

Prevalence and risk factors of diabetic retinopathy among Iraqi patients with type 2 diabetes mellitus

Ala S Tawfeeq
MBCbB, MSc

Abstract

Background: Retinopathy among patients with type 2 diabetes appears to be a public health problem in Iraq; it is serious eye disease lead to sever visual impairment and blindness if not detected early.

Objective: To estimate the prevalence of retinopathy among patients with type 2 diabetes mellitus who attended National Center of Diabetes of Al-Mustansiriyah University in Baghdad and to determine the risk factors of diabetic retinopathy.

Methods: This cross sectional study was conducted at national center of diabetes of Al-Mustansiriyah University in Baghdad from January 2011 till January 2012. Two hundred eighty nine type 2 Iraqi diabetic patients with age > 35 years and both sexes were included in this study. Diabetic Retinopathy was diagnosed by an ophthalmologist depending on the International Clinical Diabetic Retinopathy Severity Scale adopted by American Academy of Ophthalmology and the International Council of Ophthalmology. All the data were obtained from the records of the diabetic patients which include Socio-demographic, clinical and laboratory data, like duration of diabetes, the type of treatment of diabetic mellitus, hypertension body mass index, triglyceride level and glycemic control which was assessed by measuring HbA1c.

Result: From 289 patients with type 2 diabetes mellitus, 90 patients (33.1%) had retinopathy (47 males, 43 females). The mean \pm SD of the age was 57.8 ± 9.9 years. Almost half of patients were above 65 years old and 69% residing in urban area. About 40% of the patients had diabetes for more than 15 years. 69% were treated with insulin 67% were hypertensive, 44% had body mass index > 30, 59% smokers, about 71% had HbA1c > 7, and 66% had triglyceride > 200.

Conclusion: This study showed high prevalence of diabetic retinopathy among type 2 diabetic patients, with poor control of blood glucose, high triglyceride, longer diabetes duration, hypertension, insulin treatment and body mass index > 30 are more prone to develop retinopathy.

Keywords: Type 2 diabetes mellitus, diabetic retinopathy.

Introduction

Diabetes Mellitus (DM) is considered to be a major health problem that is predicted to turn into a global epidemic. The adult prevalence of DM in developed countries is about 5 percent. The actual number may be twice as high considering all the cases which have not yet been diagnosed⁽¹⁾. The prevalence of diabetes in developing countries, such as the Arab countries, varies from 3 to 35 percent⁽²⁾. Diabetic patients are prone to develop diabetic retinopathy during the first two decades of the disease. Nearly all patients (99%) with type 1 diabetes and 60% of those with type 2 diabetes develop retinopathy⁽³⁾. Recent study in 2005 in Jordan reported that the overall prevalence of DR among Jordanian diabetics was 64.1%⁽⁴⁾.

Blindness due to diabetes is becoming an ever greater problem in developing countries in age between 20 and 64 years⁽⁴⁾. In a hospital based study from Jordan, DR was the main leading cause of blindness⁽⁵⁾ while another study in U.S.A reported that the overall prevalence of DR among type 2 diabetics was 64.1 percent and those with diabetes are 25 times more likely to be blind than non-diabetic people⁽⁶⁾. Diabetes is responsible for 12,000 to 24,000 new cases of blindness every year in the United States⁽⁶⁾. Fortunately the ocular complications of diabetes are preventable and treatable in the early stages of the disease⁽⁷⁾.

Many studies show that the risk factors of DR were hypertension, obesity, treatment with insulin, high triglyceride level, HbA1c more than 7%, smoking and long duration of diabetes⁽⁸⁻¹⁴⁾.

The aim of this study is to estimate the prevalence of retinopathy among patients with type 2 diabetes mellitus who attended National Center of

Diabetes (NCD) of Al-Mustansiriyah University in Baghdad and to determine the risk factors of diabetic retinopathy.

