Original Article

Awareness of Diabetic Retinopathy among Diabetic Patients

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Objective: To find the impact of disease duration and education on the awareness of diabetic retinopathy among diabetic patients visiting a tertiary care hospital in a in a developing country.

Study Design: Cross-sectional study.

Place and Duration of Study: Lahore General Hospital from 1st January, 2016 to 28th February, 2016.

Materials and Methods: An interviewer administered questionnaire was used to assess patients' awareness about ocular complications of diabetes on a 9-point questionnaire before their fundus examination using non-mydriatic fundus camera in the eye clinic. The questions were designed to observe the knowledge and awareness about systemic and ocular complications of diabetes, diabetic retinopathy, the availability of its treatment, treatment modalities, disease consequences and its preventive measures. The patients were divided into 2 groups A and B according to their educational levels and 2 groups C and D according to the duration of disease.

Results: Among the enrolled 200 patients, 69 (34.5%) were male and 131 (65.5%) patients were female. The mean age of the participants was 48 + SD 10.57 years. Patient's education affected their knowledge about the normal random blood sugar levels (P = 0.001), the vascular complications of diabetes involving the retina (P = 0.008) and the absence of the role of glasses in treatment (P = 0.014). Duration of diabetes improved patients knowledge about normal random blood sugar levels (P < 0.001), the vascular nature of disease (P < 0.001), its blinding potential (P < 0.001) and its role in early cataract formation (P < 0.001). It also contributed in patients' motivation to seek annual fundus examination (P = 0.004).

Conclusion: The knowledge about diabetic retinopathy and its treatment was poor along with poor compliance with annual fundus examination. This is directly related to the educational level of the patient and the duration of diabetes.

Key Words: Diabetic retinopathy, awareness, annual fundus examination, screening, laser, intraocular injections.

The alarming rise in the prevalence of diabetes mellitus is a global public health and economic problem. There are 280 million diabetic patients worldwide which is estimated to double by 2025. It has been predicted that more than 30% of the global number of people with diabetes in 2025 will be in the Asia Pacific region[1]. In Pakistan the prevalence of diabetes mellitus is 12% according to the Diabetes national survey 2010[2,3], which is high compared to the National Diabetes Report, 2014, which stated that the prevalence of diabetes mellitus was 7.6% among non-Hispanic Whites in America.

Diabetic retinopathy retinopathy is a major cause of blindness in the age group of 20 – 60 years[4]. Prompt screening of diabetic patients for diabetic retinopathy is the key to address this huge amount of preventable

blindness in the working population, however it is unfortunately, not a top up priority in many parts of the world including Pakistan[5]. The prevalence of diabetic retinopathy in Pakistan is estimated to be 26% in a pilot study, and it increased alarmingly in the age group 51 years and above to 66.1%[6]. A high level of awareness is needed to educate diabetic patients in the context of this debilitating complication. A previous study assessing the awareness of diabetes complications in Australia found that only 37% of the diabetic population was aware of the association between diabetes and eye disease[7], whereas a study from the U.S. found that 65% of people with diabetes were aware of the association between diabetes and eye disease[8]. In a study of an urban general population in India where the prevalence of diabetic retinopathy was high, Dandona *et al*[9] observed a low level (27.0%) of awareness about this dreaded complication.

Little has been reported on awareness of eye complications and the retinopathy changes among diabetic patients in Pakistan despite the high prevalence of diabetic retinopathy among Pakistani diabetics[10]. The purpose of this article is to assess the awareness of diabetic retinopathy in this developing country.

