PREVALENCE OF DIABETIC RETINOPATHY IN PATIENTS WITH NEWLY DIAGNOSED TYPE II DIABETES MELLITUS

A. Abdollahi, M. H. Malekmadani, M. R. Mansoori, A. Bostak, M. R. Abbaszadeh and A. Mirshahi

Department of Ophthalmology, Eye Research Center, Farabi Eye Hospital, School of Medicine, Medical Sciences/University of Tehran, Tehran, Iran

Abstract- Diabetic retinopathy is a common complication of type II diabetes mellitus and carries with it the threat of blindness. Accurate information regarding the incidence of diabetic retinopathy and associated risk factors is important in the prevention of its development and of the visual impairment caused by this complication. This study was designed to determine the prevalence of diabetic retinopathy in newly diagnosed patients with type II diabetes mellitus. We have also evaluated the association of diabetic retinopathy with clinical and biochemical variables. In a cross-sectional study, 152 consecutive patients with newly diagnosed type II diabetes mellitus were referred from two outpatient clinics in Tehran for ophthalmologic exam to detect retinopathy. Indirect ophthalmoscopy was performed and data regarding risk factors were extracted from routine medical records. Chi square and Mann Whitney U tests were used to analyze the data. The overall prevalence of diabetic retinopathy was 13.8 %(21 cases): three cases with microaneurysm only, 10 with mild, 5 with moderate and 2 with severe non proliferative diabetic retinopathy. Only one patient had advanced proliferative retinopathy. The prevalence of diabetic retinopathy was positively associated with age, duration of disease, fasting plasma glucose, HbA1c, and systolic blood pressure. Diabetic retinopathy is common in newly diagnosed type II diabetes mellitus patients. Ophthalmologic consultation is essential at the time of diagnosis for all patients.

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INTRODUCTION

Diabetic retinopathy is a common complication of type II diabetes mellitus and carries with it the threat of blindness (1). The prevalence of diabetic retinopathy (DR) in patients with newly diagnosed type 2 diabetes mellitus varies between 10% and 20% in population-based studies (2). Diabetic eye disease and its complications, especially diabetic retinopathy, is the leading cause of blindness and visual dysfunction in adults in economically developed societies.

The prevalence of type II diabetes mellitus is estimated to be 3-5% in Iran (3). Epidemiological studies of the impact of diabetic eye disease in developing countries are scarce. Accurate information regarding the incidence of diabetic retinopathy and associated risk factors is important in the prevention of its development and of the visual impairment caused by this complication in these countries (4).

This study was undertaken to establish the prevalence of diabetic retinopathy and its concomitants in terms of risk factor and other diabetic complications in newly diagnosed diabetic patients in Tehran, the capital city of Iran.

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*** Corresponding Author:**
A. Abdollahi, Department of Ophthalmology, Farabi Eye Hospital, School of Medicine, Medical Sciences/University of Tehran, Tehran, Iran
Tel: +98 21 55416134
Fax: +98 21 55421002
E-mail: tuerc@sina.tums.ac.ir

MATERIALS AND METHODS

In this cross–sectional study, 152 consecutive patients with newly diagnosed type II diabetes mellitus who were seeking treatment in out- patient diabetic centers of Abouzar and Imam Khomeini were evaluated for the presence of diabetic retinopathy. The study protocol was approved by the science ethical committee of Tehran University of Medical Science. Those patients who were diagnosed for the first time as diabetic within the duration of the study, between March 19th 2002 and March 20th 2004, were included in the study. American Diabetic Association criteria for diagnosis of diabetes mellitus is routinely used in both centers. Three general practitioners evaluated the height and weight of the patients at their routine follow up visits to the centers. A questionnaire was completed using the medical records of patients about "gender, age, type of treatment, family history of diabetes mellitus, history of myocardial infarction, history of angina pectoris, history of stroke and smoking. Laboratory data of fasting blood sugar, glycosylated hemoglobin (hemoglobin A_{1c}), cholesterol, triglyceride and serum creatinine were extracted from last existing data in patients' charts. Hypertension was defined as systolic blood pressure > 140 mmHg or diastolic blood pressure > 90 or treatment with antihypertensive drugs or both. Body mass index (BMI) was calculated as body weight (in kg) height (in meters) (2).

