Original Research Article

https://doi.org/10.53339/aimdr.2026.12.3.12
E-ISSN: 2395-2822 | P-ISSN: 2395-2814

A Study on Diabetic Retinopathy and Type 2 Diabetes Mellitus Patients Attending at Tertiary Care Hospital

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Abstract

Background: Diabetic retinopathy is a condition that arises as a complication of diabetes. It involves irreversible damage to the microvascular system in the retina, which is the light-sensitive tissue at the back of the eye. Prolonged elevated blood sugar levels contribute to the development and progression of DR. DR is the major cause of blindness. Only upto Mild-to-moderate NPDR stage of DR in Type 2 diabetes is substantially reversible through combined systemic risk factor control. Objective of the present study was to evaluate the Diabetic Retinopathy and type 2 Diabetes Mellitus Patients attending at tertiary care hospital, Muzaffarpur, Bihar, India.

Methods: A total of 200 patients were examined. All participants above 50 years of sage having diabetes of more than 10 years underwent presenting and pinhole visual acuity testing in each eye using Snellen's tumbling E chart. Retinal examination was carried out with indirect ophthalmoscope and 20D lenses after a minimum 30 min of dilatation for aassessment of DR. The International Clinical Diabetic Retinopathy Severity scale (ICDR) classification was used for grading retinopathy and maculopathy.

Results: Most of the cases 121 (60.5%) were males. Most of the cases 140 (70%) were above the age of 50 years. Most of the patients 192 (96%) of duration of diabetes mellitus was greater than 10 years. Only 40 (20%) cases had mild to proliferative retinopathy. Prevalence of retinopathy was 20%. out of 200 type 2 diabetes mellitus cases, Mild Non Proliferative diabetic retinopathy cases were 17 (8.5%), Moderate NPDR 5 (2.5%), severe non proliferative cases were 9 (4.5%) and proliferative cases were 9 (4.5%). No any cases were seen of Ungraded. Maculopathy was seen in only 24 (12%) cases. Maculopathy -Noncentral 15 (7.5%) and maculopathy- central was 9 (4.5%).

Conclusions: Diabetic retinopathy is preponderance to male population as compared to female. Diabetic retinopathy is commonly seen in chronic cases which had longer (>10 years) duration of type 2 diabetes mellitus. Mild DR and non central maculopathy are more common. Screening to detect mild to moderate stage alert for strict control, my reduce to progression to nonprogressive phase.

Keywords: Diabetic retinopathy, prevalence, age group, gender

Introduction

Diabetic retinopathy (DR) is responsible for 4.8% of the 37 million cases of blindness throughout the world and has increasing trend. Only upto mild-to-moderate NPDR stage of DR in Type 2 diabetes is reversible through combined systemic risk factor control.[1–3] Intensive glycaemic control

(HbA1c ~7%) reduced the risk of DR progression by 76% in the primary prevention cohort and 54% in the secondary intervention cohort-as per DCCT trial. Tight blood pressure control independently reduced DR progression by 34%-UKPDS study. Intensive multifactorial intervention (glycaemic + BP + lipid + RAS blockade + antiplatelet) reduced DR progression by 55%-Steno-2 Study. Furthermore as per Diabetes Prevention Program (DPP) Outcomes Study — Ocular Substudy-Lifestyle intervention reduced the incidence of DR by 58% at 10 years. A significant challenge is the limited awareness of DR among both patients and healthcare providers, which contributes to late detection and advanced disease presentation.[1] In India, the reported prevalence of diabetic retinopathy among individuals with diabetes has been estimated to range between 17.6% and 28.2%.[4,5]

Visual impairment as a result of diabetic retinopathy has a significant impact on patients' quality of life, resulting in an overall negative impact on life expectancy and productivity.[6] Diabetic retinopathy usually has a systematic and predictable natural history.[7] Endothelial cells and pericytes are lost as a result of vascular endothelial dysfunction brought on by chronic hyperglycaemia. The retina develops focal regions of retinal ischemia (cotton-wool patches), intraretinal haemorrhages, and micro-aneurysms seen in moderate NPDR. ETDRS study classification was taken into consideration.[8] The retinal pre capillary arterioles and sustain more damage as the retinopathy worsens, leading to retinal nonperfusion and more extensive ischemia. Clinically, venous beading, intraretinal microvascular anomalies,[8] and more serious haemorrhages are all indications of vascular injury in the retina. Retinopathy is now classified as severe NPDR. The majority of patients are asymptomatic even at this point. More ischemic injury triggers the new blood vessels formation on retina's inner surface as a consequence of compensatory chemical mediators, especially vascular endothelial growth factors.[5] Neovascularization of the optic disc and other areas are characteristics of this stage, which is called (PDR) proliferative diabetic retinopathy. The vitreous haemorrhage from the bleeding of these veins can produce "floaters" or, in more severe cases, blindness. Significant vision loss may follow from tractional retinal detachments caused by the new vessels and eventual fibrosis and contraction can take place. Macular oedema, the main cause of vision loss in diabetics, can develop from any level of DR.[9] Objectives of the present study was to estimate the Diabetic Retinopathy in type 2 Diabetes Mellitus Patients attending at tertiary care hospital, Muzaffarpur, Bihar, India.

