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Sabina Shaikh

Department of Zoology,
University of Sindh, Jamshoro,
Sindh, Pakistan

Tahira J Ursani

Department of Zoology,
University of Sindh, Jamshoro,
Sindh, Pakistan

Khalid H Dhilloo

Department of Entomology,
Faculty of Crop Protection,
Sindh Agriculture University,
Tando Jam, Sindh, Pakistan

Rocky Samuel

Department of Zoology,
University of Sindh, Jamshoro,
Sindh, Pakistan

Rafeen Talpur

Sindh Institute of
Ophthalmology & Visual
Sciences, Hyderabad. Sindh,
Pakistan

Muhammad Jawed

Sindh Institute of
Ophthalmology & Visual
Sciences, Hyderabad. Sindh,
Pakistan

Muhammad Yaseen

Department of Agricultural
Extension, College of
Agriculture, University of
Sargodha, Punjab, Pakistan

Kousar Yaqoob

Indus Medical College, Tando
Muhammad Khan, Sindh,
Pakistan

Correspondence**Khalid H Dhilloo**

Department of Entomology,
Faculty of Crop Protection,
Sindh Agriculture University,
Tando Jam, Sindh, Pakistan

Prevalence of diabetic retinopathy and related factors in patients with type 2 diabetes mellitus in Hyderabad and adjoining areas

Sabina Shaikh, Tahira J Ursani, Khalid H Dhilloo, Rocky Samuel, Rafeen Talpur, Muhammad Jawed, Muhammad Yaseen and Kousar Yaqoob

Abstract

Diabetic Retinopathy (DR) is the major cause of acquired blindness and visual impairment among the people of working age as well as those aged 60 years or more. The present study was carried out to ensure the prevalence and to examine the factors involved in the progression of DR in T2DM patients from Hyderabad and adjoining areas. Therefore, total 180 patients were observed in our study with type 2 DM out of which 127 were male (70.56%) and 53 were female (29.44%) with different age ranges between 50 to 70 years. The results declared that out of 180, 14 (08%) patients were suffering from mild NPDR, 17 patients (09%) from moderate NPDR, 22 subjects (12%) with severe NPDR, 50 patients (28%) from PDR, 31 cases (17%) with vitreous hemorrhage and 46 patients (26%) with macular oedema with risk factors in DR patients Hypertension 69.44% Cardiovascular disorder 34.44% HBA1c values mean & (SD) 10.025(2.34), Triglycerides values reported with mean & SD 317.15 (61.48) and Diabetic Duration mean & (SD) 15.54 (24.54).

Keywords: Prevalence, Retinopathy, Diabetes Mellitus, Mild NPDR, Vitreous Hemorrhage, Macular Edema

1. Introduction

Type 2 Diabetes mellitus (T2DM) is chronic progressive condition that is marked by hyperglycemia due to hypo-insulinemia or insulin resistance [1]. Pakistan stands 7th in number and by the year 2025, it will be at 5th position in the list of highest diabetic population country as estimated by International Diabetic Federation (IDF) Database on Diabetes [2]. Diabetic retinopathy is most common and serious complication of type 2 diabetes mellitus T2DM and leading cause of blindness in not only Pakistan but also worldwide [3]. Diabetic retinopathy is highly specific vascular complication of both type 1 and type 2 diabetes. The prevalence of retinopathy is strongly related to duration of diabetes. Diabetic retinopathy poses a serious threat to vision. With increasing age risk of diabetic retinopathy increases [4]. The factors that influence the prevalence of Diabetic retinopathy including duration of diabetes [5], Types of treatment [6], Hyperglycemia [7], Hypertension [8], Proteinuria [9], Serum Cholesterol and triglycerides [10], age, gender and cardiovascular disorders.

In general the progression of retinopathy is from mild non-proliferative abnormalities characterized by increased vascular permeability, to moderate and severe non-proliferative diabetic retinopathy characterized by vascular closure, to proliferative diabetic retinopathy characterized by growth of new vessels on the retina and posterior substance of vitreous. Blindness due to diabetic retinopathy results from several mechanisms central vision maybe impaired by macular edema [11]. According to the American Diabetes Association (ADA) 21% of patients with diabetes have Diabetic retinopathy at diagnosis [12] and more than 60% of patients with diabetes will have Diabetic retinopathy with into the decades of diagnosis [13]. According to ADA guidelines, ophthalmic examination should be conducted at the time of diabetes diagnosis [14] and repeated annually unless it is the ophthalmologist's clinical judgment to have the exam every two to three years [15]. Therefore, keeping in view that how diabetic retinopathy is highly specific vascular complication of type 2 diabetes, we carried out a research base survey to record the prevalence of DR in T2DM patients and to examine the factors which involve in the progression of DR in T2DM patients from Hyderabad and its adjoining areas.

2. Materials and Methods

The present study was conducted at Sindh Institute of Ophthalmology and Visual Sciences (SIOVS) in Hyderabad, Pakistan from September 2016 to February 2017.