Patients and Methods:

This cross sectional study was conducted on 289 type 2 diabetic patient attending national center of diabetes (NCD) in Baghdad between January 2011 and January 2012. These patients were initially diagnosed as diabetics by physician and diagnosis of retinopathy was done by an ophthalmologist in the same center. The diagnosis was based on International Clinical Diabetic Retinopathy Severity Scale adopted by the American Academy of Ophthalmology (AAO) and the International Council of Ophthalmology (ICO)^(15,16). Socio-demographic, clinical and laboratory data were obtained from the records of the patients; all these data were registered by the doctors who treated those patients. The variables include Socio-demographic, (sex and age), the participants residence, clinical data include, smoking, duration of DM, the type of treatment of DM, Hypertension or if the patient is currently using prescribed antihypertensive drugs, and BMI which were measured by trained nurse.

All patient underwent blood investigation HbA1c (good glycemic control if HbA1c is less than 7%) and triglycerides (TG) investigation.

Statistical analysis was carried out using the Statistical Package for Social Sciences (SPSS, version 11.5). Chi-square for association between two variables. P-value < 0.05 was considered significant.

Results:

Figure 1 shows that the number of DR increased with age of the study sample, Almost half of patients with DM (48%) who were >65 years of age had diabetic retinopathy (22 females and 21 males) followed by the age 56-65, 31% (15 females and 13 males). 18% (8 females and 8 males) for the age 45-55 years and only 3% (2 females and 1 male) for the age

35-45 years. There is significant association between DR and age (P=0.002). There was no significant differences between the rate of males and females in this study (P=0.5). Figure 2 shows that DR rate among diabetics residing in an urban area was more than diabetics residing in rural areas 68.8%, 31.3% respectively. There was significant association between residence and diabetic retinopathy (P=0.002).

