A Cross Sectional Study of Incidence of Retinal Changes in the Newly Detected Cases of Type 2 Diabetes Mellitus Patients

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Abstract

Introduction: *The rise in prevalence of diabetes mellitus, especially type 2 diabetes, is a global health and economic problem. Diabetic retinopathy is a frequent complication of the disease and the leading cause of blindness among working-age populations in the developed world. Type 2 diabetes is characterized by a long, often asymptomatic, period of hyperglycaemia. Therefore, end-organ damage, such as diabetic retinopathy, may already be present in individuals who are unaware that they have type 2 diabetes, and the likelihood of this increases with the duration of the diabetes.*

Materials and Methods: *It was a cross-sectional study conducted over a period of 1 year from January 2018 to December 2018. Among 400 eyes, 200 patients were diagnosed as new case of type II Diabetes mellitus attending the Outpatient Department of Ophthalmology in M.G.M Medical College Hospital, Jamshedpur and Jharkhand. Both male and female patients of age group between 30-60 years were taken up in this study. The patients were selected non-randomly and the sample was taken for convenience. Type I diabetes mellitus, chronic renal failure, pregnant women, patients with opaque media and patients who did not give consent for the study were excluded from our analysis. Special emphasis was laid in categorizing age, sex incidence, presence of DR, staging of DR, presentation of complications and associated comorbid conditions.*

Results: *The predominantly affected group was aged between 40 and 50 years (42.5%). The male: female ratio was 2.1:1. The majority of patients had visual acuity between 6/9 and 6/18 on first presentation (43.5%). 12% of patients had positive family history. 33% of the patients were exposed to risk factors like smoking, alcohol and anaemia. 12% of the patients had bilateral diabetic retinopathy. Of the 400 eyes evaluated 62 eyes had NPDR and 2 had PDR, while 336 had no features of diabetic retinopathy. Among the NPDR, majority (38 eyes) fell under moderate NPDR. One patient had vitreous haemorrhage at the time of presentation.*

Conclusion: *Incidence of DR is common among middle-aged working population. Both eyes were usually affected, though asymmetrically. In conclusion DR including sight threatening complications was found even at the time of diagnosis of diabetes mellitus type II. Early diagnosis and treatment of DR helps to stabilize the visual acuity and prevent further vision loss. Diagnosis of complications of diabetic retinopathy at the earliest helps to control progression of proliferative diabetic retinopathy. Increased awareness of the ophthalmological complication in diabetes is necessary in the society to prevent unnecessary visual morbidity in diabetic patients.*

Key Words: *Diabetic retinopathy, DR, NPDR, type 2 diabetes*

I. Introduction

The rise in prevalence of diabetes mellitus, especially type 2 diabetes, is a global health and economic problem. Diabetic retinopathy is a frequent complication of the disease and the leading cause of blindness among working-age populations in the developed world. Type 2 diabetes is characterized by a long, often asymptomatic, period of hyperglycaemia. Therefore, end-organ damage, such as diabetic retinopathy, may already be present in individuals who are unaware that they have type 2 diabetes, and the likelihood of this increases with the duration of the diabetes.

The analysis of retinal vessels provides the opportunity to observe early functional and morphological changes in the microvasculature before clinically significant microvascular and macrovascular complications arise. Most guidelines recommend annual screening for diabetic retinopathy, but limited resources and the slow progression of diabetic retinopathy suggest that longer recall intervals should be considered if patients have no detectable lesions. Screening procedures have advantages and disadvantages that must be considered. It has been shown that healthcare costs increase with the severity of diabetic retinopathy, which suggests that preventing its progression may lower healthcare expenditure. In addition, information technology based on

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epidemiological data may facilitate an individualized determination of screening intervals for diabetic retinopathy.

Models to determine a personalised screening frequency for diabetic retinopathy have been developed to help to reduce healthcare use and the costs of diabetes care. These models still require refinement as, for example, in a model proposed by van der Haijden et al, almost 12% of participants had developed sight-threatening diabetic retinopathy before the model-based time of screening. Other outcome measures of screening procedures are psychosocial well-being and cardiovascular morbidity and mortality. In a targeted screening programme, the diagnosis of type 2 diabetes had no substantial adverse or positive effect on psychological well-being and perceived health status. In summary, in contrast to macrovascular complications, some microvascular events, such as background retinopathy, could theoretically be prevented by earlier diagnosis and better glycaemic control. Therefore, screening for diabetes may lead to the detection of retinopathy at an earlier stage before clinically evident complications occur. In line with this, it has been shown that patients who do not attend diabetic eye screenings are at increased risk of developing sight-threatening diabetic retinopathy.

