PREVALENCE OF DIABETIC RETINOPATHY IN DIABETES MELLITUS PATIENTS ATTENDING A TERTIARY EYE CLINIC IN UYO SOUTH- SOUTH NIGERIA

Victor Umoh,[1] Emem Abraham[2]

[1]Department of Internal Medicine, University of Uyo Teaching Hospital, Uyo, Nigeria
[2]Department of Ophthalmology, University of Uyo Teaching Hospital, Uyo, Nigeria

ABSTRACT

Diabetes retinopathy is the most serious eye complication of diabetes mellitus. Ocular complications from diabetes mellitus could result from microangiopathy and changes in the lens largely from poor gylcaemic control. Ocular complications also depend on duration of diabetes and presence or absence of other co-morbid conditions like hypertension. Since onset of diabetic retinopathy is without symptoms and may even occur several years prior to first diagnosis of diabetes mellitus, there is the need for improved level of awareness in the community about this potentially blinding condition. This can only occur from the background of knowledge, hence this study.

Interviewer administered questionnaire was administered to 218 consenting diabetic patients who were previously diagnosed or diagnosed in the eye clinic between January 2009 and December 2010. Ocular examination was carried out by the investigator. Result so obtained was analysed using SPSS17.0 statistical package. Result obtained presented as simple frequency tables of the 218 diabetic patients examined 115 (52.7%) had diabetic retinopathy and commonest wasnon-proliferative diabetic retinopathy (63.3%)while proliferative diabetic retinopathy accounted for only1.7% and 2.6% had DR coexisting with other retinopathies

Key words: *diabetes mellitus, non-proliferative retinopathy, diabetic maculopathy*

Correspondence: Emem Godwin Abraham
Department of Ophthalmology, University of Uyo Teaching Hospital, Uyo, Nigeria
E-mail: ememabraham@yahoo.com- Phone:+2348033497769

Introduction

The rising prevalence of diabetes and its vascular complications is a global public health issue [1]. Worldwide DM is the leading cause of end-stage renal disease (ESRD), non-traumatic lower extremity amputations, and adult blindness [2]. Studies evaluating diabetic patients over 20–30 years have identified poor glycaemic control, longer duration of diabetes, hypertension and hyperlipidaemia as risk factors for developing complications [3, 4]. Considerable data indicate that diabetes is one of the leading causes of blindness in industrialized countries. It accounts for 10% of all new cases of blindness and 20% of new cases of blindness diagnosed between the ages of 45 and 74 years [5].

Diabetic retinopathy (DR) can be defined as the structural and functional changes in the retina due to diabetes [6, 7]. Diabetic retinopathy is the most well-known ocular complication of diabetes and the leading cause of blindness among people 20–64 years of age in the United States of America(U.S.A) [8]with up to 4 million Americans with diabetes, 40 years of age and older, have retinopathy, and nearly one million have sight-threatening retinopathy [9].

Diabetic retinopathy (DR) affects 60% of those who have had diabetes mellitus for more than 15 years and 70% of all persons with diabetes over their lifetimes [10-12]. Another determinant of the prevalence of diabetic retinopathy is the age of the patient. The age of the patient at the time of diagnosis is an important determinant of diabetic retinopathy [13]. In major clinical trials, tight control of blood glucose and blood pressure has been demonstrated to reduce the risk of retinopathy and associated blindness [14]. Diabetes tends to cause

blindness more in Blacks than Whites [15]. This blindness can be avoided in majority of patients by early detection and treatment. Even with the control of retinopathy risk factors such as high blood pressure, high serum cholesterol, poor diabetic control, smoking, obesity, and renal disease, regular ocular examination is highly recommended. Unfortunately this is not the case in our environment. The study was carried out to determine the prevalence of diabetic retinopathy among diabetic patients in Uyo, AkwaIbom state, South- South Nigeria.

Material and Method

This was a prospective study carried out in University of Uyo Teaching Hospital (UUTH),Uyo in AkwaIbom State, South-South Nigeria. Uyo is essentially urban with an estimated population of 554,006 people according to 2006 national population census [16]. The UUTH is the only tertiary hospital in the state and serves both the indigenes as well as people in neighbouring states. All consecutive new patients presenting in the eye clinic between January 2009 and December 2010 with previously diagnosed DM and those whose assessed fasting blood sugar (FBS) levels when tested in the eye clinic was ≥ 7.00mml/L [17] and who consented were included in the study. Information was collected through interviewer administered structured questionnaire including the bio data of the patients, duration of DM(defined as the time interval in years between date of first diagnosis and date of recruitment into study), family history (positive if any of the parents or siblings was diagnosed with diabetes), treatment methods, level of control of DM(monitored with fasting blood sugar), co-morbid conditions such as hypertension (HTN), and eye examination findings.