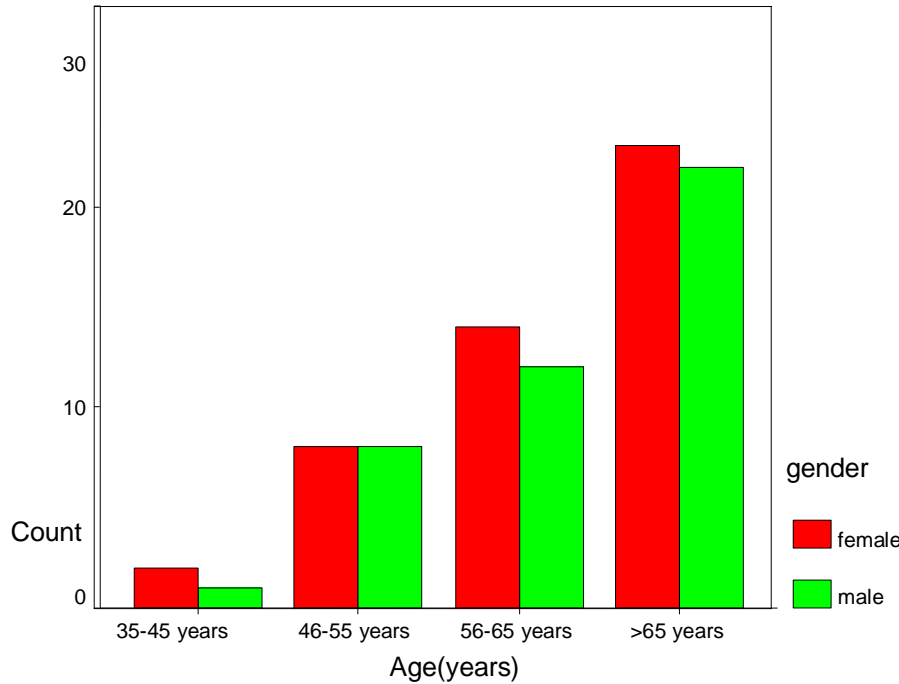


Figure 1: The age and gender distribution of patients with diabetic retinopathy

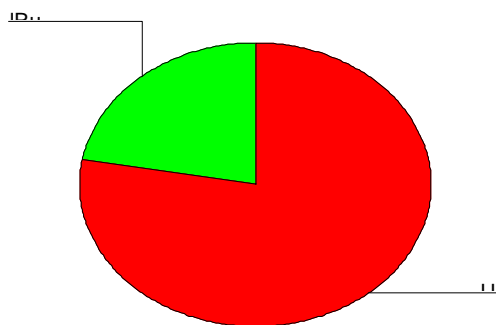


Figure 2: The distribution of the study sample according to their residence

As shown in table 1 the rate of DR increase with duration of diabetes. about 40% of the study sample has duration more than 15 years followed by 11-15 years, 5-10 years, and less than 5 years (31%, 21%, 7.7%) respectively. The rate of DR is more in those who have treatment with insulin (68.8%),

hypertensive (66.7%), BMI > 30 (45.5%), HbA1c > 7 (71%), triglyceride > 200 (65.5%), and smoking (58.8%). Diabetic retinopathy was significantly associated with duration of DM (P=0.0002) and treatment with insulin (P=0.001), hypertension (P=0.002) and BMI (P=0.0002).

As shown in table (2) Diabetic retinopathy was significantly associated with HbA1c > 7% (P=0.0001),

and triglyceride > 200mg/dl (P=0.001).

Table 1: The clinical characteristics among study sample

Variable	Patients with DR (n=90)		P value
	No	%	
Duration of diabetes (years) <5	7	7	0.0002
5-10	19	21.1	
11-15	28	31.1	
>15	36	40.1	
Type of treatment With insulin	62	68.8	0.001
Without insulin	28	31.2	
Hypertension(mm/Hg) Hypertensive	60	66.7	0.002
Normotensive	30	33.3	
BMI(kg/M2) <25	16	17.7	0.0002
25-29.9	35	38.8	
>30	39	43.5	
Smoking Smoker	53	58.8	0.311
None smoker	37	41.2	

Table 2: The laboratory results of the study sample.

Variable	Patients with DR (n=90)		P value
	No	%	
HbA1c >7%	64	71.1	0.0001
<7%	26	28.9	
Triglyceride(Mg/dl) >200	59	65.5	0.001
<200	31	34.5	

Discussion:

The prevalence of Diabetic Retinopathy in type 2 diabetic patients was 33.1%. Comparison among studies is difficult because the prevalence of retinopathy has varied widely depending on the methodology and populations. The prevalence of DR in this study is comparable to the RJ, *et. al.* study in 2003 in Australia⁽⁸⁾. Other study in Africa also have shown similar prevalence of DR as this study⁽¹⁰⁾. On the other hand, one study show a lower prevalence of DR among type 2 diabetic patients⁽¹¹⁾. Sparrow *et. al.* (2003) in England found a higher overall rate of retinopathy⁽⁹⁾.

The age of the patient was associated to the occurrence of DR (P=0.002). Some studies reported a significant association between DR and age. Aging, high blood glucose and high blood pressure cause microvascular destruction of blood vessels which increase with time of exposure so aging and duration of diabetes is main risk factors of diabetic retinopathy^(12,17). Gender was not identified as a risk factor in our study, which agrees with a study conducted by Janghorbani *et. al.* in Isfahan⁽¹³⁾. On the other hand, Sparrow study concluded that the severity of DR was related to male sex⁽⁹⁾. The urban residents rate were more than rural residents rate (P=0.002), this agree with Sparrow study⁽⁹⁾ and this may be due to the awareness of those patients (reside in urban area) before reaching visual

disability, or may be due to difficulty of accessibility to the diabetic clinics for those reside in rural area.

The duration of the disease in the present study was strongly associated with the rate of retinopathy (P=0.0001). Klein *et. al.* reported that after 20 year of diabetes, more than 60% percent of type 2 DM will have retinopathy regardless of diabetic control⁽³⁾. This has been confirmed by numerous other studies in Australia, Saudi, Oman, Kuwait^(14,18-20). Treatment with insulin showed significant association with DR (P=0.001) this agree with many studies⁽¹⁸⁻²⁰⁾. Those studies show that treatment with insulin may cause more destruction to the micro vascular system than that of oral drugs.

