

ORIGINAL ARTICLE

Prevalence of Visual Impairment Among Indoor Diabetic Patients at Teaching Hospital of RawalpindiMuhammad Shafah Shehzad¹, Muhammad Usayd Khan², Saqib Jan Shah³, Aneeq Ullah Baig Mirza⁴**ABSTRACT**

Objective: To determine the prevalence of blindness and partial sight among the indoor Diabetic patients of a teaching hospital.

Study Design: Observational/cross-sectional study.

Place and Duration of Study: The departments of Medicine, Surgery, Obstetrics and Gynecology and Ophthalmology at Pakistan Railway Hospital Rawalpindi from 1st November 2018 to 30th November 2019.

Materials and Methods: History and clinical information of 200 indoor diabetic patients (400 eyes) admitted in the departments of Ophthalmology, Medicine, Surgery and Obstetrics & Gynecology were noted on organized and institutionalized questionnaire. Detailed ocular examination was performed by a qualified ophthalmologist. Only visual acuity (VA) criteria was used to define visual impairment. The data was evaluated using SPSS version 21.

Results: Two hundred indoor diabetic patients (400 eyes) were included in the study. Among them 91 (45.5%) were males and 109 (54.5%) were females. The number of patients having age below 30 years were 7 (3.5%), between 30 to 60 years of age were 84 in number (42%) and 109 patients (54.5%) were over 60 years of age. No visual impairment was found in 38 patients (19%). There was partial sight in 97 patients (48.5) and blindness was recorded in 65 patients (32.5%) of the total. Cataract as the cause of visual impairment was found in 63 patients (38.8%). Diabetic retinopathy was the cause in 55 patients (33.9%). Diabetic macular edema was found in 35 patients (21.6%) and age-related macular degeneration in 7 patients (4.3%). Glaucoma was found in 2 patients (1.2%). Visual impairment in our patients was significantly associated with age, duration of diabetes, BMI, hypertension, heart disease, peripheral neuropathy, pregnancy ($p < 0.05$).

Conclusion: It is concluded that the prevalence of visual impairment among diabetic patients is quite high. There is an increased risk of visual impairment with the increase in the age, duration of diabetes and other associated risk factors such as hypertension, heart disease, increased BMI and peripheral neuropathy.

Key Words: *Blindness, Diabetes Mellitus, Diabetic Retinopathy, Prevalence, Visual Impairment.*

Introduction

Diabetes Mellitus (DM) is a multifactorial disease responsible for many complications including visual impairment.¹ According to WHO, by 2025, there will be 300 million diabetics of which 75% will be in developing countries with Pakistan as the 4th country in the list.²

Pakistan exhibits a rise in diabetes. More than 10% of

its adult population has diabetes.³ In Pakistan, we have an expected 7.5 million individuals known to have diabetes, and number is to be expanded to 16.1 million by year 2045.⁴

The increase in the frequency of DM proposes that more individuals with this condition will turn out to be visually impaired if steps are not taken to anticipate the occurrence of DM and its visual complications. DM is driving reason for the visual impairment among various regions of the world. Diabetic Retinopathy causes 12000 to 24000 new cases of blindness every year in United States.⁵ Changes in the way of life have expanded the danger of diabetes as well as visual impairment in many developing countries.⁶ In Oman, the prevalence of visual impairment in diabetics is 28.4%. With increase in the incidence of DM, the odds of visual misfortune are on the rise. It is entrenched that in the

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upcoming 15 years, roughly 2% of diabetics may turn lawfully blind, and around 10% may create serious visual impairment.⁷ Thus, for the avoidance of visual impairment at around the world, tending to visual complications of diabetes is required. It is assessed that the pervasiveness of hypertension in type 2 diabetes is 50%.⁸

In Pakistan, a research conducted 10 years ago showed the prevalence of Non-proliferative diabetic retinopathy (NPDR) in 25.14% and proliferative diabetic retinopathy (PDR) in 11.11% of cases.⁸

Variations in the incidence of diabetes suggests that the current status of visual impairment in the diabetics is expected to be different from that reported previously.