2.1. Collection of Data: The data were collected in the course of self-developed Questionnaire in English edition (Annex-1). Throughout visit, verbal consent was taken from the DR with T2DM patients and predesigned feedback Proforma concerning the DR was filled out by the inquiring questions to the medical OPD patients of hospital. Total 180 DR with T2DM patients with different age ranges between 50 to 70 years of two dissimilar sex age groups were reviewed from above mentioned hospital SIOVS from September 2016 to April 2017.

2.2. Study of effect: All 180 patients (127 males and 53 females) were comprised for detailed medical history especially enchanting in account the period of disease, blood

sugar test, eyesight impairment was taken from patients. Hypertension, cardiovascular and family background HBA1c and triglycerides data was collected from DR patients. Oral consent was also taken from the entire DR in T2DM patients. Patients with diverse ages of both genders were also confirmed with their visual impairment on the basis of controlled and uncontrolled diabetics and symptoms.

2.3. Method of Observation: The pupil of each patient was dilated by 1% of tropicamide and 10% of phenylephrine to observe fundus completely using 90D mirror through slit lamp. Diabetic retinopathy was classified into mild, moderate, severe NPDR and proliferative Diabetic retinopathy. Macular edema, maculopathy was also noted according to [16, 17].

2.4. Statistical analysis

Questionnaire associated to age group of the patients were proposed and graphically corresponded by using "www.GraphPad" Prism for windows account.

Annex-1: Questionnaire about DR in type 2 diabetic patients used in the study.

S. No.	Questionnaire	Yes	No
01	Do you know about Diabetic retinopathy?		✗
02	Do you know about symptoms and complications of DR?		✗
03	In your family, does anyone else suffer from same condition?	✓	
04	Are you patient of Hypertension?	✓	
05	Do your sugar level is under control?		✗
06	Are you suffering from other problems related with DM?	✓	
07	Have your eyesight ever been decreased suddenly or gradually?		✗
08	Both eyes affected either vision or not?		✗
09	Do you have persistent pain?	✓	
10	Whenever your eyesight decreased, do spots or floaters appear?	✓	
11	Have you ever visited a Doctor before?		✗
12	Do you feel irritation in your eyes?	✓	

Table 1: Diagnostic Criteria for Diabetic retinopathy

Diagnosis	Criteria
Mild+Moderate NPDR	Microaneurysm Hard Exudates Renal Edema/Thickning Retinal hemorrhage
Maculopathy	Retinal Edema/Thickning of macular region
Severe NPDR	Cotton wools spots Vascular abnormalities Venous bleeding IRMA Intra retinal Microvascular abnormalities
Proliferative DR	Neo vascularization at disc Neo vascularization else where Vitreous hemorrhage
Advanced eye disorder	Vitreous hemorrhage Pre retinal fibrosis Retinal detachment

3. Results and Discussion

Out of 180 patients, 129 were male with NPDR (58.4%) PDR (82%) VH (74.1%) and ME (73.9%) and 51 were female with NPDR (41.6%) PDR (18%) VH (25.8%) and ME (26.1%) enrolled in observational studies 40-80 years was age range with mean age of patients was 60 years. 14 patients were diagnosed as having mild NPDR, 17 moderate NPDR, 22 severe NPDR, 50 patients observed with the proliferative diabetic retinopathy, 31 patients were also diagnosed as vitreous hemorrhage and 48 patients with macular edema maculopathy.

Table 2: Showing DR grades with subject numbers.

DR grades	N=180
Mild NPDR	14
Moderate NPDR	17
Severe NPDR	22
Proliferative DR	50
Vitreous Hemorrhage	31
Macular Edema	46

Table 3: Type of DR with different age groups (N=180)

Age (Years)	G1	n %	G2	n %	G3	n %	PDR	n %	VH	n %	ME	n %
40-50	6	3.33	6	3.33	6	3.33	19	10.56	8	4.44	17	9.44
51-60	7	3.89	8	4.44	7	3.89	18	10.00	12	6.67	22	12.22
61-70	1	0.56	1	0.56	6	3.33	11	6.11	8	4.44	5	2.78
71-80	0	0.00	2	1.11	3	1.67	2	1.11	3	1.67	2	1.11
Total	14	7.78	17	9.44	22	12.22	50	27.78	31	17.22	46	25.56

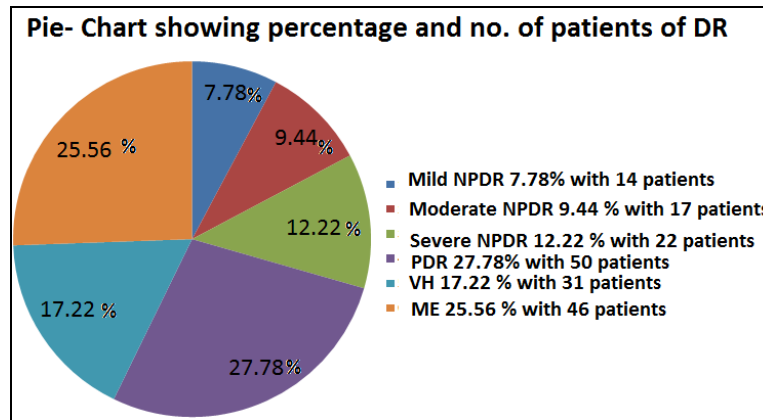


Fig 1: Pie-Chart showing percentage of different grades of DR according to number of patients.

