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Original Research Article

Study of Analysis of Different Risk Factors of Diabetic Retinopathy at a Tertiary Care Hospital

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ABSTRACT

Background: Diabetic retinopathy (DR) is vision loss due to complications from diabetes mellitus mainly caused by microvascular complications in the retina, which strongly correlate to both the duration of diabetes and the level of glycemic control. The present study was conducted to evaluate different risk factors of diabetic retinopathy.

Materials & Methods: 200 consecutive diabetic patients were included in the study. Fasting blood glucose was estimated. Duration of diabetes, current insulin intake, alcohol intake, smoking status, and family history of diabetes was recorded. Blood pressure, Visual acuity was measured. Classification of retinopathy was based on the findings of the worst eye of each subject. Estimation of total serum cholesterol, high density lipoprotein, serum TG was done. The software used in the analysis were SPSS 17.0 and p<0.05 was considered as level of significance (p<0.05).

Results: In the present study, 10% of patients had diabetic retinopathy. The frequency of diabetic retinopathy increased significantly with increasing duration of diabetes; 0-10 years (5.84%), 11-20 years (14.28%) and 21-30 years (28.12%). The p-value was 0.02 and the difference was statistically significant for duration of diabetes. A comparatively higher frequency of diabetic retinopathy was also seen in patients with hypertension (21.05%) and hyperlipidaemia (28.57%). The p-

value shows statistically significant difference for hypertension (p=0.01), hyperlipidaemia (p=0.03).

Conclusion: The present study concluded that higher patient age, increasing duration of diabetes, insulin dependent diabetes mellitus, hypertension, hyperlipidemia, and positive family history of diabetes and hypertension were found to be associated with increased frequency of diabetic retinopathy.

Keywords: Diabetic Retinopathy, Complications, Diabetes Mellitus, Risk Factors.

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INTRODUCTION

Diabetes is a metabolic syndrome resulting from hyperglycemia due to decreased indigenous insulin, decreased sensitivity to circulating insulin or both.[1] According to the World Health Organization, it is estimated that the total number of people with diabetes will double from 171 million in 2000 to 366 million by 2030.[2] Diabetic retinopathy (DR) is a common ocular complication of DM and is considered to be one of the leading causes of vision loss and vision impairment in adults.[3] Initially, diabetics suffering from retinopathy are usually asymptomatic but gradually they start experiencing various symptoms including floaters, distortion and blurred vision which further may progress to irreversible blindness. The prevalence of DR was reported to be 18% in studies carried out in South India, out of which almost all patients of IDDM and 75-80% of NIDDM were reported to suffer from DR, with further

partial or complete blindness after 15-20 years of duration of diabetes.[4,5] Existing research has identified a number of factors attributable for the development of diabetic retinopathy including but not limited to duration of diabetes along with glycemic control, systemic hypertension, hyperlipidemia, obesity and positive family history of diabetes.[6-10] Early detection, control and treatment of diabetes itself will help in reduction in cases of diabetic retinopathy and to delay progression of NPDR to PDR. The factors, which have a contribution in presence and progression of visual impairment, due to DR are modifiable (blood glucose, blood pressure, serum lipids, obesity, alcohol, and smoking), non-modifiable (duration, age, sex)[5,11] and other independent variables like type of diabetes mellitus, family history of DR. More focus should be towards modifiable risk factors. Long term protection is

possible if blood glucose levels are controlled which reduces microvascular complications and progression of severity of DR.[12] The present study was conducted to evaluate different risk factors of diabetic retinopathy.

MATERIALS & METHODS

The present study was conducted in the Department of Ophthalmology, Krishna Mohan Medical College & Hospital, Mathura, Uttar Pradesh (India) to evaluate different risk factors of diabetic retinopathy. 200 consecutive diabetic patients were screened on their first visit for presence or absence of diabetic retinopathy. Those patients with no signs of diabetic retinopathy and good glycemic control (HbA1c<6.5%) were registered after taking written informed consent. They were evaluated for hypertension, hyperlipidemia and smoking status. Patients of ischemic heart disease, chronic liver and kidney diseases were excluded.