Distant visual acuity was assessed using the Snellen's chart and E chart, and near vision with near vision chart. Posterior segment examination was carried out with Heine direct ophthalmoscope. Pupils were dilated with 1% tropicamide for dilated funduscopy. Clinical measurements like weight, height were taken and BMI calculated. The presence and grading of DR was according to the Early Treatment of DR classification.

Patients diagnosed with DM before the age of 30years were classified as type I DM while those diagnosed after 30 years were diagnosed as type II. Patients with no previous history of DM but with blood sugar of ≥ 7.0mmol/L during pregnancy were diagnosed as gestational DM. Hypertension was diagnosed as a self-reported history of physician diagnosis or subjects who were receiving drug treatment for hypertension. Fasting blood sugar of 3.0-5.5mmol/L was taken as good control

Results obtained were analysed using SPSS17.0 and presented as simple frequency. A *P*- value of 0.05 was considered statistically significant. Chi squared test was used in the calculation of all tests of significance.

Result

A total of 218 patients made up of 102 males (46.8%) and 116 females (53.2%) were seen between January 2009 and December 2010 and included in the study. The male to female ratio of patients was therefore 1:1.4. The age range of patients was 19 - 82years while the mean age was 54.7±17.6years. Table 1 shows age and sex pattern. Majority 206(94.5%) had type 2 DM, 10 (4.6%) had type1 DM while 2(0.9%) had gestational DM. Duration of DM was between 2weeks and 20years. In the majority (102 out of 218), duration of DM was ≤5years. There was family history of DM in first degree relative in 131(60.1%), and good control of DM in 98(45%). Diabetic retinopathy was seen in 115(52.7%) of the patients, 80(36.7%) showed no signs of DR, while the back of the eye was not viewed in 18(8.7%).

A total of 115 out of 218 DM patients had DR. Table 2 shows the classification of diabetic retinopathy. Of the115 patients with DR 2(1.7%) had proliferative DR,

73(63.4%) had non-proliferative DR, while 37(32.2%) had diabetic maculopathy. Of the 115 patients with DR, 66(55.5%) had poor control of their DM while 53(44.5%) had good control {using fasting blood sugar (FBS)}.Twenty seven (71.0%) of those on insulin developed DR as against 79(53.7%) of those on oral hypoglycaemics who developed DR. Of the 17 DM patients with systemic complications 15(88.2%) had coexisting DR. One hundred and thirty seven (62.8%) had coexisting hypertension, 81(37.2%) did not. Duration of DM was positively associated with DR (*p=0.009)*

Table1: Age and Sex distribution of 218 DM patients in UUTH

Age Group	Sex		Total(%)
	Male	Female	
=30	0	6	6(2.8%)
31-40	7	4	11(5.1%)
41-50	24	39	63(28.6%)
51-60	35	37	72(33.0%)
61-70	28	18	46(21.2%)
>70	8	12	20(8.7%)
Total	102	116	218(100.0%)

Table 2: Types of diabetic retinopathy amongst 115 patients with DR in UUTH, Uyo

Classification of DR	**Frequency(%)**
Proliferative diabetic retinopathy	2(1.7)
Non proliferative DR	73(63.4)
Diabetic maculopathy	37(32.2)
DR coexisting other retinal problems	3(2.6)
Total	115(100.0)

Table3: Duration of DM and the distribution of DR in UUTH, Uyo

Duration of DM	Proliferative retinopathy	Non proliferative DR	Diabetic Maculo-pathy	DR and other retinal problems	Total
<5yrs	0	32	11	1	44
=5years	2	41	26	2	71
Total	2	73	37	3	115

P= 0.009

Discussion

Diabetic retinopathy is a progressive condition and is potentially vision threatening [18]. The underlying pathogenesis has to do with microangiopathy and capillary occlusion [19].Diabetic retinopathy is the commonest cause of blindness amongst the working population in the USA [8] and has become an important cause of blindness in the developing world with the near pandemic situation of diabetes mellitus in the world [20].Diabetic retinopathy has few ophthalmic symptoms until visual loss occurs. Up to 21% of DM patients develop DR at the time of diagnosis. The prevalence of diabetic retinopathy in the general population is strongly dependent on the prevalence of DM itself, because only persons with DM can have diabetic retinopathy. Over 40 years ago DR was reported to be rare in Nigeria [21, 22]

