

**Research Article**

## **Frequency of diabetic retinopathy in newly diagnosed type-II diabetes**

**Imran Khawaja, Alina Ahsan Syed  
and Shafaq Khalid**

<sup>1</sup>Medical Officer, Ayub Teaching Hospital Abbottabad

<sup>2</sup>Woman Medical Officer, DHQ Hospital, Rajanpur

<sup>3</sup>EX-WMO, THQ Hospital, Yazman

[Received: 01/04/2019; Accepted: 29/06/19; Published: 03/07/2019]

### **ABSTRACT**

**Objectives:** To assess the frequency of diabetic retinopathy in newly diagnosed type-II diabetics.

**Materials & Methods:** This cross sectional study was conducted at Department of Medicine, Ayub Teaching Hospital Abbottabad from July 2018 December 2018 over the period of 6 months. Total 113 newly diagnosed patients of type II diabetes mellitus, having age from 30-60 years either male or female were selected. Diabetic retinopathy was assessed in selected patients.

**Results:** Total 113 diabetics were selected for this study. Age range in this study was from 30 to 60 years with mean age of  $45.46 \pm 7.40$  years. Out of 113 diabetics, retinopathy was found in 18 (16%) patients. Diabetic retinopathy was noted in 08 (11.59%) male patients and 10 (22.73%) female patients. Statistically insignificant association between diabetic retinopathy and gender was found with p value 0.115. Diabetic retinopathy was noted in 04 (26.67%) patients, 03 (13.64%) patients, 04 (14.81%) patients, and 07 (14.29%) patients respectively. But insignificant association between diabetic retinopathy and educational status was noted with p value 0.682.

**Conclusion:** Results of present study was showed higher percentage of patients with diabetic retinopathy. Most of the diabetics were male as compared to female. Slightly higher rate of diabetic retinopathy was found in female.

**Keywords:** Diabetes mellitus, retinopathy, insulin

### **INTRODUCTION**

There are three main types of diabetes mellitus (DM): (i) Type I or insulin dependent DM or juvenile diabetes, (ii) Type II or non-insulin dependent DM or adult-onset diabetes, (iii) gestational diabetes occurs when pregnant women without a previous diagnosis of diabetes develop a high blood glucose level.<sup>1,2</sup> Incidence of diabetes

mellitus is 10-14% worldwide.<sup>2</sup> Diabetes mellitus type 2 (formerly noninsulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes) is a metabolic disorder that is characterized by high blood glucose in the context of insulin resistance and relative insulin deficiency.<sup>3</sup> This is in contrast to diabetes mellitus type 1, in which there is an

absolute insulin deficiency due to destruction of islet cells in the pancreas.<sup>4</sup>

The classic symptoms are excess thirst, frequent urination, and constant hunger. Type II diabetes makes up about 90% of cases of diabetes with the other 10% due primarily to diabetes mellitus type 1 and gestational diabetes.<sup>5</sup> Long-term complications from high blood sugar can include heart disease, strokes, diabetic retinopathy where eyesight is affected, kidney failure which may require dialysis, and poor circulation in the limbs leading to amputations.<sup>6</sup>

Diabetic retinopathy is the leading cause of new blindness in persons aged 25-74 years in the United States. The exact mechanism by which diabetes causes retinopathy remains unclear, but several theories have been postulated to explain the typical course and history of the disease.<sup>7</sup> Hyperglycemia affects blood vessel formation in the retina of the eye, can lead to visual symptoms, reduced vision, and potentially blindness.<sup>8</sup> Since type 2 diabetes mellitus may be present well before its clinical diagnosis is made, it is not uncommon to see its micro vascular complications at the time of diagnosis.

The longer a person has diabetes, the higher his or her chances of developing diabetic retinopathy.<sup>9</sup> Reported prevalence of diabetic retinopathy at the time of diagnosis of type 2 diabetes varies from 5-35%.<sup>10</sup>

Blindness due to diabetic retinopathy can be delayed with timely detection and appropriate therapy. Hussain F et al<sup>8</sup> in a study has found frequency of diabetic retinopathy in newly diagnosed type II diabetes mellitus patients as 12%. In another study, Wahab S et al<sup>11</sup> has shown the frequency of diabetic retinopathy in newly diagnosed type II diabetes mellitus patients as 15%. In a study by Khanzada MA et al<sup>2</sup> this prevalence of diabetic retinopathy was found very high i.e. 40.64%.