Fasting blood glucose was estimated by performing glucose oxidase and peroxidase method. Then, history containing study variables like duration of diabetes, current insulin intake, alcohol intake, smoking status, and family history of diabetes was recorded. Blood pressure of each subject was measured in right arm, supine position. Two readings were taken half an hour apart and the average of two was taken as a final reading. The patients were considered hypertensive as per JNC VII criteria in which the reported classification suggests that all patients having average blood pressure <120/80 mmHg are normotensive; systolic blood pressure (SBP) 120-139 mmHg or diastolic blood pressure (DBP) 80-89 mmHg are pre-hypertensive; SBP 140-159 mmHg or DBP 90-99 mmHg are stage 1 hypertensive; and SBP>160 mmHg or DBP>100 mmHg are stage 2 hypertensive. The hypertensive patients are further to be given appropriate medications. Visual acuity was measured by Snellen's chart. A slit lamp was used for anterior segment evaluation including the depth of anterior chamber. IOP measurement was performed by non-contact tonometry. Indirect ophthalmoscopy was done after complete pupillary dilatation by 1% tropicamide eye drops. Classification of

retinopathy was based on the findings of the worst eye of each subject. Biochemical studies include estimation of total serum cholesterol by CHOD/PAP method, high density lipoprotein by direct enzymatic method, serum TG by GPO/PAP method. All the data collected was compiled edited classified as was entered into the proforma. The software used in the analysis were SPSS 17.0 and p<0.05 was considered as level of significance (p<0.05).

RESULTS

The mean age of the patients was 52.75±7.26 years and there were 58% males and 42% female patients. The majority (81%) of patients had NIDDM. The mean duration of diabetes was 8.36±6.80 years. 12% of the patients were smokers, 38% were hypertensive, 7% had hyperlipidemia, 62% had a family history of diabetes and 28% had a family history of hypertension.

In the present study, 10% of patients had diabetic retinopathy. The frequency of diabetic retinopathy increased with increasing age of the patient; 30-40(0%), 41-50 (4.34%) and 51-60 years (16.66%). The p-value was 0.09; however, the difference was statistically insignificant for the age group. The frequency of diabetic retinopathy was almost equal in both males (10.34%) and females (10.34%). The p-value was 0.92, however, the difference was statistically insignificant for gender. However, the frequency of diabetic retinopathy increased significantly with increasing duration of diabetes; 0-10 years (5.84%), 11-20 years (14.28%) and 21-30 years (28.12%). The p-value was 0.02 and the difference was statistically significant for duration of diabetes. A comparatively higher frequency of diabetic retinopathy was also seen in patients with IDDM (15.79%). The p-value was 0.21 but the difference was statistically insignificant for type of diabetes. A comparatively higher frequency of diabetic retinopathy was also seen in patients with hypertension (21.05%) and hyperlipidaemia (28.57%). The p-value shows statistically significant difference for hypertension (p=0.01), hyperlipidaemia (p=0.03). The p-value shows statistically insignificant difference for smoking (p=0.99), family history of diabetes (p=0.08) and family history of hypertension (p=0.31).

Table 1: Baseline Characteristics of the patients.

Variables	N(%)
Age	52.75±7.26 years
Gender	
Male	116(58%)
Female	84(42%)
Type of diabetes	
IDDM	38(19%)
NIDDM	162(81%)
Duration of diabetes	8.36±6.80 years
Comorbid	
Hypertension	76(38%)
Hyperlipidemia	14(7%)
Smoker	24(12%)
Family history of diabetes	124(62%)
Family history of hypertension	56(28%)

Table 2: Patients characteristics including risk factors

Variable	Diabetic Retinopathy n (%)	p-value
Prevalence	20(10%)	
Age Group		
30-40 years	0/46(0%)	0.09
41-50 years	2/46(4.34%)	
51-60 years	18/108(16.66%)	
Gender		
Male	12/116(10.34%)	0.92
Female	8/84(9.52%)	
Duration of Diabetes		
0-10 years	9/154(5.84%)	0.02
11-20 years	2/14(14.28%)	
21-30 years	9/32(28.12%)	
Type of diabetes		
NIDDM	14/162(8.64%)	0.21
IDDM	6/38(15.78%)	
Hypertension		
No	4/124(3.22%)	0.01
Yes	16/76(21.05%)	
Hyperlipidaemia		
No	16/186(8.60%)	0.03
Yes	4/14(28.57%)	
Smoking		
No	18/176(10.22%)	0.99
Yes	2/24(8.33%)	
Family History of Diabetes		
No	2/76(2.63%)	0.08
Yes	18/124(14.51%)	
Family History of hypertension		
No	12/144(8.33%)	0.31
Yes	8/56(14.28%)	