Our study of 218 cases was made up of 102(46.8%) males and 116(53.2%) females, M: F=1:1.4. The slight female preponderance was also seen in the study in Kano by Lawan et al [23] and Mohammed et al [24] also in Kano but lower than that seen by Bamashmus et al in Yemen [25]. The age range was 19-82 years with a mean of 54.83 ±17.68years, similar to what was seen in other studies[25].Type II diabetes was the predominant type (94.5%), type I, 10(4.6) and gestational DM 2(0.9%) in line with findings from other studies[26]. The prevalence of DR in this study was 52.7%. This is similar to the findings in Yemen (54.9%) [25] and Vanuatu (52.9%) [27]. Prevalence of DR was highest between 40-60years as observed in previous studies [23].Elderly diabetics are 1.5 times more likely to develop low vision and blindness than their eye –match non-diabetic [28]. Prevalence for DR varied from28.8% in persons who had DM for less than 5years to 77.8% in those who had DM for more than 15years according to a population-based study by Klein in southern Wisconsin [29]. The high prevalence in our series could be because of the high co morbid conditions like hypertension in our series 137(62.8%) which is known to worsen diabetic retinopathy and also there is an improvement in health seeking attitudes of the studied population. The prevalence of DR in this study is higher than what was observed by Nwosu in Nnewi(33%)[30] which was also a clinic based study and Ashaye et al [31] in Ibadan 42.1%. There appears to be an increase in the prevalence of DR among diabetics in Nigeria. Proliferative diabetic retinopathy (PDR) accounted for 2(1.7%), which was lower than that recorded by El Haddad in Oman[32]but close to the findings of Omolase 2% in Owo[33]. Diabetic maculopathy accounted for 37 (32.2%) and non proliferative diabetic retinopathy (NPDR) accounted for 73(63.4%) This finding is similar to what was observed in some previous studies [30]. Most of the patients who developed DR had DM for longer than 5years and association of DR with duration of DM was statistically significant $p<0.009$. This is consistent with other studies[23,31,33]and has been described as the most important and strongest risk factor associated with the development of diabetic retinopathy as increase duration leads to increased risk of microvascular complications [29] Poor gycaemic control 66(55.5%), along with hypertension 137(62.8%) are other associated factors for the development and progression of diabetic retinopathy [31]. The high positive family history 60.1% is consistent with other studies [34].Family medical history represents valuable genomic information because it characterizes the combined interactions between environmental, behavioural and genetic factors [35].In the U.S. population, family history of diabetes has a significant, independent, and graded association with the prevalence of DM [35]. Twenty seven (71.o%) of those on insulin therapy as against 53.7% of those on oral hypoglycaemic drugs developed DR. This

corroborates previous studies [31].The use of insulin in type 2 DM is an indication of the severity of the disease and the risk of retinopathy is higher in patients with more severe DM [29]. The high prevalence of other systemic complications with DR (88.6%) is consistent with other studies that the pathophysiology of DR is also seen in other systems such as the kidney [2].
Limitation of this study included lack of more sensitive tool for examination and inability to assess HaemoglobinA1c.

CONCLUSION

Prevalence of diabetic retinopathy in diabetic patients in this study is higher than previously reported. Increased patients awareness of this sight threatening condition and importance of regular eye examination must be a priority in the management of these patients. A proper referral system within the tertiary health facility and from secondary health facility must be put in place.

References

1. Shaw JE, Sicree RA, Zimmet PZ. Global estimates of the prevalence of diabetes for 2010 and 2030. Diabetes Res ClinPract 2010;87:4–14
2. American Diabetes Association. **Diagnosis and classification of diabetes mellitus.** Diabetes Care. 2007;30(Sl 1):S42-7.
3. Fong DS, Aiello LP, Ferris FL 3rd, Klein R: Diabetic retinopathy. Diabetes Care 2004; 27:2540– 2553
4. Keenan HA, Costacou T, Sun JK, Doria A, Cavellerano J, Coney J, Orchard TJ, Aiello LP, King GL: Clinical factors associated with resistance to microvascular complications in diabetic patients of extreme disease duration: the 50-year medalist study. Diabetes Care 2007; 30:1995-7
5. UK Prospective Diabetes Study (UKPDS) Group. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). Lancet 1998; 352: 837–53.
6. Tavakoli M, Kallinikos PA, Efron N, Boulton AJ, Malik RA. Corneal sensitivity is reduced and relates to the severity of neuropathy in patients with diabetes. Diabetes Care. 2007; 30(7): 1895–7.
7. Engerman RL. Pathogenesis of Diabetic Retinopathy. Diabetes 1989; 38:1203-6.
8. UK Prospective Diabetes Study Group. Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes: UKPDS 38. BMJ 1998;317:703–713
9. The Diabetes Control and Complications Trial Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. N Engl J Med 1993;329:977–986
10. Benson WE, Brown GC, Tasman W, eds. Diabetes and Its Ocular Complications. Philadelphia, Pa: WB Saunders Co; 1988:1-5.
11. Gale EA. Glucose control in the UKPDS: what did we learn? Diabet Med 2008;25 (Suppl. 2): 9-12
12. Congdon NG, Friedman DS, Lietman T. Important causes of visual impairment in the world today. JAMA 2003; 290:2057–2060.
13. Kempen JH, O' Colmain BJ, Leske MC, Haffner SM, Klein R, Moss SE et al. The prevalence of diabetic retinopathy among adults in the