This high prevalence of diabetic retinopathy was also found in the study from Egypt, that reported its frequency 42.0% and a study from Oman that reported 42.4%.<sup>12,13</sup>

As there was controversy in previous results and also the type II diabetes mellitus goes on increasing in our population with majority of them are uneducated, belong to poor socioeconomic status and remain unaware of their diabetes due to unavailability of easily approachable health care facilities which result in their late presentation with its long term micro vascular complications, so the purpose of this study was to determine frequency of diabetic retinopathy in newly diagnosed type II diabetes patients in local population.

This study would not only provide the data on the magnitude of problem in our local population but also would help us to screen these high risk patients.

Also public awareness and intensive periodic educational programmes on national and regional levels could be arranged for all newly diagnosed type 2 diabetic patients to spread awareness and education of disease, its complications, detailed ophthalmic examination at the time of diagnosis of diabetes and periodic screening to detect retinopathy early so that early therapeutic measures could be taken to prevent its further complications.

#### **OPERATIONAL DEFINITIONS:**

- 1. Newly diagnosed Type II diabetes mellitus:** all patients having age >30 years with diagnosed diabetes mellitus < 6 months and HbA1c levels  $\geq 6.5$  was deemed as positive.
- 2. Diabetic retinopathy:** presence of any one of the following on fundus examination was deemed as positive;
  - a. Grade I (Background Diabetic Retinopathy): presence of microaneurysms and retinal hemorrhage  $\pm$  any exudates.
  - b. Grade II (Diabetic Maculopathy): presence of focal/diffuse maculopathy and macular oedema.
  - c. Grade III (Pre-proliferative Diabetic Retinopathy): presence of venous

beading, venous reduplication, intraretinal microvascular abnormality and blot hemorrhage.

- d. Grade IV (Proliferative Diabetic Retinopathy): presence of new vessels on disc (NVD), pre-retinal/vitreous hemorrhage and pre-retinal fibrosis ± tractional retinal detachment.

## MATERIAL AND METHODS

This cross sectional study was conducted at Department of Medicine, Ayub Teaching Hospital Abbottabad from July 2018 December 2018 over the period of 6 months. Total 113 newly diagnosed patients of type II diabetes mellitus, having age from 30-60 years either male or female were selected.

Patients with type I diabetes mellitus (assessed on history and medical record), patients with h/o hypertension, patients with h/o any retinal surgery and patients not willing were excluded from the study.

An approval was taken from ethical committee and written informed consent was taken from every patient. History was taken from all the patients and demographic profile of all the patients was also taken. Diabetic retinopathy was assessed in selected patients.

Statistical analysis was performed using SPSS version 20.0. Results were presented as mean and standard deviation for quantitative variables i.e. age and duration of disease. Frequency and percentage were calculated for qualitative variables like gender, duration of diabetes, mellitus, educational status, diabetic retinopathy (Yes/No).

Effect modifiers like age, gender, educational status and duration of disease were controlled through stratifications. Post-stratification chi square was applied to see their effects on outcome and p value  $\leq 0.05$  was considered as significant.

## RESULTS

Total 113 diabetics were selected for this study. Age range in this study was from 30 to 60 years with mean age of  $45.46 \pm 7.40$  years. Out of 113 diabetics, retinopathy was found in 18 (16%) patients. (Fig. 1) Total male diabetics were 69 (61.06%) and female diabetics were 44 (38.94%). Diabetic retinopathy was noted in 08 (11.59%) male patients and 10 (22.73%) female patients. Statistically insignificant association between diabetic retinopathy and gender was found with p value 0.115. (Table 1)

