

## Frequency of Diabetic Retinopathy in Karachi, Pakistan: A Hospital Based Study

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### ABSTRACT

**Objective:** This study was conducted to determine the prevalence of diabetic retinopathy in diabetes patients presenting to the National Institute of Diabetes and Eye out patient department of Dow University Hospital (Ohja campus), Dow University of Health Sciences.

**Materials and Methods:** This was a cross sectional study in which known diabetics were recruited between the period of 1<sup>st</sup> July 2011 till 31<sup>st</sup> July 2012. They were then referred to the Ophthalmology unit for eye examination. Subjective refraction was done with Snellens chart, anterior segment examination and fundus examined was done using a TopCon PS-61E Slit lamp BioMicroscope. All patients were dilated with eye drop tropicamide 1% instilled every ten minutes for thirty minutes and the fundus was examined with Volk 90D lens. Classification of diabetic retinopathy was done using the International clinical diabetic retinopathy disease severity scale study. The data was analyzed using Statistical package for social Science (SPSS version 20) and a p value of < 0.05 was taken as statistically significant.

**Results:** There were a total number of 570 patients included in this study. Amongst them 325 were males and 245 were females. Out of these patients those that were found to have diabetic retinopathy were 315 (55.3%). The age range was between 25 and 75 years and the mean age was  $52.30 \pm 9.333$ . Patients that were found to have mild non proliferative diabetic retinopathy were 231 (40.5%) while 33 (5.8%) had moderate non-proliferative diabetic retinopathy, 11 (1.9%) had severe non-proliferative diabetic retinopathy and 40 (7.0%) had proliferative diabetic retinopathy. Diabetic Maculopathy was seen in a total number of 72 (12.6%) of patients.

**Conclusions:** Diabetic retinopathy is highly prevalent in Karachi, Pakistan thus it is vital to detect as well as manage the disease early so as to prevent the onset of blindness in relation to it.

**Key words:** Non proliferative diabetic retinopathy, Diabetic maculopathy, Proliferative diabetic retinopathy.

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### INTRODUCTION

International Diabetes Federation stated that 381 million people currently have diabetes and the most number of cases are to occur in Africa and Asia by 2030<sup>1</sup>.

Diabetes Mellitus (DM) is a metabolic disease in which there is raised blood glucose levels over a long duration<sup>2</sup>. Long-term complications include ischemic heart disease, stroke, nephropathy, foot ulcers and diabetic retinopathy<sup>3</sup>. The acute life threatening complications of diabetes are diabetic ketoacidosis and non ketotic hyperosmolar coma. Diabetes is due to lack of Insulin or insulin resistance. There are three main types of

diabetes mellitus. In Type 1 DM there is lack of insulin production. This is also known as insulin-dependent diabetes mellitus<sup>3</sup>. In Type 2 DM there is insulin resistance which means that the body cells fail to utilize insulin properly<sup>3</sup>. As the disease progresses deficiency of insulin may also occur<sup>6</sup>. This is also known as "non insulin-dependent diabetes mellitus" (NIDDM) or; another name of it being "adult-onset diabetes". The third main type is known as Gestational diabetes and it affects pregnant women. These women do not have a previous history of diabetes and they develop it<sup>3</sup>.

Diabetic retinopathy is one of the manifestations of Diabetes in which the microvessels in the retina are affected. Hyperglycemia causes the outer cells lining the blood vessels which are called Pericytes to die and this is followed by thickening of the basement membrane. These damages alter the blood retinal barrier and causes the retinal blood vessels to become more permeable<sup>7</sup>. Various Changes occur due to these leaky vessels leading to formation of hemorrhages hard/soft

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exudates and neo vascularization. An accepted, standardized set of definitions describing the severity of diabetic retinopathy and diabetic macular edema is critical for clinical decision making, optimal communication among caregivers, and research in different settings. ETDRS was a clinical trial that was randomized and it categorized Diabetic retinopathy into various grades based on severity. ETDRS also studied the effects of argon laser photocoagulation and aspirin treatment in patients that were diagnosed with non proliferative or early proliferative diabetic retinopathy<sup>8</sup>. Although it is recognized as the gold standard for grading the severity of DR in clinical trials, its use in everyday clinical practice has not proven easy or practical. There are an excessive number of levels, required correlations with standard photographs, and additional complicated grading rules for the different stages, which are difficult to remember

There seems to be a genuine need for consistent international clinical classification systems for diabetic retinopathy and diabetic macular edema that are supported with solid evidence scale. In an effort to simplify the classification of diabetic retinopathy a number of experts met and created the International Clinical disease severity (table 1)<sup>9</sup>. We used this scale in our study to classify the severity of diabetic retinopathy.