The objective of our study is to determine the prevalence and reasons of blindness and partial sight among the indoor diabetic patients of a teaching hospital and to assess the effect of duration, type, gender, hypertension, body mass index (BMI), heart disease, smoking, pregnancy, neuropathy and nephropathy on incidence and progression of visual impairment.

Our information will be valuable for future correlations and give benchmark data to screen the advancement towards the reduction in visual impairment because of diabetic eye difficulties.

Materials and Methods

In this observational/cross-sectional study, all the ambulant patients who were diabetic and admitted in the departments of medicine, surgery, obstetrics & gynecology and ophthalmology at Pakistan Railway Hospital Rawalpindi from 1st November 2018 to 30th November 2019 were examined in detail.

The number of indoor diabetic patients thoroughly examined to check for the visual impairment was 200 (400 eyes). The sampling technique used was non-probability consecutive sampling. The study was approved by the ethics review committee of Islamic International Medical College.

Type 1 and Type 2 diabetic patients above the age of 20 years were included in the study. The patients who were non-ambulatory due to their deteriorated clinical condition were excluded from the study. Informed verbal consent was taken before examination.

History and clinical information were noted on structured questionnaire. Age, gender, type and

duration of diabetes, existence of one or more comorbidities including hypertension, heart disease, renal disease and neuropathy were noted. Biological assessment included BMI, smoking and pregnancy.

Detailed ophthalmic examination was done by a qualified ophthalmologist which included Snellen's visual acuity and pinhole vision to rule out refractive errors. Slit-lamp examination for anterior segment and funduscopy with maximum mydriasis was done for the posterior segment. Where there was more than one cause of visual impairment, the irreversible cause was mentioned.

Only visual acuity (VA) criteria was utilized to depict visual impairment in our study using the US definitions which defines Partial sight as 20/200 (6/60) < VA < 20/40 (6/12) and blindness is defined as VA of < 20/200 (6/60) in the better eye.⁹

When describing both blindness and partial sight, the term visual impairment (VI) was used. The main diagnostic group of the causes of visual impairment were cataract, age-related macular degeneration (ARMD), glaucoma and diabetic retinopathy (DR). Diabetic Retinopathy was further classified into non-proliferative diabetic retinopathy (NPDR) and proliferative diabetic retinopathy (PDR).¹⁰

The data collected was of non-parametric type and was evaluated using SPSS version 21. Chi-square statistics was utilized to evaluate the relations. The Confidence level (CI) of 95% was set. A *p*-value of less than 0.05 was deemed statistically significant.

Results

Two hundred indoor diabetic patients (400 eyes) were included in the study. Demographic findings are shown in Table I.

Table I: Age and Gender. n=200

		Gender		Total n (%)
		Male	Female	
Age	<30	3	4	7 (3.5)
	30-60	34	50	84 (42)
	>60	54	55	109 (54.5)
Total n (%)		91 (45.5)	109 (54.5)	200

Type 1 DM was found in 6 patients (3%) and type 2 in 194 patients (97%). Patients having span of diabetes mellitus for under 5 years were 70 (35%), those with the length of illness between 5 to 10 years were 47 (23.5%) and those over 10 years was found in 83 patients (41.5%).

Prevalence of the visual impairment is shown in Table II.

Table II: Prevalence of Visual Impairment. (n=200)

Visual Impairment	Frequency	Percent
No Visual loss	38	19.0
Partial sight	97	48.5
Blindness	65	32.5

Patients of DM with associated systemic diseases were 131 hypertensives (65.5%), 77 patients (38.5%) had some sort of adult onset heart disease, peripheral neuropathy was found in 123 patients (61.5%), and renal disease was found in 73 patients (36.5%).

During the biological assessment according to BMI 12 patients (6%) were underweight, 116 (58%) were normal in range and 72 patients (36%) were found to be overweight. 43 patients (21.5%) were active smokers. Our study comprised of 7 female pregnant patients (3.5%).

The main causes of visual impairment among the diabetic patients found in our study are mentioned in Table III and Figure 1.