United States. Arch Ophthalmol 2004; 122:552-563.
14. Mohamed Q, Gillies MC, Wong TY. Management of diabetic retinopathy: a systematic review. JAMA 2007; 298:902–916.
15. Kahn HA, Hiller R. Blindness caused by diabetic retinopathy. Am J Ophthalmol. 1974; 78: 58-67.
16. Rotimi C, Daniel H, Zhoul J, Obisesan A, Chen G, Chen Y, Amoah A, et al. Prevalence and determinants of retinopathy and cataracts in West African type 2 diabetes patients.
17. Genuth S, Alberti KG, Bennett P, Buse J, DeFronzo R, Kahn R. for The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. Follow-up Report on the Diagnosis of Diabetes Mellitus. Diabetes Care 2003; 26(11): 3160-7.)
18. Morello CN. Etiology and natural history of diabetic retinopathy: An overview. Am J Health Syst Pharm2007;64 Suppl17:3-7.
19. Kelliher C, Kenny D,O'BrienC. Trends in blind registration in the adult population of the Republic of Ireland 1996-2003. Br J Ophthalmol 2006;90:367-71.
20. Ginter E, Simko V. Type 2 diabetes mellitus pandemic in the 21st century. Adv Exp Med Bio 2012;771:42-50
21. Osuntokun BO. Diabetic retinopathy in Nigerians. Br. J Ophthalmol 1969;53:652-663
22. Abiose A. Retinal diseases in Nigeria- a preliminary report. Niger Med. J 1978;6:180-3
23. Lawan A, Mohammed TB. Pattern of diabetic retinopathy in Kano, Nigeria. Ann Afr Med 2012;11:75-9
24. Mohammed I, Waziri AM. Awareness of diabetic retinopathy amongst diabetic patients at the murtalamohammed hospital, Kano, Nigeria. Niger Med J 2009;50:38-41
25. Bamashmus MA, Gunaid AA, Khandekar RB. Diabetic retinopathy, visual impairment and ocular status among patients with diabetes mellitus in Yemen: A hospital-based study. Indian J Ophthalmol 2009; 57:293-298,
26. Chineye S, Uloko AE, Ofoegbu EN, Fasanmade OA, FasanAA,Ogbu OO. Profile of Nigerians with diabetes mellitus .Diabcare Nigeria study group (2008): Results of a multicentre study. Indian J of EndocrMetab 2012;16:58-64
27. Nerendran B, John RK, Raghuram A, Ravindran RD, NirmalanPK, Thuiassiraj RD. Diabetic retinopathy among self reported diabetics in southern India: A population-based assessment. Br J Ophthalmol 2002; 86: 1014-8
28. Tumosa N. Eye disease and the older diabetic, clinGeriatr Med 2008; 24: 515-7
29. Klein R, Klein BEK,MossES,Davis MD, DeMets DL. The Winsconsin Epidemiologic study of Diabetic Retinopathy:111 Prevalence and Risk of Diabetic Retinopathy when age at diagnosis in 30 or more years. Arch Ophthalmol 1984; (24):527-532
30. Nwosu SN. Diabetic retinopathy: management update. Niger Postgrad Med J 2003 Jun; 10(2):115-20
31. Ashaye A, Arije A, Kuti M, Olusanya B, Ayeni E, Fasanmade A et al . retinopathy among type 2 diabetic patients seen at a tertiary hospital in Nigeria: a preliminary report. ClinOphthalmol 2008

March;2(1):103-108
32. El Haddad OA, Saad MK. Prevalence and risk factors for diabetic retinopathy among Oman diabetics. Br J Ophthalmol 1998; 82:901-6
33. OmolaseCO, AdekanleO, Owoeye JFA, Omolase BO. Diabetic retinopathy in a Nigerian community. Singapore Med J2010;5(1): 56-59
34. Annis AM, Caulder MS, Cook KL, Duquette D. Family history, diabetes and other demographic and risk factors among participants of National Health and Nutrition Examination Survey 1999-2002. Prev Chronic Dis. 2005 April;2(2):A19 Epub 2005 Mar15.
35. Valdez R, Yoon PW, Liu T, Khoury MJ. Family history and prevalence of diabetes in the U.S. population, the 6-year results from the National Health Nutrional Examination survey(1999-2004). Diabetes Care; october2007,vol. 30 no.102517-25.