We therefore aimed to determine the prevalence of diabetic retinopathy in persons with type 2 diabetes that was newly detected within the framework of the population-based Gutenberg Health Study (GHS). Visual acuity served as a test for functional limitations caused by diabetic retinopathy. As micro- and macrovascular events have been shown to be related to age, sex, HbA_{1c} concentration, hypertension and dyslipidaemia, we also analysed associations between these variables and diabetic retinopathy in screening-detected type 2 diabetes.

II.   Materials And Methods

It was a cross-sectional study conducted over a period of 1 year from January 2018 to December 2018. Among 400 eyes, 200 patients were diagnosed as new case of type II Diabetes mellitus attending the Outpatient Department of Ophthalmology in M.G.M Medical College Hospital, Jamshedpur and Jharkhand. Both male and female patients of age group between 30-60 years were taken up in this study. The patients were selected non-randomly and the sample was taken for convenience. Type I diabetes mellitus, chronic renalfailure, pregnant women, patients with opaque media and patients who did not give consent for the study were excluded from our analysis. Special emphasis was laid in categorizing age, sex incidence, presence of DR, staging of DR, presentation of complications and associated comorbid conditions. Diagnosticcriteria include fasting blood sugar more than 126mg/dLand post prandial blood sugar -higher than 200mg/dLafter 2 hrs.Data collection was done using a case study proforma by principal investigator.After obtaining informed consent from all patients a detailed evaluation including ocular history, best corrected visual acuity, slit lamp examination of anterior segment, posterior segment examination with indirect ophthalmoscope, slit lamp biomicroscopywith 90D, intraocular pressure measured with Goldmannapplanation tonometer, gonioscopy, visual field analysis and fundus fluoresceinangiography for selective cases were done.

III.   Results

In our study number of male patients participated were 136 and female were 64.Regarding age, 61 patients belonged to 30-40 years, 85 patients belonged to 41-50 years and 54 patients belonged to 51-60 years. Least incidence was seen in patients in age group 50 to 60 years, because they had undergone previous blood sugar evaluations for various purposes. Hence, their diabetic status was detected earlier. Among 200 patients evaluated, 162 patients were diagnosed to have DR. Among them, family history of diabetes was positive for 89 patients. In our study many patients had associated risk factors like smoking 56 patients, alcoholic 61 patients, anaemia 8patients, smoking with alcoholism 12 patients and smoking alcoholism with anaemia were 47 patients. These 324 patients had various stages of DR including PDR. Our study showed raised intraocular pressure for 36 patients, of them gonioscopic examination with Goldmann single mirror lens the angles were open for them. In our study 36 patients had bilateral DR with asymmetrical DR, while 126 of them had unilateral eye involvement. On evaluating the visual acuity on first time presentation, 184 eyes had 6/6 vision. 174 patients had visual acuity between 6/9 and6/18 and 42 patients had visual acuity between 6/24 and6/60.The reduction in vision is due to various other causes like refractive error, cataract, pseudophakia with posterior capsular opacification, age related macular disorder changes and other retinal pathologies. Regarding the type of retinopathy in our study 292 eyes had NPDR and 32 eyes had PDR, of them 18 eyes had neovascularisation of disc and other 8 had neovascularisation elsewhere and 9 eyes had vitreous haemorrhage. 135 patients fell into the category of moderate NPDR, 89 patients had mild NPDR, 42 patients had severe NPDR and 26 had very severe NPDR. Of the DR patients 5 patients had vitreous haemorrhage, is one of the sight threatening complication seen on initial presentation. In our study, the HbA1C levels of the patients with DR are higher than those of the patients without retinopathy changes. So this indicates that patients might have had poor glycaemic control prior to the development of DR.

S.No	Age of onset of DM	Recommended time of first eye examination	Routine minimum follow up
1	0-30	Within five years of diagnosis	Annually
2	31 or Older	Upon Diagnosis	Annually
3	Pregnancy	Before conception or early in first trimester	Every 3 months or at the discretion of the ophthalmologist

Table 1: Suggested Timetables for Detailed Ophthalmologic Examination of Diabetic Patients

S.No	Retinal Abnormality	Suggested Follow-Up
1	Normal or rare microaneurysms	Annually
2	Mild NPDR	Every 9 months
3	Moderate NPDR	Every 6 months
4	Severe NPDR	Every 2-4 months
5	CSME	Every 2-4months (Consider laser therapy)
6	PDR	Every 2-3months (Consider laser therapy)

