

## Research Article

# Awareness of Diabetic Retinopathy among Patients with Diabetes Mellitus in Ilorin, Nigeria

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### Abstract

**Background:** Diabetic retinopathy is a major cause of blindness worldwide. The associated loss of productivity and quality of life of the patients with diabetic retinopathy will lead to additional socioeconomic burden. This study aims to determine the level of awareness of diabetic retinopathy among diabetic patients. **Materials and Methods:** This hospital-based cross sectional study, was carried out at the Diabetic and Ophthalmology clinics of University of Ilorin Teaching Hospital, Nigeria from November 2011 to July 2012. A total of 365 patients had validated, semi-structured, and interviewer-administered questionnaires to obtain information on socio-demographic characteristics, clinical information and awareness of diabetic retinopathy. **Results:** A total of 365 patients were enrolled, with age between 19 and 90 years, and a mean of  $45.8 \pm 16.3$  years. The male to female ratio was 1: 2.2. Ninety-nine respondents (27.1%) had no education. The majority (30.4%) had only primary education; 21.1% had tertiary; 14.5% had secondary while 6.8% had Quranic education. The mean duration of diabetes mellitus was  $14.1 \pm 13.09$  years. Of the 365 patients with diabetes mellitus, 279(76.4%) had heard that diabetes mellitus affects the eyes, while 86(23.6%) had not. Of those who had heard, 221(79.2%) heard it from health personnel, 45(16.1%) from radio/television, 25(9.0%) from internet, 23(8.2%) from books/newspapers, while 16(5.7%) heard from other sources. **Conclusion:** There was a high level of awareness of diabetic retinopathy amongst the patients. However, the high level of awareness of the blinding complication of diabetes mellitus did not translate to a correspondingly high level of ocular examination for diabetic retinopathy.

**Keywords:** Awareness, Diabetic retinopathy, Diabetes mellitus, Eye examination

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## الملخص

**الخلفية:** اعتلال الشبكية السكري هو أحد الأسباب الرئيسية للعمى في جميع أنحاء العالم. إن الخسارة المرتبطة بالإنتاجية ونوعية الحياة للمرضى المصابين باعتلال الشبكية السكري ستؤدي إلى عبء اجتماعي اقتصادي إضافي. تهدف هذه الدراسة إلى تحديد مستوى الوعي باعتلال الشبكية السكري بين مرضى السكري.

**المواد والطرق:** أجريت هذه الدراسة المقطعية المستندة إلى المستشفى، في عيادات السكري وأمراض العيون في مستشفى جامعة إيلورين التعليمي، نيجيريا من نوفمبر ٢٠١١ إلى يوليو ٢٠١٢. و للحصول على معلومات عن الخصائص الاجتماعية والديموغرافية والمعلومات السريرية والوعي بمرض اعتلال الشبكية السكري من ٣٦٥ مريضا، تم استخدام استبيانات مدروسة ومعدة لهذا الغرض مع اجراء المقابلات.

**النتائج:** تم تسجيل ما مجموعه ٣٦٥ مريضا، تراوحت أعمارهم بين ١٩ و ٩٠ سنة، ومتوسط عمر ٤٥,٨ ± ١٦,٣ سنة. وكانت نسبة الذكور إلى الإناث ١:٢,٢. ولم يتلق ٩٩ (١,٢٧) % مشاركا أي تعليم. أما الأغلبية (٣٠,٤) % فلم يحصلوا إلا على التعليم الابتدائي؛ و ٢١,١ % لديهم التعليم العالي. ١٤,٥ % منهم ثانويون و ٦,٨ % لديهم تعليم قرآني. كان متوسط مدة داء السكري ١٤,١ ± ١٣,٠٩ سنة. من بين ٣٦٥ مريض مصاب بداء السكري، ٢٧٩ (٧٦,٤) % سمعوا أن داء السكري يؤثر على العينين، في حين أن ٨٦ (٢٣,٦) % لم يسمعوا بذلك. من بين الذين سمعوا، ٢٢١ (٧٩,٢) % سمعوا من العاملين في المجال الصحي، و ٤٥ (١٦,١) % من الإذاعة والتلفزيون، و ٢٥ (٩,٠) % من الإنترنت، و ٢٣ (٨,٢) % من الكتب / الصحف، في حين أن ١٦ (٥,٧) % سمعت من مصادر أخرى.

