The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 3, Issue 5, 2025

DIABETIC RETINOPATHY IN NEWLY DIAGNOSED DIABETES MELLITUS

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DOI: https://doi.org/10.5281/zenodo.15490507

Keywords
: Diabetes, Diabetic control, Diabetic Retinopathy, Frequency, HbA1C%.

Article History
Received on 14 April 2025
Accepted on 14 May 2025
Published on 22 May 2025

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Abstract

Objectives: *To determine frequency of diabetic retinopathy in newly diagnosed cases of diabetes mellitus.*

Place and Duration of the study: *Pakistan Institute of Medical Sciences, Islamabad from July-2024 to December-2024.*

Methodology: *A total of 175 patients with newly diagnosed diabetes were included. They were assessed for presence of diabetic retinopathy thorough fundoscopic examination by consultant ophthalmologist to screen for presence and severity of diabetic retinopathy. Data was analyzed using SPSS version 20.*

Results: *In this study, 175 patients were included. Median age was 45.00 (60.00 – 25.00) years. There were 89 (50.86%) male and 86 (49.14%) female patients. Median BMI was 31.60 (34.50 – 21.70) kg/m2. Median HbA1C% was 8.10 (12.60 – 6.80) %. Frequency of DR in newly diagnosed cases of diabetes in present study was 50 (28.57%). Amongst these patients with DR (n = 50), 22 (44.00%) were found to have mild non-proliferative DR, 15 (30.00%) had moderate non-proliferative DR, 8 (16.00%) had severe non-proliferative DR and 5 (10.00%) had proliferative DR.*

Conclusion: *Frequency of diabetic retinopathy in newly diagnosed cases of diabetes was 28.57%.*

INTRODUCTION

Type II diabetes mellitus (DM) is a disease of endocrine system that affects approximately 10.5% of the general population worldwide. [1, 2] Pakistan ranks 3rd in the world in terms of diabetes prevalence and according to the International Diabetes Federation, in 2022, 26.7% of adults in Pakistan are affected by diabetes making the total number of cases approximately 33,000,000. [3] Numerous factors, such as age, fast urbanization, obesity, unhealthy eating habits, family history of diabetes, poor food hygiene standards, inactivity, and smoking, have been linked to an increasing prevalence of this disease. [4]

The condition affects several organ systems, various anatomical and physiological processes, and can result in a number of serious side effects, such as

retinopathy, nephropathy, peripheral neuropathy that can cause foot ulcers, amputation, and Charcot joints, and autonomic neuropathy that can cause gastropathy, urination incontinence, and sexual dysfunction. [5] Amongst these diabetic retinopathy (DR) is one of the most common complication associated with long standing diabetes and is well known to be associated with long standing and poorly controlled diabetes. [6] However, recent studies have shown that there is possibility of developing retinopathy even in newly diagnosed cases of diabetes mellitus. In this instance, a study reported that the frequency of DR in newly diagnosed cases of DM was reported at 43.5%. [7] On the contrary, one study found that the frequency of DR in newly diagnosed DM cases was merely 13.1%. [8]

Previous studies exhibit that almost half of the newly diagnosed cases of diabetes mellitus may have DR at the time of DM diagnosis which can potentially go unchecked due to a misconception that DR is only associated with long standing poorly managed DM. Therefore, present study was conducted with the aim to determine frequency of DR in newly diagnosed cases of DM. The results obtained from the current study may provide useful insight regarding this complication in newly diagnosed diabetic population and also record its exact magnitude in local population. This, in turn, may be helpful for newly diagnosed type II diabetic patients and physicians managing DM to ensure early recognition of DR and provision of prompt management to save vision of diabetic patients.

METHODOLOGY

This cross-sectional study was conducted at Pakistan Institute of Medical Sciences, Islamabad from July-2024 to December-2024 after getting approval from research evaluation unit of College of Physicians and Surgeons (CPSP/REU/MED-2022-042-19389). Sample size calculation was performed using World Health Organization (WHO) sample size calculator using following formula:

Sample size calculation was performed by using confidence level of 95%, absolute precision of 5% and anticipated frequency of DR in newly diagnosed DM of 13.1%. [8] This gave a sample size of 175. Study sample was selected by using non-probability consecutive sampling technique. Male and female patients, aged 25 – 60 years who were newly diagnosed with type 2 DM were included. Newly diagnosed DM cases were defined as diabetes cases diagnosed by consultant physician for not more than 6 months ago Diagnosis of diabetes was made in symptomatic patient having single random blood glucose level of > 200mg/dl or in asymptomatic patient having two readings of random blood glucose level of > 200mg/dl assessed 24 hours apart. Patients who were diagnosed for having DM for more than six months, history of pre-existing retinal disease and those with history of poorly controlled hypertension for more than six months were excluded. After approval of the study proposal and attaining the informed consent of the patients, all patients presenting at the medical outdoor department meeting all the inclusion criteria were included in the study. Baseline characteristics including age, gender, body mass index (BMI), duration of diabetes, education status, area of residence, history of smoking and HbA1C% were documented. All these patients were referred to ophthalmology department to go through a thorough fundoscopic examination by consultant ophthalmologist to screen for presence and severity of diabetic retinopathy (as per the characteristic fundoscopic findings). Appropriate treatment was provided to all the patients for diabetes. In case of presence of DR, treatment was provided as per directions of consultant ophthalmologist. Statistical analysis of collected data was performed using Statistical Package for Social Sciences (SPSS) software version 20. Normality of data was assessed using Shapiro-Wilk test. Based on this the numerical variables (age, BMI, HbA1C and duration of diabetes) were presented as median interquartile range (IQR) since these were not distributed normally. Frequency and percentages were used for categorical variables (gender, education status, area of residence, history of smoking, presence of DR and severity of DR). Frequency of

$$n = \frac{z^2_{1-\alpha/2} P(1-P)}{d^2}$$

DR was stratified by age, gender, BMI, history of smoking and HbA1C% to deal with effect modifiers. Post-stratification chi-square test was used as test of significance. A p-value of ≤ 0.05 was considered statistically significant.

RESULTS

In this study, 175 patients were included. Median age was 45.00 (60.00 – 25.00) years. In younger age group (< 45 years) there were 98 (56.00%) patients while 77 (44.00%) patients were aged ≥ 45 years. There were 89 (50.86%) male and 86 (49.14%) female patients. Median BMI was 31.60 (34.50 – 21.70) kg/m2. Healthy BMI (< 25 kg/m2) was found in 44 (25.14%) patients while 131 (74.86%) patients had unhealthy BMI (≥ 25 kg/m2). Median duration since diagnosis of diabetes was 2.00 (5.00 – 1.00) months. A total of 104 (59.43%) of the patients had no formal education while 71 (40.57%) patients were educated. Amongst all patients, 108 (61.71%) patients were resident of urban area while 67 (38.28%) were residents of rural area. Smoking history was positive in 108 (61.71%) patients. Median HbA1C% was 8.10 (12.60 – 6.80) %. Based on HbA1C% value, good glycemic control (< 7.5%) was observed in 73 (41.71%) of the patients while 102 (58.29%) patients had poor glycemic control (≥ 7.5%). Baseline demographics of the patients are summarized in Table-I:

Table-I: Baseline demographics (n = 175)

Parameter	Median (IQR); n (%)
Median age	45.00 (60.00 – 25.00) years
< 45 years	98 (56.00%)
≥ 45 years	77 (44.00%)
Gender	
Male	89 (50.86%)
Female	86 (49.14%)
Median BMI	31.60 (34.50 – 21.70) kg/m2
< 25 kg/m2	44 (25.14%)
≥ 25 kg/m2	131 (74.86%)
Median duration since diagnosis	2.00 (5.00 – 1.00) months
Education status	
No formal education	104 (59.43%)
School education or above	71 (40.57%)
Area of residence	
Urban	108 (61.71%)
Rural	67 (38.28%)
Smoking	
Yes	108 (61.71%)
No	67 (38.28%)
Median HbA1C%	8.10 (12.60 – 6.80) %
Glycemic control	
< 7.5%	73 (41.71%)
≥ 7.5%	102 (58.29%)

Frequency of DR in newly diagnosed cases of diabetes in present study was 50 (28.57%). Amongst these patients with DR (n = 50), 22 (44.00%) were found to have mild non-proliferative DR, 15 (30.00%) had moderate non-proliferative DR, 8 (16.00%) had severe non-proliferative DR and 5 (10.00%) had proliferative DR. This distribution of DR in newly diagnosed DM cases is given in Table-II:

Table-II: Distribution of DR and its severity in newly diagnosed DM cases (n = 175)

DR	n (%)
Yes	50 (28.57%)
No	125 (71.43%)
DR severity (n = 50)	
Mild NPDR	22 (44.00%)
Moderate NPDR	15 (30.00%)
Severe NPDR	8 (16.00%)
Proliferative DR	5 (10.00%)