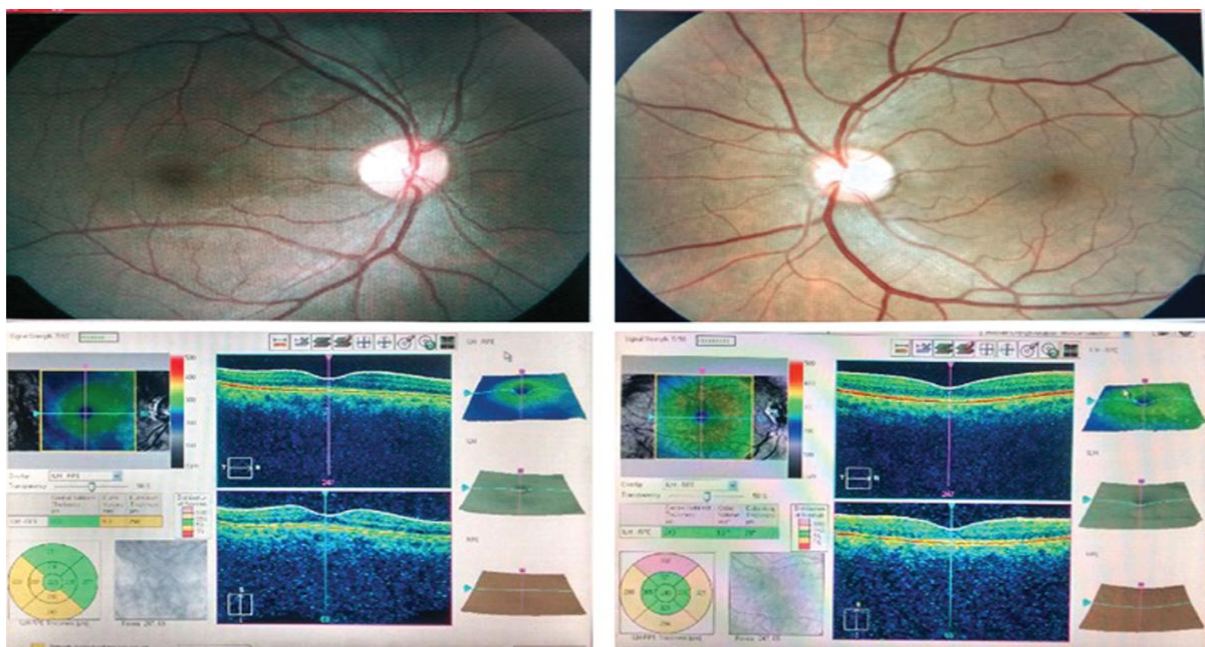**Table 2: Suggested Timetables for Follow-Up in Diabetic Retinopathy Patients**

Figure 1: fundus photograph shows absence of diabetic retinopathy. COT macular scan shows decreased parafoveal and perifoveal thicknesses in right eye, and increased (superior outer quadrant) and decreased perifoveal thickness (remaining outer quadrant) in left eye
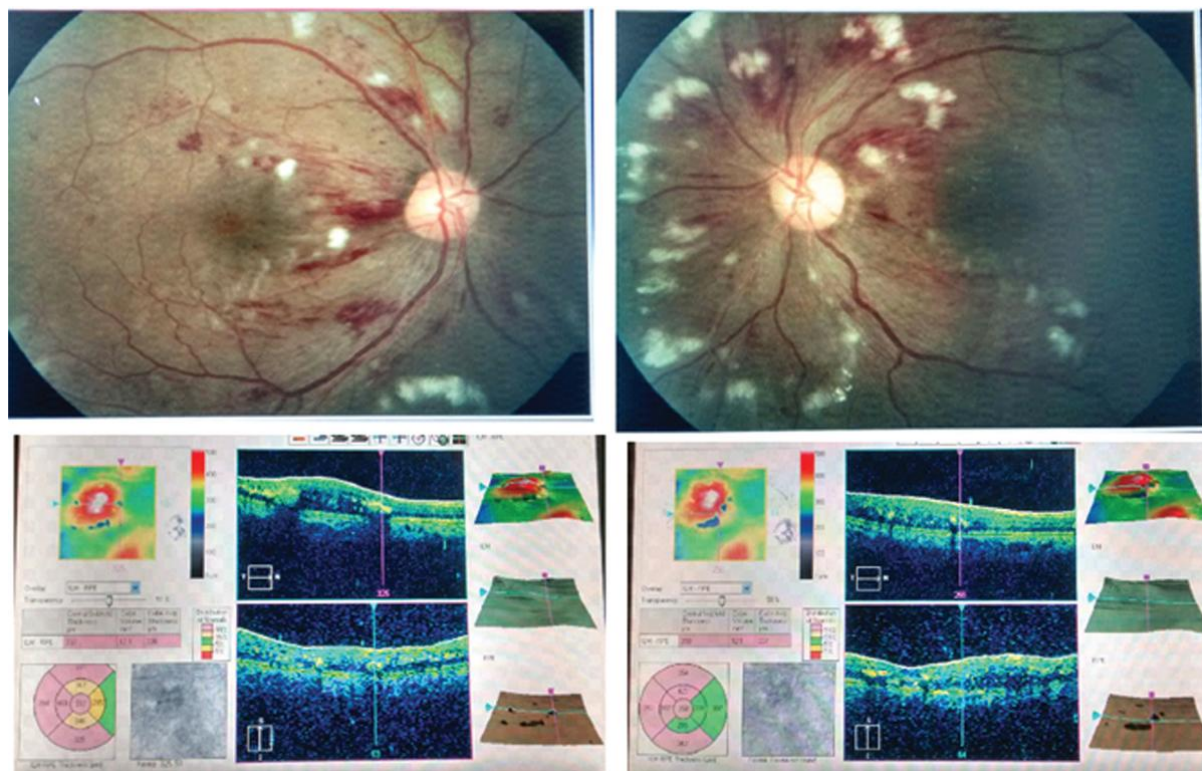
Figure 2: Fundus photograph and OCT macular scan of a patient with severe NPDR with CSME. It shows microaneurysms, hard exudates, hemorrhages, cotton wool spots, and dull foveal reflex. OCT macular scan shows above lesions as hyperreflective areas in outer retina, CSME as cystoid spaces and increased macular thickness (pink and yellow color)