Material and Methods

The present study was conducted in the Department of Ophthalmology, SKMCH, Muzaffarpur, Bihar, India during a period from January 2022 to November 2022.

A total of 200 patients were examined during the study period. Patient on treatment for diabetic retinopathy were excluded from this study. All participants above 50 years of sage having diabetes of more than 10 years underwent presenting and pinhole visual acuity testing in each eye using Snellen's tumbling E chart. Retinal examination was carried out with indirect ophthalmoscope and 20D lenses after a minimum 30 min of dilatation for assessment of DR. The International Clinical Diabetic Retinopathy Severity scale (ICDR) classification was used for grading retinopathy and maculopathy. Self-reported diabetics cases with a long-standing history of type II diabetes mellitus were examined for DR after pupillary dilatation. Those who refused to undergo pupillary dilatation were excluded from the study.

Those with proliferative changes and macular oedema involving the centre were classified as having sight threatening DR (STDR). All self-reported diabetics were asked about the timing of last retina evaluation in order to determine DR

screening coverage. All participants also then underwent presenting and pinhole visual acuity testing in each eye using Snellen's tumbling E chart. Participants were labelled as having normal vision, early/moderate/severe Visual impairment or blindness as per WHO convention.

Statistical Analysis

Data was analysed with the help of MS-Office software by using simple statistical methods. All data was tabulated and percentages were calculated.

Results

A total of 200 patients were included in the present study. All the cases were known ofmore than 10 years duration of type 2 diabetes mellitus. Most of the cases 121 (60.5%) were males. 79 (39.5%) cases were females. Most of the cases 75 (37.5%) were in age group of 51–60 years. Most of the patients 192 (96%) of duration of diabetes mellitus was greater than 10 years. Only 8 (4%) cases had less than 10 years of duration of diabetes mellitus [Table 1].

Out of 200 cases, retinopathy was not seen in 160 (80%) cases. Only 40 (20%) cases had mild to proliferative retinopathy. Thus, prevalence of retinopathy was 20%. out of 200 type 2 diabetes mellitus cases. Mild Non Proliferative retinopathy cases were 17 (8.5%) moderate non proliferative cases were 5 (2.5%), severe non proliferative cases were 9 (4.5%) and proliferative cases were 9 (4.5%). No any cases were seen of Ungraded [Table 2].

Out of 200 cases, maculopathy was not seen in 176 (88%) cases. Only 24 (12%) cases had maculopathy. Maculopathy-NON CENTRAL was seen in 15 (7.5%) cases and Maculopathy-CENTRAL was seen in 9 (4.5%) cases. Complete blindness was not noted in this study [Table 3].

Discussions

DR is a leading cause of blindness in the adult working population. Poor patient compliance with annual ocular screening (only 35%–55% compliance) is an important factor for late diagnosis of the disease. Screening of the retina or retinal photography focused on vascular abnormalities is usually delayed, and the disease is often left undetected.

Table 1: Age and gender wise distribution of the cases

Age group (Years)	Number of cases	Male	Female
<40	5 (2.5%)	4 (80%)	1 (20%)
41–50	55 (27.5%)	37 (67.27%)	18 (32.73%)
51–60	75 (37.5%)	42 (56%)	33 (44%)
>60	65 (32.5%)	39 (60%)	26 (40%)
Total	200 (100%)	121 (60.5%)	79 (39.5%)

Table 2: Participants based on their retinopathy grade

Retinopathy grade	No. of cases (*N* = 200)	Percentage
No apparent retinopathy	160	80%
Mild Non-Proliferative DR (NPDR)	17	8.5%
Moderate NPDR	5	2.5%
Severe NPDR	9	4.5%
Proliferative DR (PDR)	9	4.5%
Ungraded	0	0

Table 3: Participants based on their maculopathy grade

Maculopathy grade	No. of cases (*N* = 200)	Percentage
No maculopathy	176	88%
Maculopathy-NON CENTRAL	15	7.5%
Maculopathy-CENTRAL	9	4.5%

