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Frequency Of Patients With Different Stages Of Diabetic Retinopathy Presenting To A Tertiary Care Eye Hospital In Rawalpindi, Pakistan

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Abstract:

Objective: To determine the frequency of patients with different stages of diabetic retinopathy presenting to a tertiary care eye hospital in Rawalpindi.

Methods: A descriptive cross-sectional study was carried out in the general ophthalmology department. Consultant ophthalmologists identified 366 individuals, 66 (18.0%) with type I and 300 (82.0%) with type II diabetes mellitus based on patient history. A consultant ophthalmologist performed clinical evaluation; diabetic retinopathy was diagnosed and graded according to the 2017 ICO classification².

Results: The mean age of patients with Type I Diabetes Mellitus and Type II Diabetes Mellitus was 24.64+7.74 and 54.76+3.60 respectively. Mean visual acuity in patients with Type I DM and Type II DM was 0.36+0.26 and 0.37+0.27 decimal respectively. The mean duration of disease in patients with Type I DM and Type II DM was 7.61+2.79 and 7.59+2.87 years respectively. Similarly, 16 (16.0%) patients with Type I DM had proliferative diabetic retinopathy as compared to 84 (84.0%) patients having Type II DM.

Conclusion: The present study demonstrated a huge burden of proliferative diabetic retinopathy amongst Type II diabetic patients, thus warrants large multicentered studies to generalize its results to the overall population of the province and to contribute to the establishment of the national screening program for catering diabetic retinopathy. *Al-Shifa Journal of Ophthalmology* 2023; 19(2): 70-76. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.

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Introduction:

Damage to the retina caused by diabetes is known as diabetic retinopathy (DR). Retinopathy caused by diabetes can be either non-proliferative or proliferative. According to the International Diabetes Federation (IDF) ¹ the number of persons with diabetes mellitus (DM) is projected to increase from 463 million in 2019 to 700 million by 2045. The most common and distinct complication of diabetes mellitus is diabetic retinopathy ^{1,2} which affects 25.1% of people with type 2 diabetes and 77.3% of people with type 1 diabetes. It is responsible for more cases of blindness in adults than any other preventable cause ^{3,4,5}. The prevalence of blindness owing to diabetic eye disease has increased from 14.9% to 18.5% across the world among people aged 30 and older over the past 30 years ⁶. There will be more cases of diabetic

retinopathy as the world's population ages rapidly. Diabetic retinopathy can cause blindness if not caught and treated in time⁷. Longer diabetes duration, higher hyperglycemia, and higher blood pressure are the main risk factors for diabetic retinopathy^{8,9,10}. Nephropathy, dyslipidemia, tobacco use, and obesity are also contributors^{11,12,13}.

Diabetic retinopathy can be diagnosed clinically through the observation of microvascular abnormalities in the retina. Diabetic retinopathy has two distinct clinical stages: non-proliferative (NPDR) and proliferative (PDR). NPDR can range from mild to severe¹². Microaneurysms, hemorrhages, and hard exudates are discovered during NPDR. When neovascularization of the retina occurs in patients with NPDR, the condition advances to PDR¹³. Patients may experience severe vision loss if complications, including vitreous hemorrhage, occur. One of the most common complications of diabetes is diabetic macular edema (DME), which can lead to blindness. When the blood-retinal barrier (BRB) is compromised, fluid accumulates sub- and intra-retinally, leading to macula swelling and thickening¹⁴.

Patients with NPDR were found to be 61% more common than those with PDR¹⁵. There are many studies, but not nearly as many that include data from Asia, and Pakistan in particular⁶.

The rationale of this study was to assess the frequency of diabetic retinopathy in our local population. Since it is a preventable cause of vision loss, it is imperative to know about the current magnitude and burden of diabetic retinopathy in our local population.