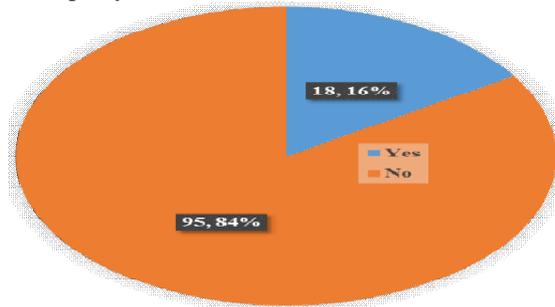
Selected patients were divided into 3 age groups i.e. age group 30-40 years, age group 41-50 years and age group 51-60 years. Total 27 (23.89%) patients belonged to age group 30-40 years followed by 56 (49.56%) patients to age group 41-50 years and 30 (26.55%) patients to age group 51-60 years. Insignificant association between diabetic retinopathy and age group was noted with p value 0.550. (Table 2)

Total 44 (38.94%) patients found with  $\leq 3$  months duration of diabetes and 69 (61.06%) patients found with  $>3$  months duration of diabetes. Retinopathy was seen in 04 (9.09%) patients of  $\leq 3$  months duration of diabetes group and 14 (20.29%) patients found with  $>3$  months duration of diabetes group. But the association was not statistically significant with p value 0.113. (Table 3)

Total 15 (13.27%) patients were illiterate, 22 (19.47%) patients were school going, 27 (23.89%) patients studying in college and 49 (43.36%) patients studying in university.

Diabetic retinopathy was noted in 04 (26.67%) patients, 03 (13.64%) patients, 04 (14.81%) patients, and 07 (14.29%) patients respectively. But insignificant association between diabetic retinopathy and educational status was noted with p value 0.682. (Table 4)

**Figure 1:** Frequency of diabetic retinopathy



**Table 1:** Association of DR with gender

Gender	Diabetic Retinopathy		Total	P-value
	Yes	No		
Male	08 (11.59%)	61 (88.41%)	69 (61.06%)	<b>0.115</b>
Female	10 (22.73%)	34 (77.27%)	44 (38.94%)	
<b>Total</b>	18 (16%)	95 (84%)	113	

**Table 2:** Association of DR with age group

Age group	Diabetic Retinopathy		Total	P-value
	Present	Absent		
30-40 years	03 (11.11%)	24 (88.89%)	27 (23.89%)	<b>0.550</b>
41-50 years	11 (19.64%)	45 (80.36%)	56 (49.56%)	
51-60 years	04 (13.33%)	26 (66.67%)	30 (26.55%)	
<b>Total</b>	18 (16%)	95 (84%)	113	

**Table 3:** Association of DR with duration of diabetes mellitus

Duration of diabetes mellitus	Diabetic Retinopathy		Total	P-value
	Present	Absent		
≤3 months	04 (9.09%)	40 (90.91%)	44 (38.94%)	<b>0.113</b>
>3 months	14 (20.29%)	55 (79.71%)	69 (61.06%)	
<b>Total</b>	18 (16%)	95 (84%)	113	

**Table 4:** Association of DR with educational status

Educational status	Diabetic Retinopathy		Total	P-value
	Present	Absent		
Illiterate	04 (26.67%)	11 (73.33%)	15 (13.27%)	<b>0.682</b>
School	03 (13.64%)	19 (86.36%)	22 (19.47%)	
College	04 (14.81%)	23 (85.19%)	27 (23.89%)	
University	07 (14.29%)	42 (85.71%)	49 (43.36%)	
<b>Total</b>	18 (16%)	95 (84%)	113	

**DISCUSSION**

Diabetic retinopathy is the leading cause of new blindness in persons aged 25-74 years in the United States. The exact mechanism by which diabetes causes retinopathy remains unclear, but several theories have been postulated to explain the typical course and history of the disease.<sup>14</sup>It is

the result of microvascular retinal changes. Hyperglycemia-induced intramural pericyte death and thickening of the basement membrane lead to incompetence of the vascular walls. These damages change the formation of the blood-retinal barrier and also make the retinal blood vessels become more permeable.<sup>15</sup>

Age range in this study was from 30 to 60 years with mean age of  $45.46 \pm 7.40$  years. Majority of the patients i.e. 56 (49.56%) were between 41 to 50 years of age.