Macular edema can be present with any grade of retinopathy and is an important cause of decrease in vision. Regarding macular edema it should be observed if macular edema is present or absent. If present it can be further classified as mild, moderate and severe depending on the distance of the exudates and thickening from the center of the fovea<sup>10</sup>.

## MATERIALS & METHODS

The subjects included in our study had Diabetes since atleast five years and were aged 20 years and above. The diabetes was confirmed on two consecutive Random blood glucose level test results which were more than 200 mg/dl. Once confirmed, all patients were referred to the eye OPD of a tertiary care center Dow University Hospital where their complete ocular examination including best corrected visual acuity (BCVA) using a Snellen Chart , examination with a TopCon slit lamp biomicroscope and a dilated fundus examination with +90 Diopter Volk lens with careful attention to macular details was done .

We analyzed the type of DR, presence of maculopathy, age and gender. DR was divided in terms of severity, into non-proliferative Diabetic retinopathy (NPDR: mild, moderate and severe), proliferative Diabetic retinopathy (PDR) and Diabetic macular edema on the

basis of international clinical diabetic retinopathy severity scale<sup>12</sup>. Results were reported as frequency and prevalence. To study the association between the variables macular edema and severity of diabetic retinopathy we used chi-square test and found a significant association between the two variables (table 5). The data was analysed using Statistical package for Social Science (SPSS version 20) and a p value of < 0.05 was taken as statistically significant. Those patients that had mild, moderate and severe NPDR, without any presence of macular edema were kept on close observation with optimization of blood sugar levels while PDR was treated with pan retinal photocoagulation<sup>13</sup>.

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Informed consent was obtained from all patients for being included in the study.

## RESULTS

A total number of 570 patients were examined during a period of one year from 1<sup>st</sup> July 2011 to 31<sup>st</sup> July 2012. The total number of diabetes patients in our study were 570 There were 325 (57.02%) males and 245 (42.98%) females (Figure 1) .The average age of the patients was 52.30 ± 9.333 years and majority of the patients(25.4%) were in the age group (50-54 years) (Figure 2).Out of the total number of Diabetes patients (570) 315 (55.3%) patients were found to have diabetic while 255(44.7%) of patients did not have diabetic retinopathy(Table 2).Patients who had diabetic retinopathy were further categorized ; 231(40.5%) had mild NPDR,11(1.9%) had severe NPDR while 40(7.0%) had PDR.(Table 3).

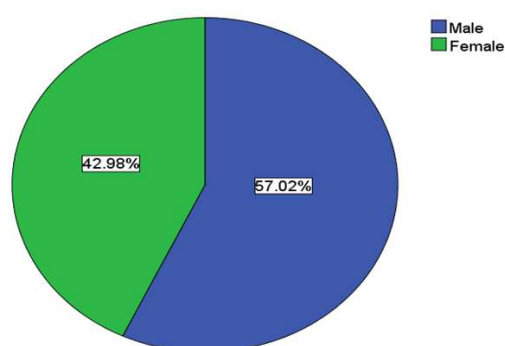


Figure 1: Sex distribution of Diabetes patients

Table 1: International Clinical Diabetic Retinopathy (DR) Disease Severity Scale

Proposed Disease Severity Level	Findings Observable With Dilated Ophthalmoscopy
No apparent DR	No abnormalities
Mild nonproliferative DR	Microaneurysms only
Moderate nonproliferative DR	More than "mild" but less than "severe"
Severe nonproliferative DR	Any of the following: 20 or more intraretinal hemorrhages in 4 quadrants Definite venous beading in 2 or more quadrants Prominent IRMA in 1 or more quadrants and no neovascularization
Proliferative DR	1 or more of the following: Definite neovascularization Preretinal or vitreous hemorrhage

Table 2: Prevalence of Diabetic retinopathy in patients ( n=570)

Diabetic retinopathy	N	%
Yes	315	55.3
No	255	44.7
Total	570	100.0

Table 4: Prevalence of macular edema in diabetic patients ( n= 570)