The patients were then referred to the ophthalmologic clinics of Farabi Eye Hospital and Imam Khomeini Hospital for ophthalmologic exam. The examination was performed by 3 experienced ophthalmologists. Visual acuity measurement and slit lamp examination were performed. Indirect ophthalmoscopy was done after pupillary dilation by tropicamide 1% ophthalmic drops. The results of fundoscopy were recorded by the ophthalmologists and categorized as: 1-No diabetic retinopathy, 2-Micro aneurysm only, 3-Mild non proliferative diabetic retinopathy, 4-Moderate non-proliferative diabetic retinopathy, 5-Severe non–proliferative diabetic retinopathy, 6-Very severe non–proliferative diabetic retinopathy, 8-Non-high risk proliferative diabetic retinopathy, 9-High risk proliferative diabetic retinopathy, 10-Advanced risk proliferative diabetic retinopathy (5). The more seriously affected eye of each patient was used for evaluation of retinal pathology.

Results were analyzed using SPSS for windows Software (version 11.5). Chi square and Mann-Whitney U tests were used to test differences between groups. We considered *P* value less than 0.05 as significant.

RESULTS

The demographic and medical characteristics of patients are shown in table 1. The overall prevalence of retinopathy in patients with newly diagnosed diabetes mellitus was 13.8 % (21 of 152 patients): 3 with microaneurysm only, 10 with mild NPDR, 5 with moderate PDR and 2 with severe NPDR, and only 1 patient, a 47 year old man, with high-risk proliferative diabetic retinopathy (PDR).

Table 1. Demographic characteristics of patients

Characteristic	Number (%)	Mean (± SD)
Gender		
Male	60 (39.5)	
Female	92 (60.5)	
Age (yr)		48.8 (11.8)
≤ 35	21 (13.8)	
36-45	38 (25)	
46-55	45 (31.6)	
≥ 56	48 (29.6)	
Disease duration (mo)		15 (8.5)
Smoking (pack year)	13 (8.6)	45.7 (57.8)
Drug Hx		
Drug	8 (57.2)	
Insulin	10 (6.6)	
Diet	55 (36.2)	
Hx of MI	2 (1.3)	
Hx of stroke	0 (0)	
Hx of angina pectoris	2 (1.3)	
Family Hx of DM	63 (41.4)	
FBS (mg/dl)		171.95 (54.7)
HbA_{1c} (%)		7.1 (5.2)
Cholesterol (mg/dl)		205.32 (49.1)
Triglyceride (mg/dl)		201.98 (95.8)
Serum Creatinine		0.6 (0.23)
BMI (kg/m^2)		28.4 (4)
Systolic BP (mmHg)		124 (17.9)
Diastolic BP		78.3 (93)
Hypertension (mmHg)	16 (10.5)	

Abbreviations: Hx, history; MI, myocardial infarction; DM, diabetes mellitus; FBS, fasting blood sugar; BMI, body mass index; BP, blood pressure.

Table 2. Possible risk factors in relation to diabetic retinopathy in newly diagnosed diabetic patients

	Yes		No		
Risk factor	**Median**	**(Min-Max)**	**Median**	**(Min-Max)**	***P* value**
Age (year)	56	(38-70)	48	(22-81)	0.03
Duration of disease (month)	22	(12-24)	14.0	(1-24)	0.001
Smoking (pack year)	20	(20-25)	30	(10-180)	0.344
Fasting plasma sugar (mg/dl)	200	(118-462)	157	(80-290)	0.003
HbA_{1c} (fract.)	8.5	(5.9-12.8)	6	(4.3-12)	0.000
Cholesterol (mg/dl)	194	(120-300)	200	(125-400)	0.314
Triglyceride (mg/dl)	180	(75-575)	185	(60-592)	0.681
Creatinine	0.7	(0.5-1.7)	0.6	(.2-1.8)	0.05
BMI (kg/m^2)	28	(18-31)	27	(20-50)	0.81
Systolic BP (mmHg)	130	(110-170)	120	(90-180)	0.005
Diastolic blood pressure (mmHg)	80	(60-100)	80	(50-110)	0.05

Abbreviations: BMI, body mass index; BP, blood pressure.