In younger age group (n = 98) frequency of DR was 26 (26.53%) while in older age group (n = 77), it was 24 (31.17%), (p = 0.178). In male patients (n = 89), DR was found in 30 (33.71%) patients while in females (n = 86), it was found in 20 (23.25%) patients, (p = 0.126). In patients with healthy BMI (n = 44), DR occurred in 16 (36.36%) patients while in those with unhealthy BMI (n = 131), it occurred in 34 (25.95%) patients, (p = 0.186). In newly diagnosed DM patients who smoked (n = 108), DR was found in 30 (27.77%) patients while in never smokers (n = 67), it occurred in 20 (29.85%) patients, (p = 0.768). In patients with good glycemic control (n = 73), DR was found in 16 (21.92%) while in those with poor control, it was found in 34 (33.33%), (p = 0.099). Stratification of frequency of DR in newly diagnosed cases of DM by various potential effect modifiers including age, gender, BMI, history of smoking and HbA1C% is given in Table-III:

Table-III: Stratification of DR frequency by effect modifiers (n = 175)

Age stratification			
	< 45 years (n = 98)	**≥ 45 years (n = 77)**	**p-value**
DR	26 (26.53%)	24 (31.17%)	0.178
Gender stratification			
	Male (n = 89)	**Female (n = 86)**	**p-value**
DR	30 (33.71%)	20 (23.25%)	0.126
BMI stratification			
	< 25 kg/m2 (n = 44)	**≥ 25 kg/m2 (n = 131)**	**p-value**
DR	16 (36.36%)	34 (25.95%)	0.186
History of smoking stratification			
	Yes (n = 108)	**No (n = 67)**	**p-value**
DR	30 (27.77%)	20 (29.85%)	0.768
HbA1C%/Glycemic control stratification			
	< 7.5 % (n = 73)	**≥ 7.5 % (n = 102)**	**p-value**
DR	16 (21.92%)	34 (33.33%)	0.099

DISCUSSION

Present study focused on one of the important complications of diabetes, i.e., retinopathy which occurs due to inflammatory damage to the ocular vasculature in response to persistent exposure to raised glucose levels in blood. [9, 10] It is usually thought as a predictor of chronically disturbed glycemic parameters of the diabetic patients [11, 12], however, in the light of recent evidence it has also been found in patients who have their new diagnosis of diabetes. This study thus focused on finding the frequency of this vision threatening complication of diabetes in newly diagnosed cases.

In this study, average age at which new diagnosis of diabetes was made was 45 years which lies in the middle to older age group. This finding correlates with the general consensus and the findings of various internationally conducted epidemiological studies showing type 2 diabetes much more prevalent among middle to old aged population. [13, 14] Similarly, Junaid et al. [15] conducted a study in Pakistan to determine the clinical characteristics of newly diagnoses cases of DM and reported that average age was 43 years which was comparable to the age in present study.

Upon analysis of gender distribution, it was observed that new diagnosis of diabetes was almost equally distributed among male and female patients. Compared to this, Qayyum et al. [16] reported a slight female predominance in this regard. One reason for the female predominance can be attributed to women being more conscious of their health which make them to seek medical advice much earlier as compared to the males. Average BMI was around 32 kg/m2 which lies in the range of obesity. This can be attributed to the higher propensity of getting diabetes in people who are overweight or obese. [17, 18] Most of the patients who were newly diagnosed with DM were the residents of urban locality. In Pakistan as well as globally, this rapid urbanization is leading to highly unhealthy dietary habits and higher stress levels which contribute to the rising burden of diabetes. [19] Another important finding of present study was the high proportion of newly diagnosed diabetes patients to have a positive history of smoking which is another factor that is strongly associated with development of DM. [20]

When it comes to frequency of DR in new DM cases, it was observed that in present study this frequency was 28.57%. Compared to this, a study reported that frequency of this ocular morbidity in newly diagnosed DM cases was 43.5% which was approximately double compared to present study. [7] In another study conducted in Nepal by Bastola et al. [21] this frequency of DR was reported to be at 27.04% which was comparable to current study. In one study conducted in India by Damor et al. [22], DR was found in 21.7% of the patients who had a new diagnosis of DM. Even lower DR frequency was reported in another study conducted by Khan et al. [23] in which it was reported at 15.81%. In terms of DR severity, most commonly mild NPDR was seen followed by moderate and severe NPDR and least number of patients were found to have proliferative type of this condition. This trend was almost similar to the DR severity distribution reported by Usman et al. [24] who found that only 1 newly diagnosed DM case had proliferative type of DR at the time of diagnosis.

Based on the findings of this study, it is strongly recommended that all newly diagnosed DM patients should be thoroughly screened for presence of DR for early diagnosis and prompt treatment. There were no limitations of present study.

CONCLUSION

In conclusion, frequency of diabetic retinopathy in newly diagnosed cases of diabetes mellitus was 28.57%.

CONFLICT OF INTEREST

None.

ACKNOWLEDGEMENTS

None

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