This was very much comparable to studies of Iqbal T et al<sup>16</sup> and Khanzada MA et al<sup>2</sup> who had a mean age of 47 and 45 years respectively. On the other hand, Wahab S et al<sup>11</sup> and Mahar PS et al<sup>17</sup> had found mean age of 43 and 42 years in their studies respectively which is much lower compared to our study. In this study, out of these 113 patients, 69 (61.06%) were male and 44 (38.94%) were females with male to female ratio of 1.6:1. Many previous studies have also found higher incidence of type II diabetes in male than female patients.<sup>2,11</sup> While Memon WU et al<sup>17</sup> and Mahar PS et al<sup>18</sup> have shown female predominance in his studies.

In our study, all the selected patients were then undergone fundoscopic examination for presence or absence of diabetic retinopathy and results have shown retinopathy present in 18 (15.93%) while 95 (84.07%) patients have shown no retinopathy. Hussain F et al<sup>8</sup> in a study has found frequency of diabetic retinopathy in newly diagnosed type II diabetes mellitus patients as 12%. In another study, Wahab S et al<sup>11</sup> has shown the frequency of diabetic retinopathy in newly diagnosed type II diabetes mellitus patients as 15%. In a study by Khanzada MA et al<sup>2</sup> this prevalence of diabetic retinopathy was found very high i.e. 40.64%. This high prevalence of diabetic retinopathy was also found in the study from Egypt, that reported its frequency 42.0% and a study from Oman that reported 42.4%.<sup>12,13</sup>

In another study by Abbas KK et al<sup>19</sup>, out of 200 subjects 63.5% were male and 36.5% were female. Age ranged from 40 to 70 years with mean age of  $51.05 \pm 6.910$  years. 29 (14.5%) subjects had Diabetic retinopathy. Out of 29 patients, 24 (82.8%) had preproliferative and 5 (17.2%) had proliferative diabetic retinopathy. There are also many clinic based studies on newly diagnosed type 2 diabetic patients which have shown similar results for prevalence of

retinopathy to our study i.e. Abdollahi A et al<sup>20</sup> reported 13.8%, Agarwal Set al<sup>21</sup> reported 11.7%, while Nathan<sup>22</sup> has reported 12.6% prevalence of retinopathy in newly diagnosed diabetics in a Diabetes Prevention Programme.

A previous local study in Pakistan by Shera AS et al<sup>23</sup> has reported the prevalence of diabetic retinopathy as 43.0%. Mahar PS et al<sup>17</sup> reported 27.43% of retinopathy in the type 2 diabetes cases. Similarly a study from India reported this figure to be 10.2%<sup>24</sup> whereas in United Kingdom the prevalence of diagnosed retinopathy was reported to be 19%.<sup>26</sup> In another study, total 100 patients were included, with mean age  $45.1 \pm 3.2$  years, 60% of them were females. Overall, 17% of type 2 diabetic patients had retinopathy within one month of diagnosis. Background retinopathy was predominant (12%) followed by pre-proliferative (4%) and proliferative (1%) lesions.<sup>26</sup>

Amir et al<sup>27</sup> conducted a study on admitted DM patients in various units of Hayatabad Medical Complex, Peshawar and evaluated 202 patients for the evidence of microvascular complications due to longstanding DM including DR. They reported a staggering figure of 58% incidence of DR in admitted patients.

Pakistan National Blindness and Visual Impairment Survey data was analyzed by Sheikh et al and found DR in 15.3% subjects recruited in the survey from the general population across Pakistan.<sup>28</sup>

The prevalence of DR was 25.7% in a group of Chinese people living in United States<sup>29</sup> which is almost equivalent to the prevalence seen in Indians in Kashmir as quoted earlier.

In Taiwan DR in diabetics prevailed in 35%<sup>30</sup> with a lower rate of 18.2% in Hong Kong.<sup>31</sup>

## CONCLUSION

Results of present study were showed higher percentage of patients with diabetic retinopathy. Most of the diabetics were male as compared to female. Slightly higher rate of diabetic retinopathy was found in female.

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