**الاستنتاج:** كان هناك مستوى عال من الوعي عن اعتلال الشبكية السكري بين المرضى. ومع ذلك، فإن المستوى العالي من الوعي بالمضاعفات المسببة للعمى من مرض السكري لم تترجم إلى مستوى عال للمقابلة من فحص العين السريري لاعتلال الشبكية السكري.

## 1. Introduction

Diabetes Mellitus (DM) is a chronic metabolic disorder of multiple aetiologies [1] It is associated with various forms of both acute and chronic complications, which often lead to premature death [2]. DM increases the risk of a range of eye diseases including cataract, but the main cause of blindness associated with DM is diabetic retinopathy (DR) [3].

Vision threatening DR is treated most commonly with laser to prevent visual impairment and blindness [3]. Studies have shown that the incidence of blindness from DR is significantly reduced by early treatment with laser photocoagulation [4, 5]. DR has few symptoms until vision loss develops. Early treatment can only be

instituted if retinopathy is detected early by regular ocular examination through a screening programme for patients with DM.

In the United States of America (USA), DR accounts for 12,000 – 14,000 new cases of blindness yearly. It also accounts for 11.9% of all blind registration in those aged 16–64 years in the United Kingdom (UK) [6]. In the recently concluded Nigerian Blindness Survey, DR accounted for 0.02% of the total blindness in Nigeria in adults 40 years and above [7]. Sadly, there is no treatment that can restore vision that has already been lost from DR. Fortunately, DR has a ten to twenty-year delay before onset allowing a small window of opportunity for early detection through regular and routine screening and treatment [3]. In our institution, University of Ilorin Teaching Hospital (UIITH), Nigeria with the availability of Laser equipment and the human resources to deliver Laser photocoagulation, the goal is to reduce blindness from DR by providing prompt treatment (laser photocoagulation). There is a paucity of information on patient's level of awareness of DR, and screening protocols for DR. This study was therefore designed to determine the level of awareness of DR with a view to developing a protocol for screening of DM patients in order to achieve this goal.

## 2. Patients and Methods

This was a hospital-based cross sectional study, carried out at the Diabetic and the Ophthalmology clinics of UIITH, Nigeria from November 2011 to July 2012.

### 2.1. Sample Size Determination

The minimum sample size was calculated using the Fisher's formula [8]

$n = Z^2 pq/d^2$ , where n = required sample size.

Z = standard normal distribution corresponding to specified confidence level = 1.96 with a confidence level of 95%.

p = 15.1% [9]

q = 1-p = 0.849

d = degree of accuracy=0.05

$n = 1.96 \times 1.96 \times 0.151 \times 0.849 / 0.05 \times 0.05 = 197$  patients.

Correcting for 10% attrition rate,  $10/100 \times 197 = 19.7$ .

197 patients plus 20 (for attrition) = 217 patients as the minimum sample size.

A total of 365 patients were eventually recruited for the study. Validated, semi-structured, interviewer-administered questionnaires were administered to obtain information on socio-demographic characteristics, and clinical information on DM. Laboratory investigations such as fasting blood glucose, and urinalysis were carried

out. Patients with confirmed diagnosis of DM, and those on treatment for DM were enrolled. Patients who decline consent were excluded.

## 2.2. Subject Selection

On each clinic day, an average of 60 DM patients were seen. The list and case notes of all patients booked to be seen at the clinic were retrieved from the medical records department a day before the clinic. Using a systematic random sampling technique, 20 DM patients were selected and screened on each clinic day. The case notes of the selected patients were marked to prevent them from being recruited again at their next clinic visit. The first patient to be recruited each clinic day was chosen by balloting in a simple random fashion. Thereafter, with a sampling interval of 3, every 3rd patient was selected using a systematic random sampling technique. Patients with confirmed diagnosis of DM, and those on treatment for DM were included in the study.