Diabetes mellitus is a major health problem and increasing in prevalence of long term complications resulting amputation, cardiovascular disorders, end stage renal [18-22], diseases and blindness [23]. DR is a main cause of blindness in DM patients [24]. It is responsible for 10000 new blind cases every year in USA only [25], between the ages of 20 to 75 years [26]. Pakistan also showed externally variable data regarding DR 28.67 % prevalence in Rawalpindi [27], then 25.5, 40.93 in Hyderabad [28] 23% in Bahawalpur, 15.43 % in Karachi and 43% in Karachi 2016 [29]. Previous studies showed that 40.64 %DR subjects were found in Egypt [30], 42% in Oman [31], 25.9 % in Nepal [32], 3.7% in South Korea [33], 27% in Sri Lanka [34], 17.6% in India [35], and 37% in Iran [36]. In present study, 85.71 % were with blurring vision and visual acuity decreased.

3.1. Age Wise Prevalence

Diabetes is known to be increasing in prevalence and incidence among the elderly [37, 38, 39]. In present study, it was found that diabetes mellitus type 2 was more prevalent in age group 40_60 years NPDR (75.4%) PDR (74%) VH (64.5%) and ME (84.7%) followed by patients age group <= 39. Least prevalence was found in patients with age 70-80 years with NPDR (24.6%) PDR (26%) VH (64.5%) and ME (15.2%) because of the rarely diabetic patients reaches up to 70 to 80 years. In Pakistan, the maximum prevalence of DR was 25%

seen in affluent communities aged 55-64 Years [40]. In rural town of Shikarpur in Sindh province Pakistan, prevalence of DM rose with age [41].

3.2. Duration of Diabetes

Diabetic duration is considered as an important factor in the development of eye complications [42]. In this study, 180 patients had diabetes and associated complications for more than 10 years.

In present study the highest prevalence of complication was found in patients having diabetes for 10 years NPDR (52.8%) PDR (40%) VH (61.2%) ME (52.15) or more than 10 years with NPDR (47.1%) PDR (60%) VH (38.7%) and with ME (47.8%).

3.3. Hypertension

Hypertension is well-recognized factor associated with the development of complication especially cardiovascular and cerebrovascular diseases, and this risk increases when it is associated with diabetes [43]. In our study 70.55% of patients with type 2 diabetes having history of hypertension with NPDR (64.15) PDR (80%) VH (64.5%) and with ME (71.7%) associated with cardiovascular disorder having results NPDR (30.1%) PDR (48%) VH (58.1%) and ME (32.6%). Diabetes complications can be prevented or delayed by controlling hypertension and cardiovascular disorder [44].

Table 4: DR with associated risk factors

No. of Patients (N=180)		NPDR (53) (%)		PDR (50) (%)		VH (31) (%)		ME (46) (%)	
Diabetic Duration in years	10 years	28	52.8	20	40	19	61.2	24	52.1
	>10 years	25	47.1	30	60	12	38.7	22	47.8
Hypertension	Yes	34	64.1	40	80	20	64.5	33	71.7
	No	19	35.8	10	20	11	35.4	13	28.2
Cardiovascular Disorder	Yes	16	30.1	24	48	18	58.1	15	32.6
	No	37	69.8	26	52	13	41.9	31	67.3
Age in years	40 – 60	40	75.4	37	74	20	64.5	39	84.7
	61 – 80	13	24.6	13	26	11	35.5	7	15.2
Gender	Male	31	58.4	41	82	23	74.1	34	73.9
	Female	22	41.6	9	18	8	25.8	12	26.1

3.4. Socio-economic status

The role of socioeconomic status in promoting diabetes management and improved glycemic control is little explored areas. Lower income is one of the major problems for the proper glycemic control in black children with diabetes [45]. Our study also supports the above finding figures because lower income is major problem for insufficient glycemic control, which may involve in occurrence and progression of diabetic retinopathy.

4. Conclusion

The overall our study concluded out of 180, most of the patients with risk factors in DR patients Hypertension 69.44% Cardiovascular disorder 34.44% were reported. The main reason for the prevalence of diabetic retinopathy is the lack of knowledge about Diabetic retinopathy. The patients do not follow the proper diet chart to maintain their diabetic level. The literacy rate was known. The effective measures should be taken for the public awareness through social media. Free medical camps should be depicted in rural areas for screening and for meditation of diabetes mellitus and diabetes retinopathy.

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