MATERIALS AND METHODS

We included 200 patients presenting to the diabetic clinic of Lahore General Hospital. The duration of the study was from 1st January, 2016 to 28th February, 2016. Sample size was calculated using a confidence interval of 95%, margin of error 7% and diabetic population size visiting Lahore general hospital of 10000 per year. The study was started after approval from the hospital ethical board. An informed consent was obtained from all the participants. An interviewer administered questionnaire was used to assess patients' awareness about diabetic retinopathy. Basic demographic data regarding age, gender, occupation and educational level of the patients was recorded. The patients were then asked to respond to a 9-point questionnaire before their eye examination in the eye clinic. The questions were designed to observe the knowledge and awareness about systemic and ocular complications of diabetes, diabetic retinopathy, the availability of its treatment, treatment modalities, disease consequences and its preventive measures. Some of the questions were in the format of 'yes', 'no' and 'do not know while others had options whereby the patients were asked to choose their best response. A sample of the questions related to diabetes knowledge and its complications is shown in annexure-1. This was followed by fundus examination using non-mydriatic fundus camera. The patients were divided into 2 groups A and B according to their educational levels and 2 groups C and D according to the duration of disease.

Patients' response to questions along with their demographic data was entered into SPSS 20, and chi square test was applied to study the significance of patients' education and the duration of diabetes in improving their knowledge. Significance was expressed in the form of P values.

RESULTS

We interviewed 200 patients visiting the diabetic clinic of Lahore General Hospital to assess their awareness about diabetic retinopathy and other eye complications. Patients' age ranged from 21 to 75 years with the mean age of 48.57 ± SD 10.09 years. 69 (34.5%) participants were male and 131 (65.5%) were females. 113 (56.5%) patients were illiterate, 39 (19.5%) patients were literate but did not achieve matriculation and 42 (21%) patients have qualified matriculation or above educational levels. 120 (60%) patients had diagnosed diabetes mellitus for more than 5 years, 54 (27%) patients had diagnosed diabetes mellitus for a duration of less than 5 years and 26 (13%) patients were freshly diagnosed to have the disease.

The patients were divided into 2 groups according to their educational levels, group A included the illiterate patients and those were 119 in number, group B included patients with some education under or above matriculation and those were 81 in number, the number and percentage of patients coming up with the correct answer in each group is displayed in table-3 and P value is determined by applying chi square test.

The patients were also grouped according to the duration of diabetes mellitus to study the effect of duration upon patients' knowledge about diabetic retinopathy and diabetic eye disease. Group C included patients freshly diagnosed to have diabetes and patients who have diabetes for less than 5 years, group D included patients having diabetes for five years and longer duration. The number and percentage of patients coming up with the correct answer is determined in each group and displayed in table 4. P value was obtained by applying chi square test. Effects of Educational level of the patient and the

Table 1: Demographic data.

Characteristic	Groups	Frequency and percentage
Age	21-40 years 41-60 >60	42 (21%) 124 (62%) 34 (17%)
Gender	Male Female	69 (34.5%) 131 (65.5%)
Duration of Diabetes	Newly diagnosed < 5 years >5 years	26 (13%) 54 (27%) 120 (60%)
Educational level	Illiterate Under matriculation Matriculation and above	119 (59.5%) 39 (19.5%) 42 (21%)
Total		200 (100%)

Table 2: Effect of patients' education on knowledge about diabetic retinopathy.

