of hyperlipidaemia		
Yes	51	13.7
No	320	86.3

Results

A total of 371 diabetic patients participated in the study. The mean age of the participants was 54.4 ± 11.6 years, with a range of 23 to 76 years. The male to female ratio (M: F) was 1:1.4. The majority 255 (68.7%) of the participants were of the Tiv ethnic group and about 185 (50%) had tertiary education. The median duration of DM was 9.0 years (interquartile range – 6.0). The mean FBS was 8.9 ± 3.3 mmol/L. There were 257 (69.3%) participants with co-existing hypertension and 63 (17.0%) with co-existing renal disease. Only 21 participants (5.7%) had documented HbA1C results.

Table 3: Systemic Examination Findings of Participants

Variable	Frequency(n=371)	Percent (%)
Systolic BP (mmHg)		
Normal	306	82.5
Elevated	65	17.5
Diastolic BP (mmHg)		
Normal	199	53.6
Elevated	172	46.4
BMI (kg/m^2)		
Normal	49	13.2
Overweight	175	47.2
Obese	147	39.6

Most of the patients had controlled systolic (82.5%) and diastolic (53.6%) blood pressure while the majority of the patients were either overweight (47.2%) or obese (39.6%).

Table 4: Presenting Visual Acuity of Participants

Visual Acuity		Right Eye		Left Eye	
Snellen	(LogMAR)	Frequency	Percent (%)	Frequency	Percent (%)
6/5	-0.08	23	6.2	20	5.4
6/6	0.00	50	13.5	70	18.9
6/9	0.17	81	21.8	73	19.7
6/12	0.30	63	17.0	68	18.3
6/18	0.48	39	10.5	27	7.3
6/24	0.60	29	7.8	45	12.1
6/36	0.77	52	14.0	29	7.8
6/60	1.00	24	6.5	2	0.5
CF	2.00	4	1.1	8	2.2
HM	3.00	3	0.8	18	4.9
LP	5.00	3	0.8	11	3.0
	Total	371	100.0	371	100.0
	Mean (LogMAR)	**0.44 ±0.59**		**0.46 ±0.63**	

CF= counting fingers, HM= hand movement, LP= light perception

Figure 2: Proportion of Patients with Diabetic Retinopathy (DR)

Diabetic macular oedema was found in 64 (44.4%) of the patients with DR.

Ocular Examination
A total of 742 eyes of 371 patients were examined.

The proportion of patients with normal presenting visual acuity increased from 62.3% to 84.9% when aided with a pinhole.

Table 5: Ocular Abnormalities Detected (All Eyes) in Participants

Variable	Frequency	Percent (%)
Preseptal cellulitis	1	0.2
Ptosis	7	1.1
Stye	1	0.2
Xanthelasma Palpebrum	3	0.5
Pterygium	64	10.3
Iris Neovascularisation	3	0.5
Early Lens Opacity*	232	37.3
Cataract**	16	2.6
Aphakia	5	0.8
Asteroid hyalosis	2	0.3
Hypertensive retinopathy***	30	4.8
Glaucoma	110	17.7
Age Related Macular Degeneration	4	0.6
Diabetic Retinopathy/ macular oedema	144	23.1
Total	**622**	**100.0**

** lens opacity allowing visualisation of the fundus (WHO grading less than or equal to NUC 2, COR 2, PSC 1).[33]*
***Any lens opacity precluding visualisation of the fundus (WHO grading greater than NUC 2, COR 2, PSC 1).[34]*
****characterised by retinal arteriolar narrowing, arteriovenous nipping, or copper wiring in hypertensive patients.[34]*

Fundal examination could not be carried out in 16 eyes of 16 patients due to media opacities. 18 eyes were pseudophakic, 12 patients had early lens opacity (ELO) with pterygium (reported under pterygium) and 3 patients had ELO with Iris neovascularization (reported under iris neovascularization)
The presence of DR was significantly associated with DM duration, plasma glucose ≥7.0mmol/L, uncontrolled systolic hypertension and renal disease (p<0.001)

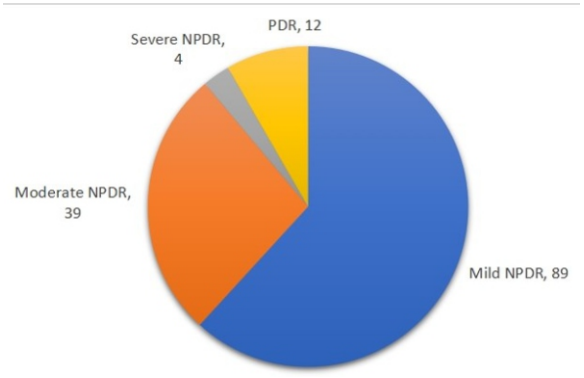

Figure 3: Distribution of Grades of Diabetic Retinopathy

Majority [89 (61.8%)] of patients with DR had mild NPDR

Table 6: Association between diabetic retinopathy and selected variables among Participants