DISCUSSION

Recent studies have reported that the prevalence of DM in India has rapidly increased to become more than 61 million due to rapid transition economically, demographically and nutritionally along with changes in lifestyle in both rural and urban population. This in turn suggests that in a few more years most of these diabetics will show ocular complications (DR) leading to blindness which is a matter of concern. The figures for NPDR were much higher than other studies which showed prevalence rates of 71.79% and 71.88%.[13,14]

The mean age of the patients was 52.75±7.26 years and there were 58% males and 42% female patients. The majority (81%) of patients had NIDDM. The mean duration of diabetes was 8.36±6.80 years. 12% of the patients were smokers, 38% were hypertensive, 7% had hyperlipidemia, 62% had a family history of diabetes and 28% had a family history of hypertension.

In the present study, 10% of patients had diabetic retinopathy. The frequency of diabetic retinopathy increased with increasing age of the patient; 30-40(0%), 41-50 (4.34%) and 51-60 years(16.66%). The p-value was 0.09; however, the difference was statistically insignificant for age group. The frequency of diabetic retinopathy was almost equal in both males (10.34%) and females (10.34%). The p-value was 0.92, however, the difference was statistically insignificant for gender. However, the frequency of diabetic retinopathy increased significantly with increasing duration of diabetes; 0-10 years (5.84%), 11-20 years (14.28%) and 21-30 years (28.12%). The p-value was 0.02 and the difference was statistically significant for duration of diabetes. A comparatively higher frequency of diabetic retinopathy was also seen in patients with IDDM (15.79%). The p-value was 0.21 but the difference was statistically insignificant for type of diabetes. A comparatively higher frequency of diabetic retinopathy was also seen in patients with hypertension (21.05%) and hyperlipidaemia (28.57%). The p-value shows statistically significant difference for hypertension (p=0.01), hyperlipidaemia (p=0.03). The p-value shows statistically

insignificant difference for smoking (p=0.99), family history of diabetes (p=0.08) and family history of hypertension (p=0.31).

Ahmedani et al. also reported variable frequency of smoking (29.5%), family history of diabetes (44.6%) and hypertension (5%) among diabetic patients.[15] Wong et al. in Australia (11.5%)[16], Nathan (12.6%)[17] and Agarwal et al. (11.7%)[18] in India and reported similar frequency of diabetic retinopathy. A Beijing Eye Study from northern China found that there was an association between incident DR and longer known duration of DM and the concentration of HbA1c.[19] Raman et al. in 2015 (OR=2.19, 95% CI:1.29-3.73; p=0.004)[20] however observed significantly increased risk of diabetic retinopathy with increasing age. Raman et al. in 2015 (OR=1.66, 95% CI:1.14-2.42; p=0.009)[20] and Chatziralli et al. in 2010 (OR=3.57, 95% CI:1.67-7.62; p=0.001)[21] however reported increased risk of diabetic retinopathy in males. Insignificant difference was observed by Wong et al. in relation to hyperlipidemia (OR=0.88, 95% CI: 0.65–1.19; p=0.39).[16]

Hu et al. (OR=1.52, 95% CI:1.20-1.92; p=0.001) also observed similar risk with positive family history of diabetes. The frequency of diabetic retinopathy increased significantly with increasing duration of diabetes; 0-10 vs. 11-20 vs. 21-30 years (5.2% vs. 14.3% vs. 25.0%; p=0.037; OR=2.00, 95% CI: 0.18-22.06).[22]

CONCLUSION

The present study concluded that higher patient age, increasing duration of diabetes, insulin dependent diabetes mellitus, hypertension, hyperlipidemia, and positive family history of diabetes and hypertension were found to be associated with increased frequency of diabetic retinopathy.

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