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FREQUENCY OF DIABETIC RETINOPATHY IN TYPE 2 DIABETES MELLITUS PATIENTS

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ABSTRACT

Objectives: To determine the frequency of diabetic retinopathy in newly diagnosed type II diabetes patients. **Settings:** Sheikh Zayed Hospital Rahim Yar Khan. **Materials and Methods:** Total 113 cases of newly diagnosed type II diabetes mellitus patients with age range from 30-60 years were selected. Patients with type I diabetes, hypertension and h/o previous retinal surgery were excluded. All patients were then undergone fundoscopy and presence or absence of retinopathy and grades of retinopathy were noted. **Results:** Mean age of patients was 45.46 ± 7.40 years. 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. Results have shown retinopathy present in 18 (15.93%) while 95 (84.07%) patients have shown no retinopathy. **Conclusion:** This study concluded that the frequency of diabetic retinopathy in newly diagnosed type II diabetes mellitus is 15.93% which is relatively high and emphasizes the detailed ophthalmic examination of each patient at the time of diagnosis of diabetes.

KEYWORDS: Diabetes, newly diagnosed, retinopathy.

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.[1,2] Incidence of diabetes mellitus is 10-14% worldwide.[2] 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.[3] 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.[4]

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.[5] 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.[6]

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.[7] Hyperglycemia affects blood vessel formation in the retina of the eye, can lead to visual symptoms, reduced vision, and potentially blindness.[8] 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.[9] Reported prevalence of diabetic retinopathy at the time of diagnosis of type 2 diabetes varies from 5-35%.[10]

Blindness due to diabetic retinopathy can be delayed with timely detection and appropriate therapy. Husain F et al,[8] in a study has found frequency of diabetic retinopathy in newly diagnosed type II diabetes mellitus patients as 12%. In another study, Wahab et al,[11] hasshown the frequency of diabetic retinopathy in newly diagnosed type II diabetes mellitus patients as 15%. In a study by Khanzada MAet al[2] 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%.[12,13]

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 programs 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 ≥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 micro aneurysms and retinal hemorrhage ± any exudates.
b. Grade II (Diabetic Maculopathy): presence of focal/diffuse Maculopathy and macular edema.
c. Grade III (Pre-proliferative Diabetic Retinopathy): presence of venous beading, venous reduplication, intra retinal 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

Study design: Descriptive, Cross-sectional study.
Setting: Department of Medicine, Sheikh Zayed Hospital Rahim Yar Khan.
Duration of study: March 2018 September 2018

Inclusion Criteria:
1. All newly diagnosed type II diabetes mellitus patients (as per-operational definition).
2. Patients 30-60 years of age.
3. Both genders.

Exclusion Criteria
1. Patients with type I diabetes mellitus (assessed on history and medical record).
2. Patients with h/o hypertension.
3. Patients with h/o any retinal surgery.
4. Patients not willing to be included in the study.

Data collection procedure
After approval from ethical review committee, total number of 113 patients of newly diagnosed type II diabetes mellitus (as per operational definition) presenting in the outpatient department of Medicine, Sheikh Zayed Hospital Rahim Yar Khan, fulfilling the inclusion/exclusion criteria were selected. After taking informed written consent and relevant history from each patient, all the patients were then undergone fundoscopic examination by one consultant ophthalmologist (at least 5 years of post-fellowship experience) in the department of ophthalmology, Sheikh Zayed Hospital Rahim Yar Khan, in the presence of researcher. In each patient diabetic retinopathy (present/absent) was noted (as preoperational definition). All this data was recorded on a predesigned proforma (Annexure I).

Data analysis procedure
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, educational status, family monthly income and diabetic retinopathy (present/absent).

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

RESULTS

Age range in this study was from 30 to 60 years with mean age of 45.46 ± 7.40 years. Majority of the patients i.e. 56 (49.56%) were between 41 to 50 years of age as shown in Table IV. 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 (Figure1).

Mean duration of disease was 4.46 ± 1.40 months as shown in Table 1. % age of patients according to educational status and family monthly income are shown in Table 2 & 3 respectively.

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 as shown in Figure 2.

Stratification of diabetic retinopathy with respect to gender and age have shown in Table 4 and 5

respectively. Table 6 has shown the stratification of diabetic retinopathy with respect to duration of disease while Table 7 & 8 have shown the stratification of diabetic retinopathy with respect to education status and family monthly income respectively.

Figure 1: %age of patients according to Gender (113).
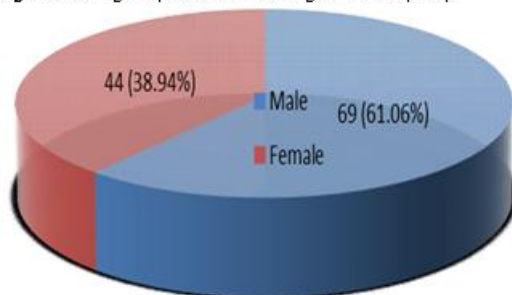
Table 1: %age of participants according to Age distribution (n=113).