Variable	Diabetic Retinopathy			Chi-square	p-value
	Yes(%)	No(%)	Total(%)		
Duration of Diabetes Mellitus (years)					
<5	9(8.5)	97(91.5)	106(100.0)	114.35	*<0.001
5 9	34(28.1)	87(71.9)	121(100.0)		
10 14	34(56.7)	26(43.3)	60(100.0)		
15 19	40(78.4)	11(21.6)	51(100.0)		
>20	27(81.8)	6(18.2)	33(100.0)		
Average Fasting Plasma Glucose (mmol/L)					
<7.0	33(25.8)	95(74.2)	128(100.0)	13.98	*<0.001
≥7.0	111(45.7)	132(54.3)	243(100.0)		
HBA1C (mmol/L)					
<7.0	2(66.7)	1(33.3)	3(100.0)	0.509	0.586
≥7.0	8(44.4)	10(55.6)	18(100.0)		
Systolic B.P (mmHg)					
Normal	107(35.0)	199(65.0)	306(100.0)	10.882	*0.001
Elevated	37(56.9)	28(43.1)	65(100.0)		
Diastolic B.P (mmHg)					
Normal	74(37.2)	125(62.8)	199(100.0)	0.479	0.522
Elevated	70(40.7)	102(59.3)	172(100.0)		
Treatment for Hyperlipidaemia					
Yes	19(37.2)	32(62.8)	51(100.0)	0.061	0.806
No	125(31.9)	195(68.1)	320(100.0)		
Renal Disease					
Yes	37(58.7)	26(41.3)	63(100.0)	12.675	*<0.001
No	107(34.7)	201(65.3)	308(100.0)		

**Statistically significant*

Table 7: Odd's Ratio and Logistic Regression of Significant Variables for Diabetic Retinopathy

Variable	AOR	95% Confidence Interval	p-value
Fasting Blood Sugar			
≥7.0	2.869	1.730 – 4.757	0.001*
<7.0	Reference		
Systolic BP (mmHg)			
Elevated	2.305	1.316 – 4.037	0.004*
Normal	Reference		
Renal Disease			
Yes	3.267	1.810 – 5.897	<0.001*
No	Reference		
Diabetes Duration (years)	1.286	1.221 – 1.354	<0.001*

AOR = Adjusted Odds ratio *statistically significant

For every additional year of diabetes duration, there was a 1.286 increase in the risk of diabetic retinopathy and this was statistically significant (p<0.001).

Discussion

The mean age of the participants was 54.4 ± 11.6 years, with a range of 23 to 76 years. The mean age was similar to that in the studies in Nigeria by Nwosu et al (57.2 years), 35 Ashaye et al (57.5 ± 10.4 years)[36] and Lawan et al (52.14 ± 13.23 years).[17] The mean age was lower than the mean found in the study by Kizor-Akaraiwe et al[16] in which patients included in the study were those who came for eye screening after being invited from their diabetic clinics. These patients were more likely to be older patients who have ocular symptoms, as a large proportion of acquired eye diseases commonly occur with increasing age. There was a male to female ratio of 1:1.4 which is similar to that found in the study by Lawan et al,[17] but at variance with other studies

within Nigeria.[16,17] This may be because men were more likely to be at work during clinic hours when the study was carried out. Another possible reason may be that DM is likely to be unmasked during pregnancy resulting in more women being aware that they have DM.

More patients (94.3%) had Type 2 DM which is in keeping with both local and global trends.[15,17,37]

Diabetic retinopathy was found in 144 (38.8%) of the patients examined. This is similar to findings in other hospital-based studies within Nigeria that reported DR rates of between 32.1 to 41%.[15,16,17,38] This finding is, however, much higher than the prevalence of 15% reported by Omolase et al.[19] This may be because they used direct ophthalmoscopy which is less sensitive than fundal photography which was used in this study, for the diagnosis of DR. Thus, some DR might have been missed.

The presence of DR was significantly associated with the duration of DM in this study (<0.001). There was a steady increase in the proportion of patients with DR as the duration of DM increased. Lawan et al28 also found an association between DR and a duration of DM longer than 15 years. There was also an association between DM duration of 11 years or longer and DR in another Nigerian study.[16] There was a 1.3 increase in the risk of diabetic retinopathy for every additional year of DM duration. This finding may be due to the prolonged and cumulative effect of risk factors. Voigt et al in their study of type 2 diabetic patients found that the prevalence of DR increased with increasing duration of DM. They proposed decreasing the frequency of DR screening among patients with well-controlled diabetes for less than ten years without complications from yearly to biennially.[39]

Significant associations were also found between DR and poor glycaemic control with average FBS ≥7.0 mmol/L (P<0.001), systolic hypertension (P=0.001) and renal disease (P <0.001). These associations were also found in other studies including randomised controlled clinical trials which showed that controlling these risk factors reduces the chances of developing DR and its progression.[40-43] They have also been established as risk factors for the development of DR. A study by Saini et al among DR patients found that the presence and severity of diabetic retinopathy could predict the presence and severity of diabetic nephropathy.[44] Diabetic patients with systolic hypertension should be monitored closely for the development of DR. The importance of blood pressure control and DR screening should be communicated clearly to such patients by their managing physicians. Only 21 participants had their HbA1c levels recorded. The association between DR and a high HbA1C was not significant in this study and is not in keeping with other studies.[40,42] This may be because the proportion of patients with available HbA1C results was little and thus such inferences may be unreliable.

This study did not use HbA1C one of the clinical parameters. This is a limitation as HbA1C is a better predictor of glycaemic control than fasting blood sugar. However, this does not negate the important evidence generated and reported by this study.

Conclusion

The prevalence of DR was high, and occurrence of DR is found to be associated with a longer duration of diabetes mellitus, poor glycaemic control, systolic hypertension, and renal disease. Adequate control of blood glucose and comorbidities may significantly reduce the risk of developing diabetic retinopathy. Routine screening of diabetic patients (especially those with a longer history of DM) and early treatment of DR will reduce the risk of developing sight-threatening DR and blindness.

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