Materials and Methods:

From November 2022 to January 2023, researchers from the Department of Ophthalmology at Al-Shifa Trust Eye Hospital in Rawalpindi gathered data in a descriptive cross-sectional study. The Ethical Committee of the Hospital

approved. The sample size was 366 calculated using the WHO Sample Size Calculator with the following inputs: the prevalence of diabetic retinopathy (61%)⁽¹⁵⁾, the power (80%), and the significance level of (5%). A nonprobability consecutive sampling technique was adopted. Patients of either gender, aged between 20 to 65, having been diagnosed with type I or type II diabetes mellitus (HbA1c > 7.5%) based on a clinical history taken by a consultant ophthalmologist were included in the study. Patients with additional posterior segment disorders and those with mental impairments were excluded.

All participants provided written informed permission following a thorough explanation of the study's purpose and procedures. Patients were sorted by diabetes subtype for analysis. Diabetic retinopathy was diagnosed and graded based on clinical findings by a consultant ophthalmologist using the 2017 ICO classification.

The version 23.00 of the Statistical Package for the Social Sciences (SPSS) was used for all analyses. Descriptive statistics were used to describe the demographic and clinical features of the patients. The quantitative data were summarized using Mean±SD. Diabetic retinopathy severity was classified according to diabetes subtype. A chi-square test was performed after stratification, with significance set at P=0.05.

Results:

A total of three hundred and sixty-six patients were recruited for this study. Mean age of patients with Type I Diabetes Mellitus and Type II Diabetes Mellitus was 24.64±7.74 and 54.76±3.60 years respectively. Mean visual acuity in patients with Type I DM and Type II DM was 0.36±0.26 and 0.37±0.27 respectively. Mean duration of disease in patients with Type I DM and Type II DM was 7.61±2.79 and 7.59±2.87 years respectively. Similarly, 16 (16.0%) patients with Type I

DM had proliferative diabetic retinopathy as compared to 84 (84.0%) patients having Type II DM. The majority of patients 301 (82.2%) were > 40 years of age with male preponderance 219 (59.8%) (Table 1).

Out of 366 patients, 215 (58.7%) patients had right eye involved while 151 (41.3%) patients had the left eye involved.

The majority of patients 300 (82.0%) had type II diabetes mellitus with presbyopia

216 (59.0%) being the common refractive error recorded and most of the patients 100 (27.3%) had proliferative diabetic retinopathy. (Table 2).

A statistically insignificant association of different stages of diabetic retinopathy with type of diabetes mellitus was observed (p-value 0.808) (Table 3).

Table 1: Demographic Characteristics of Patients (n=366)

Type of Diabetes	Quantitative Variables	Mean	Std. Deviation
Type I Diabetes Mellitus	Age (Years)	24.64	4.745
	Visual Acuity (Decimal)	.3635	.26264
	Duration of Disease (Years)	7.61	2.795
Type II Diabetes Mellitus	Age (Years)	54.76	3.604
	Visual Acuity (Decimal)	.3728	.27103
	Duration of Disease (Years)	7.59	2.875
Type of Diabetes	Age Groups	Frequency	Percent
Type I Diabetes Mellitus	≤ 40 Years	65	98.5%
	> 40 Years	1	1.5%
	Total	66	100.0%
Type II Diabetes Mellitus	> 40 Years	300	100.0%
Type of Diabetes	Gender Groups	Frequency	Percent
Type I Diabetes Mellitus	Male	30	45.5%
	Female	36	54.5%
	Total	66	100.0%
Type II Diabetes Mellitus	Male	189	63.0%
	Female	111	37.0%
	Total	300	100.0%

Table 2: Clinical Characteristics of Patients (n=366)

Type of Diabetes	Side of Eye	Frequency	Percent
Type I Diabetes Mellitus	Right Eye	39	59.1%
	Left Eye	27	40.9%
	Total	66	100.0%
Type II Diabetes Mellitus	Right Eye	176	58.7%
	Left Eye	124	41.3%
	Total	300	100.0%