## 2.3. Laboratory Tests

About 2 ml of venous blood was drawn from the antecubital vein using a vacutainer needle into fluoride oxalate for fasting blood glucose. The blood samples were analysed in the general laboratory of the hospital on the day of collection according to standard protocol. About 2ml of urine sample was also collected (into a sterile universal sample bottle) from the patients for urinalysis using a reagent strip.

Approval for the study was obtained from the Ethics and Research committee of the UIH. Verbal and informed consent was obtained from all the participants.

## 2.4. Statistical Analysis

Data collation and editing were done manually to detect omission and ensure uniform coding. The data was entered into a computer and statistical analysis was carried out with Epi-info version 6.1 statistical software. Frequency tables were generated for all the variables. Quantitative variables were expressed as mean and standard deviation.

## 3. Results

A total of 365 patients were enrolled, with age ranging from 19 and 90 years, and a mean age of  $45.8 \pm 16.3$  years. The male to female ratio was 1: 2.2 (Table 1).

Mean  $\pm$  SD =  $45.83 \pm 16.28$ .

Age distribution	Frequency	Percentage (%)
≤20	2	(0.5)
21-30	7	(1.9)
31-40	20	(5.5)
41-50	50	(13.7)
51-60	108	(29.6)
61-70	119	(32.6)
71-80	49	(13.4)
81-90	10	(2.7)
Total	365	(100.0)

TABLE 1: Age distribution of respondents.

Education Level	Frequency	Percentage (%)
No formal Education	99	(27.1)
Quranic only	25	(6.8)
Primary	111	(30.4)
Secondary	53	(14.5)
Tertiary	77	(21.1)
Total	365	(100.0)

TABLE 2: Frequency distribution of educational status of respondents.

Ninety-nine respondents (27.1%) did not have any form of formal education. One hundred and eleven respondents (30.4%) had only primary education; 77 (21.1%) had tertiary education; 53(14.5%) had secondary education; while 25(6.8%) had Quranic education (Table 2).

Out of the 365 patients, 141 (38.6%) were traders; 87 (23.8%) were retired civil servants; 56 (15.3%) were serving civil servants; 43(11.8%) were unemployed; 23 (6.3%) were artisans; 11(3.0%) were farmers; while 4(1.1%) were students (Table 3).

Type 2 DM was the main type of DM - 352(96.4%) respondents had type 2 DM, 12(3.3%) respondents had type 1 DM.

While 1 respondent (0.3%) had gestational DM.

The mean duration of DM was  $14.1 \pm 13.09$  years. Majority of the patients 203 (55.6%) had DM for 1-10 years, 66 patients (18.1%) had DM for 11-20 years, 49 patients

Occupational Status	Frequency	Percentage (%)
Trading	141	(38.6)
Retired	87	(23.8)
Civil Servant	56	(15.3)
None	43	(11.8)
Artisan	23	(6.3)
Farmer	11	(3.0)
Student	4	(1.1)
Total	365	(100.0)

TABLE 3: Frequency distribution of respondents' occupation.

(13.4%) had DM for 21-30 years, while 47 patients (12.9%) had DM for longer than 30 years.

### 3.1. Awareness of Diabetic Retinopathy

Out of the 365 patients with DM, 279(76.4%) had heard that DM affects the back of the eyes, while 86(23.6%) had not. Out of those who had heard, 221(79.2%) heard it from health personnel, 45(16.1%) from radio/television, 25(9.0%) from internet, 23(8.2%) from books/newspapers, while 16(5.7%) heard from other sources.

Two hundred and thirty-one (63.3%) respondents knew DM can cause blindness, 34(9.3%) said DM cannot cause blindness, while 100(27.4%) said they don't know if DM can cause blindness.