Macular Edema	N	%
Yes	72	12.6
No	498	87.4
Total	570	100.0

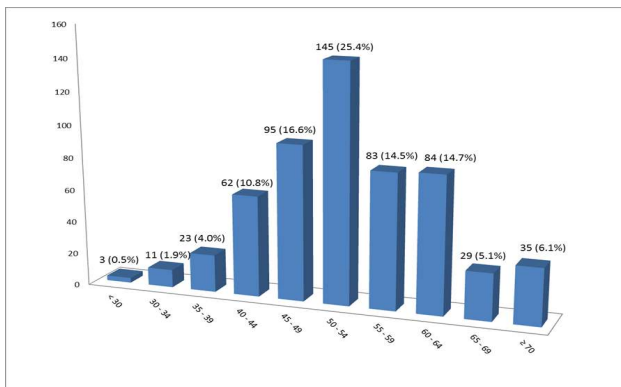


Figure 2: Prevalence of age distribution of Diabetes patients

Table 3: Prevalence of Diabetic retinopathy according to Severity ( n=570)

Diabetic retinopathy	N	%
No DR	255	44.7
Mild NPDR	231	40.5
Moderate NPDR	33	5.8
Severe NPDR	11	1.9
PDR	40	7.0
Total	570	100.0

NPDR: Non-proliferative diabetic retinopathy  
PDR: Proliferative diabetic retinopathy  
DR: Diabetic retinopathy

Table 5: Prevalence of macular edema regarding severity of diabetic retinopathy, (n=570)

Macular Edema	Severity of NPDR and PDR					p-value*
	No DR	Mild NPDR	Moderate NPDR	Severe NPDR	PDR	
Yes	3 (4.2)	45 (62.5)	10 (13.9)	5 (6.9)	9 (12.5)	< 0.001
No	252 (50.6)	186 (37.3)	23 (4.6)	6 (1.2)	31 (6.2)	
Total	255 (44.7)	231 (40.5)	33 (5.8)	11 (1.9)	40 (7.0)	

NPDR: Non-proliferative diabetic retinopathy  
PDR: Proliferative diabetic retinopathy  
DR: Diabetic retinopathy  
p-value\* is calculated by using chi-square test

72 (12.6%) of diabetes patients had macular edema while 498(87.4%) did not have macular edema (Table 4). The prevalence of Macular Edema was most commonly associated with mild NPDR (62.5%) and less with the other grades of diabetic retinopathy (Table 5).

## DISCUSSION

A total of 570 patients were recruited in our study and 55.3% were found to have diabetic retinopathy which is the highest quoted number yet as compared to other studies. A similar study done in Nepal concluded the prevalence of diabetic retinopathy to be 18.5% of the patients<sup>14</sup>. While a study done by Shreshta RK stated that the prevalence of Diabetic Retinopathy was 20.31%<sup>15</sup> and other hospital based studies showed significantly higher rates and the prevalence to be 44.7%<sup>16</sup> and 47.3%.<sup>17</sup> Another study conducted in Kashmir showed the prevalence of Diabetic Retinopathy to be 27 %<sup>17</sup>. A study by Fatima Al Kharaj et al showed

the prevalence to be 24%<sup>19</sup>. The prevalence of DR was 25.7% in a group of Chinese people living in United States<sup>19</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>20</sup> with a lower rate of 18.2% in Hong Kong<sup>21</sup>.

In our study males outnumbered females in the prevalence of diabetic retinopathy; 57% males versus 43.0% females and this was probably due to males being more in number than females to attend the OPD. In our Social setup females have less of an outdoor exposure as compared to males hence the lower detection rate of diabetic retinopathy prevalence in the former.

Diabetic Macular edema was seen in 12.6% of our patients while Non proliferative diabetic retinopathy in 42.6% patients and proliferative diabetic retinopathy in 7.0% patients. Another study done in Cameroon showed that 57.8% patients had non-proliferative

diabetic retinopathy, while 36.6% (60/164) had proliferative DR and Diabetic macular edema was found in 14.5% (59/407) of all participants<sup>23</sup>. A similar study in Sri Lanka showed significantly higher rates such that In the patients with DR, majority had NPDR (93.4%, n=71), while only one patient had PDR and 5.3% (n=4) had maculopathy<sup>24</sup>.

When data was collected and the patients questioned we realized that there was a lack of awareness of the effects of diabetes on the eyes amongst patients hence the high prevalence of diabetic retinopathy. Also there is need of coordination between diabetologists and ophthalmologists for prompt patient referral and evaluation to both prevent the onset as well as progression of diabetic retinopathy .Emphasis should be made on patients requiring regular screening as well as follow up with both diabetologists and ophthalmologists.

## CONCLUSION

Diabetic Retinopathy is a major cause of visual disability besides other causes that can occur in old people such as cataract, glaucoma, age related macular degeneration etc and it requires early screening and control.

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