Most studies concerning diabetic changes within the eye show that high blood pressure is significantly associated with diabetic retinopathy and consider hypertension as an established risk factor for DR as it cause destruction of blood vessels especially if it is associated with high blood glucose⁽¹⁶⁻²⁰⁾, hypertension showed a significant association with DR (P=0.002) but these results are not agreed with the Segato *et. al.* study, which reported that hyper tension was not related to DR⁽²¹⁾.

In the present study, BMI showed significant association with DR (P=0.0001) as obesity is main risk factors for hypertension and diabetes⁽²⁰⁾, this agree with a population-based cross sectional study by Van Leiden *et. al.*

(2002) who reported that the rate of Diabetic retinopathy was significantly associated with BMI⁽²⁰⁾. Sargeto *et. al.* study reported that the rate of DR was inversely correlated with BMI⁽²¹⁾. Previous studies differ in relation to the importance of smoking as risk factors. In this study smoking has not been identified as a risk factor (P=0.311). This is similar to Mosse *et. al.* results⁽²²⁾. On the other hand, some studies indicated that smoking has been causally related to DR⁽²³⁾.

Table 2 showed that Hyperglycemia (as measured by HbA1C) and triglyceride is considered as an important risk factor associated with DR, this may be due to their induction of retinal inflammation and vascular leakage due to their effect on blood vessels which may lead to retinal cell death. In this study they were significantly associated with retinopathy (P=0.0001). This is consistent with other studies⁽²⁴⁻²⁷⁾.

In conclusion; this study was exploring the prevalence and risk factors of DR. Though this is not a national-based study, but it highlights the size of the problem. In light of high prevalence of DR, serious national efforts to reduce DR and its associated vision threatening complications are needed. These efforts are best directed toward increasing the awareness of the necessity for regular eye examinations in patients with DM, early detection of DR.

Acknowledgment

I would like to express my great full thanks to all the members of National Center of Diabetes of Al-Mustansiriyah University in Baghdad for their help

References

- 1-Klein R, Klein BE, Moss SE, Davis MD & DeMets DL: The Wisconsin epidemiologic study of diabetic retinopathy. II. Prevalence and risk of diabetic retinopathy when age at diagnosis is 40 or more years in developed country. *Arch Ophthalmol*, 2004; 102:527-32.
- 2-Anghorbani M, Amini M, Ghanbari H & Safaice H: Prevalence and risk factors for diabetic retinopathy in developing country. *Ophthalmic Epidemiol*, 2003;10:81-95.
- 3-Al-Rubeaan K: Type 2 diabetes mellitus red zone. *Int J Diabetes Mellitus*, 2010;2(1):1-2.
- 4-Al-Till MI, Al-Bdour MD & Ajlouni KM: Prevalence of blindness and visual impairment among Jordanian diabetics. *Eur J Ophthalmol*, 2005; 15(1): 62-8.
- 5-Salem M & Ajlouni K: Diabetic retinopathy among Jordanians: Its patterns, severity, and some associated risk factors: A hospital based study. *Diabetologia Croatica*, 2001; 28(1): 17-23.

