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Research Article

CORRELATION OF RISK FACTORS WITH SEVERITY OF DIABETIC RETINOPATHY

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ABSTRACT

Objectives: Diabetic retinopathy (DR) is a major microvascular complication of diabetes. The purpose of the study is to correlate the risk factors such as duration of diabetes, hypertension, dyslipidemia, HbA1c, and high serum creatinine with severity of diabetic retinopathy.

Methods: This is a hospital-based cross-sectional study conducted on 50 patients of diabetic retinopathy from March 2021 to August 2021. Best corrected visual acuity, slit lamp examination, and detailed fundus examination were done and grade of diabetic retinopathy was noted. The severity of diabetic retinopathy is correlated with duration of diabetes, HbA1c, serum cholesterol, BP, Hb%, and serum creatinine levels.

Results: In our study, there was found to be a statistically significant association between duration of diabetes (p=0.03) and HbA1c levels (p=0.04) with severity of diabetic retinopathy whereas dyslipidemia (p=0.7), hypertension (p=0.8), high serum creatinine levels (p=0.4), and anemia (p=0.3) were shown to have no significant association with severity of diabetic retinopathy.

Conclusion: In our study, the risk factors such as duration of diabetes and poor glycemic control have statistically significant association with severity of diabetic retinopathy and hypertension, dyslipidemia, anemia, and high serum creatinine have no significant association with severity of diabetic retinopathy. Thus, good glycemic control and regular screening for DR changes are the key to prevent progression of DR and to improve the quality of vision in diabetic patients.

Keywords: Diabetes, Diabetes retinopathy, Risk factors, Glycemic control, HbA1c.

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INTRODUCTION

The number of patients with diabetes were increasing rapidly as the time progresses and it is expected that the complications of diabetes also increases with it. In diabetic patients, diabetic retinopathy constitutes a common microvascular complication and is considered to be one of the leading causes of visual impairment and vision loss in these patients. It is also considered to have an impact on the quality of life of diabetic patients. In many studies, it is reported that the prevalence of diabetic retinopathy ranged from 15 to 25% in India. Diabetic retinopathy is also considered to be a major indicator of other known systemic microvascular complications of diabetes such as diabetic nephropathy and diabetic neuropathy. Many epidemiological studies, either cross-sectional or cohort studies, have been conducted worldwide on diabetic retinopathy, exploring the risk factors associated with diabetic retinopathy and aiming at prevention and management of this disease. According to those studies, poor glycemic control, longer duration of diabetes, high lipid levels, and hypertension have been implicated as the risk factors for development of diabetic retinopathy and its progression. Hence, this study has been undertaken with the aim of correlating the risk factors such as duration of diabetes, Hba1c levels, hypertension, dyslipidemia, anemia, and high serum creatinine levels with severity of diabetic retinopathy [1-5].

MATERIALS AND METHODS

This is a hospital-based cross-sectional study conducted on 50 patients of diabetic retinopathy attending government regional eye hospital, Visakhapatnam from March 2021 to August 2021.

Inclusion criteria

All diagnosed cases of diabetic retinopathy were included in the study.

Exclusion criteria

The following patients were excluded from the study:

- Patients who did not give consent.
- Patients with media opacity whose fundus examination is not possible.
- Patients with other retinal disorders such as retinal vein occlusions and hypertensive retinopathy.

METHODOLOGY

All diagnosed cases of diabetic retinopathy were included in the study. Detailed history of patient was taken, especially regarding the presence of diabetes and hypertension and duration of diabetes and hypertension, development of defective vision, decrease in urine output and any known past history of diagnosed diabetic nephropathy or neuropathy. Systemic examination was done. Best corrected visual acuity and slit lamp examination were done. Detailed fundus examination was done using slit lamp biomicroscopy with 78 d lens or indirect ophthalmoscopy with 20 d lens for presence of any diabetic retinopathy changes. In our study, diabetic retinopathy was classified based on early treatment diabetic retinopathy study (ETDRS) classification which is shown in the Table 1.

All diabetic retinopathy patients were screened for associated risk factors with tests such as blood pressure, serum lipid profile, HbA1c, Hb%, and serum creatinine. The severity of diabetic retinopathy, then was correlated with the above tests. Patients were considered to have abnormal test values if

- Bp>/=140/90mmhg
- Hba1c - >6.7%
- Hb - <11%
- Dyslipidemia – total cholesterol - >160 mg/dl, triglycerides - >150 mg/dl, hdl - <40 mg/dl, ldl - >100 mg/dl, vldl - >40 mg/dl
- Serum creatinine - >1.5 mg/dl

RESULTS

A total of 50 patients of diabetic retinopathy were included in the study. Out of these, 58% were males and 42% were females (Table 2). Out

of 50 (78 eyes) patients of diabetic retinopathy, 54 (69%) eyes were found to have non-proliferative diabetic retinopathy (NPDR), and 24 (31%) eyes were found to have proliferative diabetic retinopathy (PDR) (Fig. 1). From the Fig. 2, it was found that among the 69% of NPDR cases, majority were moderate cases 43%. Out of 31% of PDR cases, most of them have mild-moderate severity (50%) (Fig. 3). The patients who have long duration of diabetes of 11–20 years showed more prevalence of diabetic retinopathy (Table 3). Among the different variables which influence the retinopathy, HbA1C and duration of diabetes showed highly significant results ($p<0.05$) (Table 4).