IV. Discussion

The aim of the study was to find the incidence of retinopathy changes in first time detected DM type II. Our observation were compared with various other studies about diabetic retinopathy. Various studies performed in India has found that there is an increased prevalence of DR in type II DM in the past 30 years. DR prevalence in newly diagnosed subjects in our study was 81%.But it is comparatively higher than the prevalence data found in Europe study, which was 20% to 35%.The ratio of male-to-female patients in this study was 2.1:1, while it was 1.5:1 in the Wisconsin epidemiological study of DR 1984 and 1.8:1 in the Oman study. In our study DR was more common in men, further studies such as UKPDS study, the Hyderabad study and a study of Pima Indians also have concluded that DR is common among males. In our study 18% of patients had bilateral involvement, though the severity was asymmetrical in some patients.63% of patients had unilateral involvement. Although, age is not found as a confounding factor as the Asian Young Diabetes Research (ASDIAB) study diabetic subjects who are young were recruited in several Asian countries and they showed less prevalence of DR among Indians in comparison with other Asian groups. Indirect ophthalmoscopy has been used as a standard technique as described by Dandona et al in a study. The sensitivity and specificity of indirect ophthalmoscopy for detecting any retinopathy was 82% and 95% respectively. One may speculate that diabetes-associated changes in the trabeculum is related to decreased aqueous outflow. In the Wisconsin Epidemiologic study of Diabetic Retinopathy, approximately 8% of people with older-one diabetes had intraocular pressuresgreater than 21 mmHg compared with approximately 3% in a non-diabetic comparison group of slightly older age. There may be an effect of diabetes on the optic nerve. One can postulate that the optic nerve of people with diabetes may be more susceptible to destructive effects of intraocular pressure. This may exacerbate an increased risk of glaucoma that accompanies aging.Rema et al reported that 1.7-fold increase in risk of DR is seeninsubjects who have 2% increase in HbA1c.The important risk factor fordiabetes is the blood HbA1c.Wong et al reported DR risk increases 1-21-fold for every 1% increase of HbA1c. These observations were confirmed by our study andhave showed that a raised blood HbA1c concentration was independently associated with an increased DR prevalence.

V. Conclusion

Incidence of DR is common among middle-aged working population. Both eyes were usually affected, though asymmetrically. Detailed fundus examination and FFA in selected cases are important in diagnosing the type and severity of diabetic retinopathy. In conclusion, DR including sight threatening complications were found at the time of diagnosis of diabetes mellitus type II. Treatment can help, but this condition cannot be cured. Regular ophthalmological evaluation of fundus is mandatory to detect diabetic retinopathy in early stages in new cases of DM. Early diagnosis of and treatment of DR helps to stabilize the visual acuity and prevent further loss. Diagnosis of complications of DR at the earliest helps to control progression of PDR. Increased awareness of the ophthalmological complication in diabetes is necessary in the society to prevent unnecessary visual morbidity in diabetic patients. So, it is important to take action before one can notice any eye problem.

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