In instances where severe damage has occurred, it was found that treatments are not able to effectively restore vision, with only 25%–28% demonstrating improvement of ≥ 3 early treatment DR study (ETDRS) lines.[10,11] Additionally, retinal examination alone, or with artificial intelligence-assisted photographic identification of hemorrhagic and vascular lesions, is currently limited by its capacity to overwhelmingly detect gross retinal abnormalities that cause visual impairment, and is not yet adept at identifying inner retinal ischemia, the histological levels of exudates with hemorrhages in the retina, and retinal pigment epithelium abnormalities.[12,13]

In the present study, prevalence of diabetic retinopathy was 20%. Recent studies in India revealed other data for the prevalence of diabetic retinopathy, such as 21.7% on a pan-India scale. The incidence was 12.27% in central India and 34.06% in North India, 15% in an overall study in India,[14] 14.3% in Pune,[15] and an incidence of 21.89% and progression of 33.45%[16] in the Singapore Indians in a study done for six years. Although direct comparisons among studies are challenging due to differing methodologies, areas or country or geographical differences and food habits taken for such studies, definitions used for diagnosis, and various population characteristics, these levels are, nevertheless, significant.

In the present study, most of the patients 140 (70%) suffering from diabetic retinopathy were above of 50 years of age, with lesser frequency 60 (30%) in the bellow 50 years age group. The preponderance was higher among males 121 (60.5%) than among females 79 (39.5%). Previous studies have shown varying results regarding the association of gender with diabetic retinopathy. In the Joslin Clinic patients, females had a greater onset of diabetic retinopathy in old age, but the number of males and females was equal in those with PDR.[17] Some other studies, like CURES Eye Study,[18] the UKPDS study,[19] and the Hyderabad Study,[20] show the prevalence of males to be significantly higher than females.

The duration of diabetes mellitus has a noteworthy impact on the development of diabetic retinopathy, as none of the patients having a history of one to five years suffered from diabetic retinopathy, all 8 (4%) patients with a history of DM of six to 10 years, and rest all 192 (96%) patients with a history of DM of greater than 10 years progressed to diabetic retinopathy. The reasons for this are the vascular and hematological changes that succeed in diabetes mellitus, such as endothelial cell damage, thickening of the capillary basement membrane, rouleaux formation by RBCs, and an increase in the adhesiveness of platelets. Changes in plasma viscosity promote microvascular occlusion and compromise retinal blood flow leading to ischemia. This ultimately leads to microaneurysms, retinal hemorrhages, and retinal edema, culminating in signs of DR. The most widespread and longest survey in Ophthalmology, the Wisconsin Epidemiologic Study of Diabetic Retinopathy (WESDR), reported that patients having diabetes for longer periods showed a greater incidence of diabetic retinopathy.[21] In Indian studies, too, the increased frequency of diabetic retinopathy has been related to longstanding diabetes.[18]

The results were analogous to previous studies, and the higher prevalence of NPDR 31 (15.5%) evaluated against PDR 9 (4.5%) was akin to previous observations made in South India. It was observed that out of the diabetic patients, most patients suffered from mild NPDR (8.5%). Moderate NPDR was seen in 14 (7%) of the total patients and diabetic maculopathy in 24 (12%). Management of DR involves a combination of strategies aimed at controlling the underlying diabetes and directly treating retinal complications. Primarily, it involves a combination of strategies, including glycemic control, blood pressure management, and lipid-lowering therapies to slow the progression of the disease.[22] For advanced stages of DR, treatment modalities are laser photocoagulation, intravitreal anti-vascular endothelial growth factor (anti-VEGF) agents, and corticosteroids to treat macular edema

and proliferative DR. Vitrectomy is reserved for severe cases involving vitreous hemorrhage or tractional retinal detachment.[22]

Conclusions

The present study concluded that the diabetic retinopathy is preponderance to male population as compared to female. Diabetic retinopathy is commonly seen in chronic DM cases which had longer (>10 years) duration of type 2 diabetes mellitus. Mild DR and non central maculopathy are more common. Mild DR and non central maculopathy are more common. Screening to detect mild to moderate stage alert for strict control, my reduce chances to progression to nonprogressive phase.

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How to cite this article: Kant D, Kumari J, Singh RK, A Study on Diabetic Retinopathy and Type 2 Diabetes Mellitus Patients Attending at Tertiary Care Hospital. Ann. Int. Med. Den. Res. 2026;12(3):87–92.

Source of Support: Nil, **Conflict of Interest:** None declared

Received: 29-Apr-26; **Revised:** 28-May-26;
Acceptance: 13-Jun-26; **Published:** 30-Jun-26