Table 1: Abbreviated early treatment diabetic retinopathy study classification

Category	Management
Non-proliferative diabetic retinopathy	
No DR	Review in 12 months
Very mild DR Microaneurysms only	Review most patients in 12 months
Mild NPDR Any or all of: microaneurysms, retinal haemorrhages, exudates, cotton-wool spots, upto the level of moderate NPDR. No intraretinal microvascular anomalies (IRMA) or significant beading	Review range 6–12 months, depending on severity of signs, stability, systemic factors and patient's personal circumstances
Moderate NPDR Severe retinal haemorrhages in 1-3 quadrants or mild IRMA Significant venous beading can be present in no more than 1 quadrant Cotton-wool spots commonly present	Review in approximately 6 months Proliferative diabetic retinopathy in upto 26% High risk PDR in upto 8% within a year
Severe NPDR The 4-2-1 rule: one or more of: Severe haemorrhages in all 4 quadrants Significant venous beading in 2 or more quadrants Moderate IRMA in 1 or more quadrants	Review in 4 months PDR in upto 50%, high risk PDR in upto 15% within a year
Very severe NPDR Two or more of the criteria for severe NPDR	Review in 2–3 months High risk PDR in upto 45% within a year
PROLIFERATIVE DIABETIC RETINOPATHY	
Mild-moderate PDR New vessels on the disc (NVD) or new vessels elsewhere (NVE), but extent insufficient to meet the high-risk criteria	Treatment considered according to severity of signs, stability, systemic factors and patient's personal circumstances such as reliability of attendance for review. If not treated, review in upto 2 months
High-risk PDR NVD greater than 1/3 disc area Any NVD with vitreous haemorrhage NVE greater than ½ disc area with vitreous haemorrhage	Treatment should be performed immediately when possible and certainly same day if symptomatic presentation with good retinal review Laser photocoagulation Intravitreal Anti VEGF agents Intravitreal triamcinolone Pars plana vitrectomy Lipid lowering drugs
Advanced diabetic eye disease Pre-retinal/intragel haemorrhage Tractional retinal detachment Tractional retinoschisis Rubeosis irides	Pars plana vitrectomy

Table 2: Gender-wise distribution of cases

Gender	n (%)
Males	29 (58)
Females	21 (42)

DISCUSSION

In this study, 69% of eyes have non-proliferative diabetic retinopathy (NPDR) and 31% have proliferative diabetic retinopathy (PDR). In this study, increased duration of diabetes ($p=0.03$) and high HbA1c levels ($p=0.04$) has statistically significant association with severity of diabetic retinopathy [6]. Similar to the present study, in the study by Hegde *et al.* [7], risk factors such as duration of diabetes ($p=0.02$ in above 60 years age group) and HbA1c levels ($p=0.03$) have significant association with severity of diabetic retinopathy. Similar results have

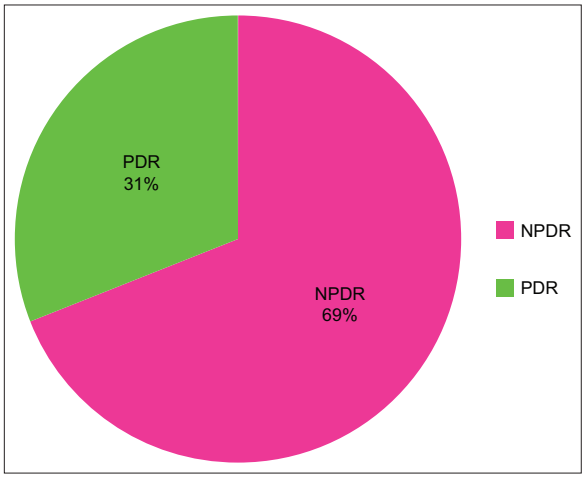

Fig. 1: Diabetic retinopathy

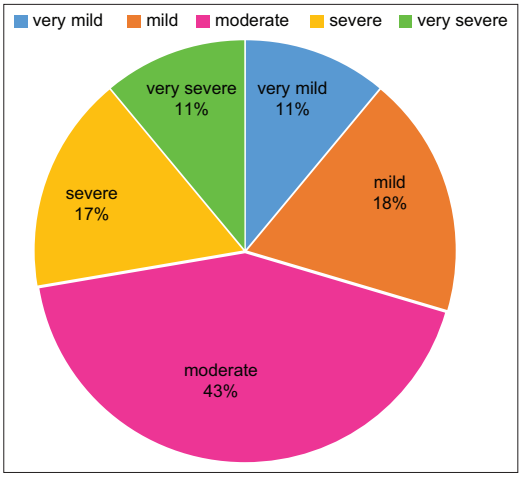

Fig. 2: Non-proliferative diabetic retinopathy

Table 3: Duration of diabetes

Duration of diabetes	n (%)
<1	2 (4)
1–5	8 (16)
6–10	17 (34)
11–20	19 (38)
>20	4 (8)