Question	Response		P value
	Group A (Illiterate) n= 119	Group B (Educated) n=81	
Q1- What is the normal range of random BSL? Correct range (100-140 mg)	Correct range 68 (57%) Incorrect range 51 (43%)	Correct range 69 (85%) Incorrect range 12 (15%)	P = 0.001
Q2- Do you know that diabetes can affect the retina?	Yes 78 (65.5%) No 41 (34.5%)	Yes 69 (85%) No 12 (15%)	P = 0.004
Q3- When did you come to know that diabetic retinopathy can lead to blindness?	Today 60 (50.4%) Before Today 59 (49.6%)	Today 29 (35.8%) Before today 52 (64.2%)	P = 0.008
Q4- Do you go for a yearly complete eye examination?	Yes 32 (26.9%) No 87 (73.1%)	Yes 25 (30.9%) No 56 (69.1%)	P = 0.520
Q5- Is diabetic retinopathy correctable with glasses?	Yes 93 (78.2%) No 26 (21.8%)	Yes 48 (59.3%) No 33 (40.7%)	P = 0.014
Q6- Do you know that diabetes can lead to early cataract formation?	Yes 73 (61.3%) No 46 (38.7%)	Yes 57 (70.4%) No 24 (29.6%)	P = 0.032
Q7- Do you know that diabetic retinopathy may need treatment with eye laser or eye injections?	Yes 0 (0%) No 119 (100%)	Yes 1 (1.2%) No 80 (98.8%)	P = 0.151
Q8- Do you think that good control of blood sugar, blood pressure and healthy life style is sufficient to protect you from diabetic retinopathy?	Yes 113 (95%) No 6 (5%)	Yes 81 (100%) No 0 (0%)	P = 0.122
Q9- Enlist measures that can help you prevent permanent damage by diabetic retinopathy	Included regular fundus examination 32 (26.9%) Did not include regular fundus examination 87 (73.1%)	Included regular fundus examination 25 (30.9%) Did not include regular fundus examination 56 (69.1%)	P = 0.520

Table 3: Effect of Duration of Diabetes on knowledge about diabetic retinopathy.

Question	Response		P value
	Group C (Diabetes of short duration < 5 years) n=80	Group D (Diabetes of long duration > 5 years) n=120	
Q1- What is the normal range of random BSL? Correct range (100-140mg)	Correct range 47 (58.8%) Incorrect range 33 (41.2%)	Correct range 90 (75%) Incorrect range 30 (25%)	P < 0.001
Q2- Do you know that diabetes can affect the retina?	Yes 43 (53.75%) No 37 (46.25%)	Yes 104 (86.7%) No 16 (13.3%)	P < 0.001
Q3- When did you come to know that diabetic retinopathy can lead to blindness?	Today 56 (70%) Before today 24 (30%)	Today 33 (27.5%) Before today 87 (72.5%)	P < 0.001
Q4- Do you go for a yearly complete eye examination?	Yes 13 (16.25%) No 67 (83.75%)	Yes 44 (36.7) No 76 (63.3%)	P 0.004
Q5- Is diabetic retinopathy correctable with glasses?	Yes 65 (81.26%) No 15 (18.75%)	Yes 76 (63.7%) No 44 (36.7%)	P = 0.041
Q6- Do you know that diabetes can lead to early cataract formation?	Yes 37 (46.25%) No 43 (53.75%)	Yes 92 (76.7%) No 28 (23.3%)	P < 0.001
Q7- Do you know that diabetic retinopathy may need treatment with eye laser or eye injections?	Yes 1 (1.25%) No 79 (98.75%)	Yes 0 (0%) No 120 (100%)	P = 257
Q8- Do you think that good control of blood sugar, blood pressure and healthy life style is sufficient to protect you from diabetic retinopathy?	Yes 76 (95%) No 4 (5%)	Yes 118 (98.3%) No 2 (1.7%)	P = 0.248
Q9- Enlist measures that can help you prevent permanent damage by diabetic retinopathy	Included regular fundus examination 13 (16.25%) Did not include regular fundus examination 67 (83.75%)	Included regular fundus examination 44 (36.7%) Did not include regular fundus examination 76 (63.7%)	0.004

duration of Diabetes of the patient on knowledge about diabetic retinopathy are given in table 2 and 3.