- 6-American Diabetes Association(ADA): Standards of medical care in diabetes 2007. *Diabetes care*, 2007; 30 Suppl 1): S4-S40.
- 7-The ACCORD Study Group and ACCORD Eye Study Group: Effects of medical therapies on retinopathy progression in type 2 diabetes. *N Engl J Med*, 2010; 363:233-44. [Erratum, *N Engl J Med* 2011; 364:190].
- 8-Tapp RJ, Shaw JE, Harper CA, de Courten MP, Balkau B, McCarty DJ, Taylor HR, Welborn TA & Zimmet PZ: The prevalence of and factors associated with diabetic retinopathy in the Australian population. *Diabetes Care*, 2003; 26:1731-37.
- 9-Sparrow JM, McLeod BK, Smith TD, Birch MK & Rosenthal AR: The prevalence of diabetic retinopathy and maculopathy and their risk factors in the type 2 diabetic patients of an English town. *Eye*, 2003, 7 (Pt1): 158-63.
- 10-Sidibe EH: Diabetic retinopathy in Dakar and review of African literature: epidemiologic elements. *Diabetes Metab*, 2000, 26:322-24.
- 11-Norymberg CK, Neumann E & Dekel H: Complication-free duration and the risk of development of retinopathy in elderly diabetic patients. *Arch Intern Med*, 2008, 158:641-44.
- 12-Wright AD & Dodson PM: Me and ACCORD Eye studies. *Eye (Lond)*, 2011; 25:843-49.
- 13-Janghorbani M, Amini M, Ghanbari H & Safaiee H: Incidence of and risk factors for diabetic retinopathy in Isfahan, Iran. *Ophthalmic Epidemiol*, 2003, 10:81-95.
- 14-Robyn J, Jonathan E, Alex H, *et. al.* The prevalence of and factors associated with diabetic retinopathy in the Australian population. *Diabetes care*, 2003; 26(6):1731-37.
- 15-American Academy of Ophthalmology(AAO): International Clinical Classification of Diabetic Retinopathy Severity of Diabetic Macular Edema. Available at: <http://www.icoph.org/pdf/Macular-Edema-Detail.pdf>, 2006;11: 201.
- 16-International Council of Ophthalmology (ICO) International Clinical Guideline: Diabetic retinopathy (initial and follow up evaluation). Available as at: <http://www.icoph.org/:/guide/guidedi.html>, 2006;15:105.
- 17-Abu El Asrar AM, Al-Rubeaan KA, Al-Amro SA, Kangave D & Moharram OA: Risk factors for diabetic retinopathy among Saudi diabetics. *Int Ophthalmol*, 2009;22:155-61.
- 18-El Haddad OA & Saad MK: Prevalence and risk factors for diabetic retinopathy among Omani diabetics. *Br J Ophthalmol*, 2008; 82:901-1022
- 19-Al-Shammari F, Al-Meraghi O, Alfred N & Al-Otaibi S: The prevalence of retinopathy and associated risk factors in type 2 diabetes Mellitus in Al-Naeem area: Kuwait. *Middle East J of Family Medicine*, 2005; 3(2):42-48.

- 20-Van leiden HA, Dekker JM, Moll AC, Nijpels G, Heine R, Bouter L, *et. al.*: Blood pressure, lipid and obesity are associated with retinopathy: The hoom study. *Diabetes care*, 2002; 25(8):1320-25.
- 21-Segato T, Midena E, Grigoletto F *et. al.*: The epidemiology and prevalence of diabetic retinopathy in the Veneto region of North East Italy. Veneto group for diabetic retinopathy. *Diabet Med*, 2008; 8:511-16.
- 22-Moss SE, Klein R & Klein BEK: Association of cigarette smoking with diabetic retinopathy. *Diabetes Care*, 2002; 14:119.
- 23-Paetkau ME, Boyd TAS, Winship B & Grace M: Cigarette smoking and diabetic retinopathy. *Diabetes*, 2007; 26:46-49.
- 24-Hirsch IB & Brownlee M: Beyond hemoglobin A1c-need for additional markers of risk for diabetic microvascular complications. *JAMA*, 2010; 303:2291-92.
- 25-Wang J, Xu X, Elliott MH, Zhu M & Le YZ: Müller cell-derived VEGF is essential for diabetes-induced retinal inflammation and vascular leakage. *Diabetes*, 2010; 59:2297-305.
- 26-Fort PE, Losiewicz MK, Reiter CEN, *et. al.*: Differential roles of hyperglycemia and hypoinsulinemia in diabetes induced retinal cell death: Evidence for retinal insulin resistance. *PLoS One*, 2011; 6(10): e26498.
- 27-Nguyen QD, Shah SM, Khwaja AA, *et. al.*: Two-year outcomes of the Ranibizumab for edema of the macula in diabetes (READ-2) study. *Ophthalmology*, 2010; 117: 2146-51.

* *MoH*