Majority 297(81.4%) believed eye examination for DR was necessary, 18(4.9%) believed eye examination for DR was not necessary, while 50(13.7%) said they don't know. Out of those who believed eye examination for DR was necessary, 65(21.9%) think it should be carried out every 6 months, 31(10.4%) think it should be every one year, 16(5.4%) think it should be when there are problems with the eyes, while 185(62.3%) said they don't know (Table 4).

### 3.2. Previous Eye Examination for DR

Only 83(22.7%) respondents have had eye examination on account of DM, while 282(77.3%) had not. Out of those who have had eye examination, 46(55.4%) were referred by their doctor, 34(41.0%) was because of eye complains, while 3(3.6%) went on their own for routine check. Out of those who have had eye examination, 53

Response	Frequency	Percentage (%)
<b>Ever heard that diabetes can affect the back of the eyes</b>		
Yes	279	(76.4)
No	86	(23.6)
Total	365	(100.0)
<b>*If yes, source of information (n = 279)</b>		
Health personnel	221	(79.2)
Radio/TV	45	(16.1)
Internet Books/Newspaper	25 23	(9.0) (8.2)
Other	16	(5.7)
<b>Can diabetes cause blindness?</b>		
Yes	231	(63.3)
No	34	(9.3)
Don't know	100	(27.4)
Total	365	(100.0)
<b>Do you believe that eye examination for diabetes is necessary?</b>		
Yes	297	(81.4)
No	18	(4.9)
Don't know	50	(13.7)
Total	365	(100.0)
<b>If yes, how often?</b>		
Every Six months	65	(21.9)
Every one year	31	(10.4)
Only when the person have problem with his/her vision	16	(5.4)
Don't know	185	(62.3)
Total	297	(100.0)

TABLE 4: Awareness of Diabetic Retinopathy in respondents.

(63.9%) had eye examination once, 17(20.5%) had it twice, 7(8.4%) had it thrice, and 6(7.2%) had more than thrice in the last one year (Table 5).

Response	Frequency	Percentage (%)
<b>Ever Had eye examination for DM before</b>		
Yes	83	(22.7)
No	282	(77.3)
Total	365	(100.0)
<b>Why did you go for the eye examination</b>		
My doctor referred me	46	(55.4)
Have eye complaints	34	(41.0)
Routine check	3	(3.6)
Total	83	(100.0)
<b>Number of times had an eye examination because of diabetes in the last one year</b>		
1	53	(63.9)
2	17	(20.5)
3	7	(8.4)
>3	6	(7.2)

TABLE 5: Previous eye examination for Diabetes Mellitus.

## 4. Discussion

Our hospital is an urban teaching hospital, with a specialist DM clinic and a well-supported Eye department. This provides an ideal set-up for DM patients to get regular eye examinations and treatment when necessary. This study took a cross-sectional look at the patients attending the DM clinic of UITH, and determined the patients' awareness and knowledge on eye examination for DR.

The age of the subjects who participated in this study ranged from 19-90 years with a mean of  $45.8 \pm 16.3$  years. The mean age in the study population is lower than in other Nigerian studies. Ashaye et al [10] and Omolase et al. [11] in south west Nigeria found the mean age of their DM patients to be 57.5 and 57.6 years respectively. Lawan and Mohammed [12] in Kano, north west Nigeria found the mean age of their DM patients to be 54.0 years. Nwosu in Nnewi [13] south east Nigeria found a mean age of 57.2 years. In this study, majority of the patients were in their seventh decade of life. This is different from that of Lawan and Mohammed [12] who found that majority of their DM patients were in their sixth decade (50-59 years). It is also different from that of Osunbokun in Ibadan, south west Nigeria who found that majority of their DM patients were in their fifth decade [14].