Age (in years)	No. of Patients	%age
30-40	27	23.89
41-50	56	49.56
51-60	30	26.55
Total	**113**	**100.0**

Table 2: %age of participants according to duration of diabetes mellitus (n=113).

Duration of diabetes (months)	No. of Patients	%age
≤3 months	44	38.94
>3 months	69	61.06

Table 3: %age of participants according to educational status (n=113).

Educational status	No. of Patients	%age
Illiterate	15	13.27
School	22	19.47
College	27	23.89
University	49	43.36

Table 4: %age of participants according to family monthly income (n=113).

Family monthly income	No. of Patients	%age
<5000	23	20.35
5000-10000	26	23.01
>10000	64	56.64
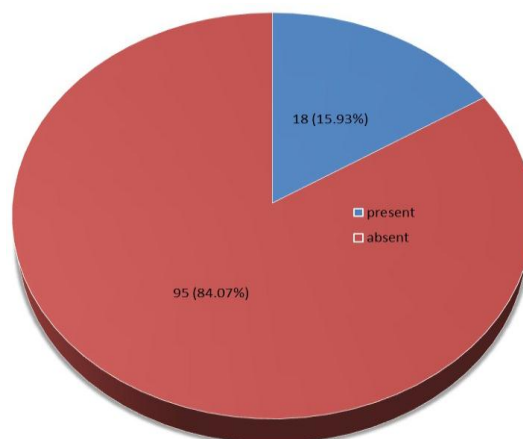
Figure 2: %age of patients according to presence or absence of diabetic retinopathy (113).

Table 5: Stratification of patients with respect to gender (n=113).

Gender	Frequency	Diabetic Retinopathy		P.value
		present	absent	
Male	69	08 (11.59%)	61 (88.41%)	0.115
Female	44	10 (22.73%)	34 (77.27%)	

Table 6: Stratification of patients with respect to age (n=113).

Age	Frequency	Diabetic Retinopathy		P.value
		Present	Absent	
30-40 years	27	03 (11.11%)	24 (88.89%)	
41-50 years	56	11 (19.64%)	45 (80.36%)	0.550
51-60 years	30	04 (13.33%)	26 (66.67%)	

Table 7: Stratification of patients with respect to duration of disease.

Duration of disease	Frequency	Diabetic Retinopathy		P.value
		Present	Absent	
≤3 months	44	04 (9.09%)	40 (90.91%)	0.113
>3 months	69	14 (20.29%)	55 (79.71%)	

Table 8: Stratification of patients with respect to Educational status (n=113).

Educational status	Frequency	Diabetic Retinopathy		P.value
		Present	Absent	
Illiterate	15	04 (26.67%)	11 (73.33%)	
School	22	03 (13.64%)	19 (86.36%)	0.682
College	27	04 (14.81%)	23 (85.19%)	
University	49	07 (14.29%)	42 (85.71%)	

Table 9: Stratification of patients with respect to income (n=113).

Income	Frequency	Diabetic Retinopathy		P.value
		Present	Absent	
<5000	23	05 (21.74%)	18 (78.26%)	
5000-10000	26	03 (11.54%)	23 (88.46%)	0.619
>10000	64	10 (15.63%)	54 (84.37%)	

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.[14] 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.[15]

Age range in this study was from 30 to 60 years with mean age of 45.46 ± 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[16] and Kwanzaa MA ET al[2] who had a mean age of 47 and 45 years respectively. On the other hand, Wahab et al,[11] and Mahar PS et al,[17] 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.[2,11] While Memon WU et al,[17] and Mahar PS et al,[18] 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. Husain F et al,[8] in a study has found frequency of diabetic retinopathy in newly diagnosed type II diabetes mellitus patients as 12%. In another study, Wahab et al,[11] hasshown the frequency of diabetic retinopathy in newly diagnosed type II diabetes mellitus patients as 15%. In a study by Khanzada MA et al,[2] 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%.[12,13]

In another study by Abbas KK ET al,[19] 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+ 6.910 years. 29 (14.5%) subjects had Diabetic retinopathy. Out of 29 patients, 24 (82.8%) had pre-proliferative 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. Abdullah A et al,[20] reported 13.8%, Agarwal Set al[21] reported11.7%, while Nathan,[22] 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,[23] has reported the prevalence of diabetic retinopathy as 43.0%. Mahar PS et al,[17] reported 27.43% of retinopathy in the type 2 diabetes cases. Similarly a study from India reported this figure to be 10.2%,[24] whereas in United Kingdom the prevalence of diagnosed retinopathy was reported to be 19%.[26]

In another study, total 100 patients were included, with mean age 45.1±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.[26]

Amir et al[27] 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.[28] The prevalence of DR was 25.7% in a group of Chinese people living in United States,[29] which is almost equivalent to the prevalence seen in Indians in Kashmir as quoted earlier. In Taiwan DR in diabetics prevailed in 35%[30] with a lower rate of 18.2% in Hong Kong.[31]

CONCLUSION

This study concluded that the frequency of diabetic retinopathy in newly diagnosed type II diabetes mellitus is 15.93% which is relatively high. So, we recommend that there should be public awareness and intensive periodic educational programs on national and regional levels 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.

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