DISCUSSION

Diabetes mellitus is a matter of global concern, as 415 million people have diabetes in the world, and more than 35.4 million people live in the MENA Region (Middle East and North Africa); Pakistan is one of the 19 countries and territories of MENA region. However further studies are required to estimate the difference between the prevalence of diabetes mellitus in the developed and the developing world[11]. There were over 7 million cases of diabetes in Pakistan in 2015. Therefore there is an urgent need to increase the

awareness and the knowledge about diabetes mellitus, because knowledge about the detrimental effects of a disease is the main incentive to make an effort to prevent that disease[12,13]. Diabetic retinopathy is increasing with an equivalent pace with diabetes mellitus and it is giving rise to a worldwide diabetic retinopathy epidemic[14]. Our study included diabetic patients visiting a tertiary care hospital located at an urban area in the capital of Punjab, 73.5% of the diabetic patients knew that diabetes affects the vasculature of eye. Ram PK et al[15] studied the awareness of diabetic retinopathy in the rural population of India and it was as low as 37.1%. Among the patients attending diabetic retinopathy screening for the first time in Australia in 1998, only 37% of the patients knew that diabetes affects vision[7]. Sixty five percent of the patients were aware about the vascular complications of diabetes in a study conducted in the United States in 2002[8]. The awareness of ocular complications of diabetes was high (86.1%) in a study conducted in Malaysia in 2011[16]. In another study, 37% of diabetic patients presenting to avitreo-retina clinic at a tertiary care hospital at Nepal in 2012 were unaware of diabetic retinopathy[17]. Thapa et al[18] evaluated the awareness among diabetic patients who needed tertiary care hospital admission due to non-ophthalmic diseases and an ophthalmic examination was requested by the respective department, nearly half of these patients were unaware of diabetic retinopathy and 44% of them had fundus examination for the first time.

Looking into the factors associated with patients' awareness of diabetic eye complications; their educational levels were significantly affecting their knowledge about 5 questions. The duration of diagnosed diabetes mellitus was significantly related in the answers of 7 questions. However, their awareness was not related to their age or gender. Both educational levels and the duration of diabetes could not improve patients' knowledge about the treatment modalities used in the treatment of diabetic retinopathy, including retinal lasers and intra-vitreal injections, P = 0.151 for education and P = 0.257 for duration. These factors could not make them know that diabetic retinopathy can occur in the eyes of patients having good glycolic control as one of the consequences of long standing disease, thus those patients with good control cannot be exempted from mandatory annual funds examination and screening for diabetic retinopathy, P = 0.122 for education and P = 0.248 for duration.

In our study only 55.5% of the patients knew that diabetic retinopathy is a blinding eye disease, the rest thought that they can't at least go blind of diabetes. 99.6% of patients had no knowledge about the treatment modalities being used in treating this disease, 97% answered YES when they were asked if good glycolic control is sufficient to protect them from diabetic eye disease. So 97% of the patients were of the opinion that individuals with good blood sugar control will not have diabetic retinopathy which can be responsible for non-compliance with screening funds examination, delayed diagnosis and poor visual outcome on the long term. Another study conducted in a Turkish tertiary care hospital showed better knowledge in this aspect as 33% of the patients knew that diabetic retinopathy can affect diabetics with good glycolic control[19]. This question was followed with an open ended question asking how to prevent from permanent vision loss caused by diabetic retinopathy and only 28.5% included regular annual funds examination in their answer list.

Lack of understanding on diabetic retinopathy was found to be the most common barrier in vision preservation in patients with diabetes mellitus and diabetic retinopathy in a previous study conducted in Malaysia[15]. Another study was conducted to suggest an effective way to enhance patients' knowledge about diabetic eye complications and it was found that medical personnel can better convey the information compared to mass media[20]. Our study supports this, as the duration of diagnosed disease significantly improved patients' knowledge regarding 7 out 9 questions included in the questionnaire, because patients with longer disease have more frequent contact with medical personnel.

Limitation of our study was that included patients from a tertiary care hospital in one city. A multicenter study is required to find the consistency of the results among the population of Pakistan.

CONCLUSION

The diabetic patients in Pakistan, although aware of the fact that diabetes affects the eye, have poor knowledge about diabetic retinopathy. The diabetic patients in Pakistan need more education regarding diabetic retinopathy. The following measures can play an effective role; prompt counseling by the health professionals, mass media and illustrated posters in the diabetic clinics of public and private hospitals.

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