In this study, most of the respondents were females compared to males (68.5% vs. 31.5%). This is similar to the findings by Erasmus et al. [9] in Ilorin, north central Nigeria of nearly three decades earlier (54.6% vs. 45.4%), and Onokpoya et al. [15] in Ile-Ife, south west, Nigeria (61.4% vs. 38.6%). Similarly, Lawan and Mohammed [12] and Mumba et al. [16] in Tanzania found more females than males in their studies (58.9% vs. 41.1%) and (53.5% vs. 46.5%) respectively. However, other authors in this environment (Ashaye *et al*, Omolase *et al*, and Nwosu) reported more males than females in their studies [10, 11, 13]. The higher number of female respondents is probably because the health seeking behaviour of females tends to be better than males, and this may explain the larger population of females in this study. Also, it may be related to the fact that DM manifest in some female patients during pregnancy which is an additional risk factor for DM that is absent in males [1].

Majority of the respondents (72.9%) had some form of formal education with 21.1% of them having up to tertiary level of education. More than a quarter (27.1%) of the respondents had no formal education. This was similar to the findings of Omolase et al. [11] where 26.0% of their study population had no formal education. This is different from what was reported by Muhammed and Waziri [17] where majority of their patients (78.4%) had no formal western education. The high level of education in this study may be due to the urban setting of the study site (the hospital is sited in Ilorin, the state capital). Also, it may be due to the generally higher literacy level of the south west geo-political zone that constitutes the neighbouring states (Ekiti, Osun, and Oyo) which are also served by the hospital.

Out of the 365 patients, 141 (38.6%) were traders; 87 (23.8%) were retired civil servants; 56 (15.3%) were serving civil servants; 43(11.8%) were unemployed; 23 (6.3%) were artisans; 11(3.0%) were farmers; while 4(1.1%) were students. This pattern of occupation of respondents in our study may be a reflection of the quality of education of the respondents, and may also influence their awareness of DR.

Quite a large number of respondents (76.4%) in this study were aware that DM can affect the eye. This was similar to the high percentage of awareness reported by Mohammed and Waziri who reported an awareness rate of 84.3% [17]. In this study, most of the patients (79.2%) attributed their source of information to the hospital personnel. Other sources were the mass media (16.1%), the internet (9.0%), and books/newspapers (8.3%) which did not play significant roles compared to health talk from hospital personnel. This may be due to challenges of poor electricity supply, low computer literacy rate, and language barrier.

Majority of respondents (63.3%) knew DM could result into blindness, and a larger percentage (81.4%) believed eye examination on account of DM was necessary. Despite their belief on the necessity of eye examination, more than two-thirds (62.3%)

did not know how often they needed to have their eyes examined with a small percentage (5.4%) of them reporting that eye examination should be carried out only when there are complaints with the eye. This may be a reflection of the depth of information provided by the health personnel to the patients. The information provided may lack necessary details such as frequency of eye examinations. The lack of depth of the information provided by the health personnel may also account for the poor rate of eye examination as only 22.7% of the respondents had eye examination on account of DM in the past. This low level of eye examination among DM patients was also reported by Mohammed and Waziri [17], and Onokpoya [15] et al. who reported rates of 15.7% and 28.9% respectively. A high level of awareness of DR was found among the DM patients in this study; however this did not translate to a higher level of eye examination. Majority (55.4%) of those who had examination in the past were referred by their doctor followed by those that went on account of eye complaints (41.0%) with only a small percentage (3.6%) having eye examination for routine checkup. Possibly, the reason why eye examination rates were low in this study was because of the low level of referral by managing physicians or lack of adequate knowledge. A qualitative study will have to be carried out in the future to identify the barriers to eye examinations in DM patients in this centre.

## 5. Conclusion

There was a high level of awareness of DR amongst the diabetic patients. However, the high level of awareness of the blinding complication of DM did not translate to a correspondingly high level of ocular examination for DR. There was a gap in the DM patients' knowledge on how often to have eye examination. This gap needs to be filled by health personnel involved in the care of these patients as the patients' main source of information was from the health workers.

## 6. Source of Funding

None

## 7. Conflict of Interest

Nil

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