Type of Diabetes	Stages of Diabetic Retinopathy	Frequency	Percent
Type I Diabetes Mellitus	Non apparent diabetic retinopathy	16	24.2%
	Mild non proliferative diabetic retinopathy	17	25.8%
	Moderate non proliferative diabetic retinopathy	6	9.1%
	Severe non proliferative diabetic retinopathy	11	16.7%
	Proliferative diabetic retinopathy	16	24.2%
	Total	66	100.0%
Type II Diabetes Mellitus	Non apparent diabetic retinopathy	66	22.0%
	Mild non proliferative diabetic retinopathy	71	23.7%
	Moderate non proliferative diabetic retinopathy	39	13.0%
	Severe non proliferative diabetic retinopathy	40	13.3%
	Proliferative diabetic retinopathy	84	28.0%
	Total	300	100.0%

Table 3: Association of Stages of Diabetic Retinopathy with Type of Diabetes (n=366)

Stages of Diabetic Retinopathy, n (%)	Type of Diabetes		Total	p-value
	Type I DM	Type II DM		
• Nonapparent diabetic retinopathy	16 (19.5%)	66 (80.5%)	82 (100.0%)	0.808
• Mild non-proliferative diabetic retinopathy	17 (19.3%)	71 (80.7%)	88 (100.0%)	
• Moderate non-proliferative diabetic retinopathy	6 (13.3%)	39 (86.7%)	45 (100.0%)	
• Severe non-proliferative diabetic retinopathy	11 (21.6%)	40 (78.4%)	51 (100.0%)	
• Proliferative diabetic retinopathy	16 (16.0%)	84 (84.0%)	100 (100.0%)	
Total	66 (18.0%)	300 (82.0%)	366 (100.0%)	

Discussion:

Elevated blood sugar caused by either insulin deficiency or insulin resistance defines diabetes mellitus (DM) ¹⁷. Worldwide, diabetes affects over 451 million people; in Pakistan, over 26% of the population has the disease, according to the International Diabetes Federation and the findings of the second National Diabetes Survey of Pakistan ¹⁸. The number of persons diagnosed with diabetes is expected to rise over the next few years as a result of significant socioeconomic change ¹⁹⁻²¹.

Out of the 366 patients, 100 (27.2%), had proliferative diabetic retinopathy, while 300 (82.0%) had type II diabetes mellitus, with presbyopia as the most prevalent refractive defect. One in twelve diabetic individuals in the southern areas of Pakistan had diabetic retinopathy, according to a recent study ²².

The prevalence of diabetic retinopathy in Pakistan's diabetic population was previously estimated at 13%, however, other studies have found rates as high as 18%. DR, which can cause blindness, is more common in people with type 2 diabetes. In 2040, DR is expected to affect over 200 million individuals worldwide.

Researchers in India estimated a frequency of retinopathy of 11.2% ²³, whereas British researchers found a prevalence of 18% ²⁴. These differences could be attributable to racial and gender differences as well as the effects of age. To show this, we can look at how our findings compare to those of research done in Abbottabad ²⁵.

The average patient age in this study was 49.33+12.21 years, the average disease duration was 7.59+2.85 years, and the average visual acuity was 0.371+0.26 decimals, all of which differ from the previously cited study. There was no statistically significant correlation between the different stages of diabetic retinopathy and the type of diabetes mellitus (p-value = 0.808), and presbyopia was the most common refractive error among the 300 (82.0%) patients who had type II diabetes mellitus.

This study had some limitations. The main limitation of this study was its study design by which findings were not followed up for any possible intervention and the whole emphasis was on ascertaining the prevalence of different stages in patients with type I and type II diabetes mellitus.

Conclusion:

The medical, social, and economic burdens of diabetes are all substantial. Vascular problems are the biggest issue, as they not only reduce the quality of life for diabetic patients but also result in substantial societal expenses. The present study demonstrated a huge burden of proliferative diabetic retinopathy amongst diabetic patients, thus warrants large multicentered studies to generalize its results to the overall population of the province and to contribute to the establishment of the national screening program for diabetic retinopathy.

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