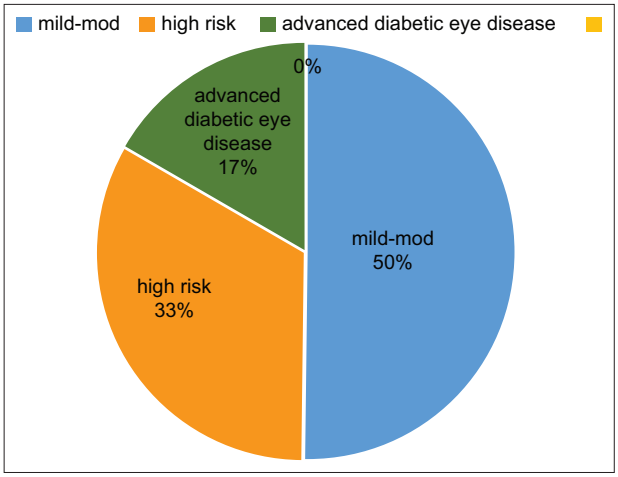

Fig. 3: Proliferative diabetic retinopathy

Table 4: Study parameters of retinopathy patients

Parameter	NPDR	PDR	p
HbA1c	43	22	0.04
Dyslipidemia	29	12	0.7
Hypertension	21	10	0.8
Serum creatinine	11	7	0.4
Anemia	22	7	0.3
Duration of diabetes	47	22	0.03

DR: Diabetic retinopathy, PDR: Proliferative DR, NPDR: Non PDR, HbA1c: Hemoglobin A1c

been obtained in the study by Cai *et al.* [8], where increased duration of diabetes (p=0.00) and HbA1c levels (p=0.04) has significant association with severity of diabetic retinopathy. Similarly, in Chatziralli *et al.* [9] study, years since DM diagnosis (p<0.0001) and HbA1c levels (p<0.0001) have positive association with severity of diabetic retinopathy. In Raman *et al.* [1] study, duration of DM of more than 15 years (p<0.0001) and higher HbA1c (p<0.0001) have significant association with diabetic retinopathy, corresponding to the present study. In this study, hypertension, dyslipidemia, high serum creatinine values, and anemia have no statistically significant association with severity of diabetic retinopathy. Similarly, in Hegde *et al.* [7] study, BP (systolic p=0.83, diastolic p=0.2) and lipid levels (total cholesterol p=0.456, triglycerides p= 0.281, LDL p=0.097 and, HDL 0.240 VLDL p=0.390) show no significant association with severity of diabetic retinopathy. In Cai *et al.* [8] study, serum creatinine (p=0.00) and systolic BP (p=0.01) have positive association whereas LDL cholesterol (p=0.83) has no association with severity of diabetic retinopathy. Chatziralli *et al.* [9] reported that there was a positive association of severity of diabetic retinopathy with hypertension (p=0.03) and in Raman *et al.* [1] study, systolic BP (p=0.01) has significant association with diabetic retinopathy, which can be attributed to variation in distribution of diabetic retinopathy and its risk factors in different ethnic groups and countries. Yau *et al.* [6] reported that longer duration of diabetes, poorer glycemic and blood pressure control are strongly associated with diabetic retinopathy, similar to the present study. They also found that diabetic retinopathy is more commonly associated with male gender. Wat *et al.* [10] reported that good glycemic and blood pressure control remain the most important modifiable risk factors to reduce risk of progression of diabetic retinopathy and vision loss.

CONCLUSION

In our study, high HbA1c levels and increased duration of diabetes have significant association with severity of diabetic retinopathy. Dyslipidemia, hypertension, high serum creatinine levels, and anemia were found to have no significant association with severity of diabetic retinopathy. Hence, good glycemic control and regular screening for diabetic retinopathy changes are required to prevent the progression of disease and reduce morbidity due to diabetic retinopathy.

AUTHORS CONTRIBUTION

Vuyyuru Sridurga, Postgraduate in department of Ophthalmology, Government Regional Eye Hospital, Visakhapatnam, advised the patients who are diagnosed with diabetic retinopathy to undergo the investigations that are required for the study and collecting the information of reports, analyzing them, thereby framing the final outcome of the study, along with the other authors.

Gurivindapalli Premalatha, Assistant professor in department of Ophthalmology and full time Retina specialist in Government Regional Eye Hospital, Visakhapatnam, diagnosed the cases of diabetic retinopathy and analyzed the reports of the patients.

Kattoju Padmavathi, Assistant professor in department of Ophthalmology, Government Regional Eye Hospital, Visakhapatnam, aided in diagnosis of patients with diabetic retinopathy and compiling the reports of patients, along with the other authors, and thereby achieving the final outcome of the study.

CONFLICTS OF INTEREST

The authors declared no conflicts of interest.

AUTHORS FUNDING

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