Table III: Causes of Visual Impairment (n=162)

		Visual Impairment		
		Partial Sight	Blindness	Total n (%)
Causes	Cataract	48	15	63 (38.8)
	DR	42	13	55 (33.9)
	DME	4	31	35 (21.6)
	ARMD	3	4	7 (4.3)
	Glaucoma	0	2	2 (1.2)

Our study showed that cataract was the major cause of visual impairment overall with prevalence of 38.8% and Diabetic Macular Edema was main reason of blindness with an occurrence of 47.6% among blind people as shown in Figure 1.

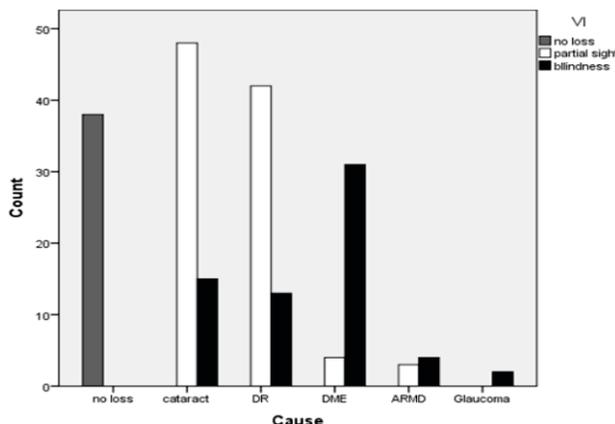


Fig 1: Causes of Visual Impairment.

Prevalence of the stages of diabetic retinopathy was also assessed among the patients. NPDR was found in 126 eyes (31.5%) and PDR was found in 56 eyes (14%).

It was similarly noticed that with the increase in the duration of diabetes mellitus, the significant cause for visual impairment was seen as DR with a prevalence of 50.6% in individuals with duration of diabetes greater than 10 years as shown in Figure 2.

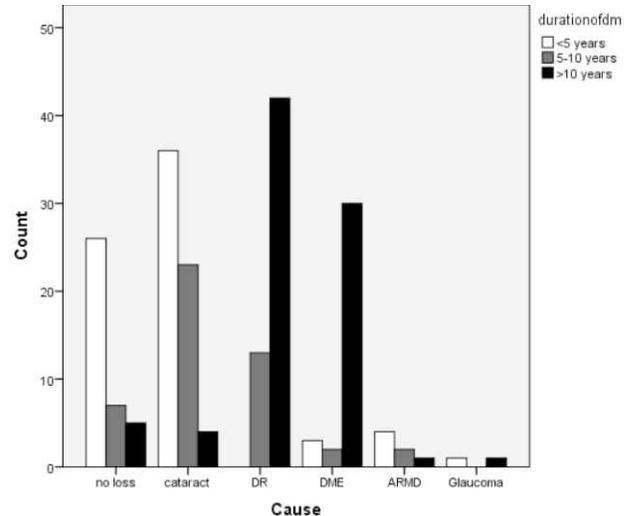


Fig 2: Changes in the Causes of Visual Impairment with the Increase in Duration of DM

Visual impairment in our patients was significantly connected with age ($p=0.001$), duration of diabetes ($p=0.00001$), BMI ($p=0.01$), hypertension ($p=0.02$), heart disease ($p=0.041$), peripheral neuropathy ($p=0.044$), pregnancy ($p=0.01$).

Visual impairment was also significantly related with causes of visual impairment including cataract ($p<0.001$), DR ($p<0.001$), stage of DR ($p<0.001$), DME ($p<0.001$), ARMD ($p<0.001$), Glaucoma ($p<0.001$).

However, our study didn't show a significant association with gender ($p=0.11$), type of DM ($p=0.45$), smoking ($p=0.34$) and renal disease ($p=0.53$).

Discussion

For the reduction of visual problems, we need information of the occurrence and reasons for visual impairment among the individuals with DM. Our study gives such information to the health care experts to plan effective management for the patients.

Our study reports high prevalence of partial sight (48.5%) and blindness (32.5%) among the diabetic

patients. Cataract was the significant reason for visual impairment in our investigation with a frequency of 38.8%. Our study also recorded a high prevalence of 31.5% with NPDR and 14% with PDR. Diabetic macular edema (DME) was found to be the major reason of blindness with incidence of 47.69% of the blind population in our study.