No statistically significant univariate association was observed between DR and gender, family history of diabetes mellitus, history of myocardial infarction, and history of angina pectoris, stroke and smoking. Frequency of diabetic retinopathy was significantly different in treatment groups. Of 21 patients with diabetic retinopathy, 18 (85.7%) were taking drugs, 1(4.8%) received insulin and 2 (9.5%) were on diet.

Age, duration of disease, fasting plasma glucose, HbA1c, and systolic blood pressure were significantly higher in patients with retinopathy (table 2). No significant difference was found in cholesterol, triglyceride, weight and BMI.

DISCUSSION

Diabetic retinopathy was found to be common in patients with newly diagnosed diabetes mellitus in this study.

Our study, which is a clinic-based rather than population–based survey, reflects the prevalence of diabetic retinopathy in the outpatient setting in current health system in Iran. There is no active screening system in Iran, and Abouzar center serves as one of the center where passive screening of diabetes takes place. Our sample size is low in comparison with other studies. Besides it does not cover all the patients referring to both clinics. People with disabilities and those who refused to enter the study may have caused a lower estimation of true prevalence of diabetic retinopathy. A screening study on 2033 residents of Islamshahr showed that 48.7% of diabetic patients were unaware of their disease (6).

Evaluation of diabetic patients who sought ophthalmologic consult for the first time in Farabi Hospital had shown that 48.4% of patients were diagnosed as non PDR and 45.4% of them were PDR. The average time to seek ophthalmologic consult after diagnosis of diabetes mellitus was 11.5 +/- 5.5 years. All the data reveal that those patients designated as newly diagnosed diabetes mellitus have had the disease for a significant duration of time and after diagnosis of their disease their ophthalmologic examination will be postponed until it is too late for effective treatment of diabetic retinopathy.

A study in Isfahan estimated the incidence of diabetic retinopathy to be 89.4% per person year and concluded that diabetic retinopathy poses a formidable health threat to Iranian diabetic patients (4). In a population-based study in Denmark, the prevalence of DR was reported to be 5%-8%. They suggested that the low prevalence is due to the Danish health system which is free of charge and results in early diagnosis of diabetic patients (2).

In a study on 1640 Pima Indians of 15 years and older, 18% of those with two-hour postload plasma glucose levels of equal to or greater than 200 mg/dl had some evidence of retinopathy (7).

Two studies performed in Australia showed the prevalence of diabetic retinopathy in newly diagnosed type 2 non treated diabetic patients to be 14%-20 % (8, 9).

Chowdhury *et al.* evaluated 292 patients (165 South Asians) for cardiovascular risk factors of early onset diabetes at diagnosis and found significantly higher prevalence of diabetic retinopathy in South Asians (17.5% versus 7.9 %) (10). The prevalence of retinopathy was also reported as high as 29% in newly diagnosed patients in Sri Lanka. All the mentioned studies have used indirect ophthalmoscopy to diagnose diabetic retinopathy. Large studies such as United Kingdome Prospective Diabetes Study (UKPDS), which have screened diabetic retinopathy in newly diagnosed patients using stereoscopic photography, have reported prevalence of DR 39% in men and 35% in women (11). In the univariate analysis we found associations between DR and age, duration of disease, fasting plasma glucose, HbA1c, and systolic blood pressure. These findings have been confirmed in most studies (3, 11-14).

Denmark's study had found strong inverse association between DR and triglycerides and between DR and BMI. Our statistical analysis did not indicate the same association. Other factors thought to be important in some previous studies, such as smoking, were not found to be important (12). In conclusion, diabetic retinopathy was common in patients with newly discovered type 2 DM. The high prevalence of diabetes mellitus underlines the importance of early detection of diabetes mellitus and detailed ophthalmic investigation of newly diagnosed patients. We suggest population-based studies with larger sample sizes to determine a better estimation of DR prevalence in Iran and study its associated risk factors.

Conflict of interests

The authors declare that they have no competing interests.

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