This can be compared with a study of another developing country where it was found that partial impairment was found in 39.3% of the patients and 15.7% were blind. The higher rate of blindness in our study can be due to the fact that our study was performed on indoor patients who are admitted with increased comorbidities. It was likewise noticed that there were more patients of higher age group included in the study. It was noted that with increasing age more patients were found to be visually impaired which is also mentioned in another previous study.⁵

By comparing our study with a study conducted in a developed country like England showed significant difference in visual impairment and blindness. Their study showed data of visual impairment in 2.84% and blindness in 1.13%.⁷ this difference is because of better health care facilities provided in developed countries.

A past report of Jordanian diabetic's demonstrated cataract as the major source of visual impairment in diabetics with incidence of 37.8%.^{11,12} Cataract is similarly seen as the main source of visual impairment in other developing countries.^{5,13,14,15}

Our study also showed that in individuals with the increase in duration of DM of over 10 years, DR was seen as the main source of visual impairment. This can be compared with a previous study which additionally indicates that with increasing duration of DM, DR is seen as the main source of visual impairment.¹⁶ Some previous studies also show that DME as the main source of blindness in diabetics.^{12,13,15}

Age related macular degeneration (ARMD) was seen as the main source of visual impairment in the developed nations like England.⁷ An investigation of the developed nation indicated that DR was seen as driving reason for visual impairment among the working age population of individuals with DM.⁷ However, in our study, cataract was the major cause of visual impairment among the working age

population.

The prevalence of stages of DR can be compared with previous study held in a developing country where ratio of NPDR was 31.1% and PDR was 22% among the diabetic patients.¹³ In another previous research of a developing country NPDR was detected in 54.8%, this higher value in their research was because the patients which were included mainly presented in the eye departments when they got their condition of the eyes worst. In a previous research of a developed country NPDR was found in 11.66% and PDR in 0.36%.¹⁷ The lower number of patients with both PDR and NPDR compared to our research are because of better health facilities including early screening programs throughout the country.

By comparing our results with a research conducted 10 years ago in the same hospital as ours showed increase in the prevalence of NPDR and PDR.¹⁸ NPDR increased from 25.14% to 31.5% and PDR increased from 11.11% to 14%. This increase in patients may be because of the low socioeconomic status of the area of study due to which they cannot afford the treatment.⁵

In our study, the incidence of visual impairment was not statistically associated with gender, but it was associated with age hence it increased with the increase in the age. The other risk factors that had significant associations included increased BMI, hypertension, heart disease and peripheral neuropathy. Smoking was not statistically associated with visual impairment. This was compared with a previous study among Tunisian diabetic patients which also had a significant relation of the above-mentioned risk factors.¹⁹ However, in contrast to the mentioned study, our study did not show a significant correlation of renal disease with the visual impairment, this may be because our collection of data on renal disease was based on the history alone. It is noted in our study that visual impairment was associated with the duration of diabetes. With the increase in the span of diabetes it was seen that visual impairment also increased. Visual impairment was also significantly associated with complications such as cataract, DR, DME, ARMD and glaucoma. The associations of duration of diabetes, advanced stage DR, DME and cataract with visual impairment were also seen in the previous studies.²⁰

This study has some limitations so the outcomes ought to be perused with caution. The hospital based indoor contextual analysis for the most part chooses the patients which are bed bound already in crumbled condition when contrasted with outdoor patients. Study was directed in a single teaching hospital so the results may not be summed up for the entire population. Other limitations included cross sectional nature and the data collection of associated risk factors were based on previous health records. Regardless of these confinements this investigation gives important information which can characterize the magnitude of the issue in population.

Our study provides a baseline data for future comparison studies in this region and other developing countries. In addition, our data will also be useful for the health care providers to minimize the comorbidities such as visual impairment associated with diabetes. Aggressive screening programs should be inculcated in primary health care. Proper eye care services should be provided at affordable rates.

Conclusion

It is concluded that the prevalence of visual impairment among diabetic patients is quite high. There is an increased risk of visual impairment with the increase in the age, duration of diabetes and other associated risk factors such as hypertension, heart disease, increased BMI and peripheral neuropathy.

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