



**ORIGINAL RESEARCH PAPER**

**Medicine**

**PREVALENCE AND RISK FACTORS FOR DIABETIC RETINOPATHY IN A TERTIARY CARE CENTRE IN SOUTH INDIA.**

**KEY WORDS:** Diabetic Retinopathy, Dyslipidemia, Glomerular Filtration Rate.

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**ABSTRACT**

This study was conducted to determine the prevalence and risk factors of diabetic retinopathy in type 2 diabetes mellitus patients in a tertiary care centre in south india. The study was conducted on patients attending the outpatient department (OPD) and inpatients admitted in Yenepoya medical college Hospital after obtaining the Ethical committee approval. The study was conducted on 220 type 2 diabetic patients who were more than 5 years from diagnosis. Informed written consent was obtained for participation in the study and for conduction of investigations. The study was conducted between the period of May 2017 to May 2018.it was a observational cross sectional study. In our study, 53.18% had no diabetic retinopathy. Mild, moderate and severe NPDR was found in 22.7%, 16.4%, 2.3% respectively. 5.5% had evidence of PDR. Using Independent t test, we observed statistically significant correlation of diabetic retinopathy with duration of diabetes, both systolic and diastolic blood pressure, total cholesterol, LDL, serum creatinine, blood urea and eGFR.

**INTRODUCTION**

Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia. Depending on the etiology of the DM, factors contributing to hyperglycemia include reduced insulin secretion, decreased glucose utilization, and increased glucose production. The metabolic dysregulation associated with DM causes secondary pathophysiologic changes in multiple organ systems that impose a tremendous burden on the individual with diabetes and on the health care system.<sup>[1]</sup>

DM is the leading cause of blindness between the ages of 20 and 74 in the United States. The gravity of this problem is highlighted by the finding that individuals with DM are 25 times more likely to become legally blind than individuals without DM. As per the International Diabetes Federation (IDF), it is estimated that in 2017, approximately 425 million (age 20 - 79 years) people were living with diabetes worldwide, with most cases being type 2 diabetes. These figures were expected to increase to 629 million by 2045. It was estimated that 1 in 2 adults with diabetes were undiagnosed (over 212 million people). Moreover, it was projected that every 1 in 6 live births is affected by hyperglycemia in pregnancy.<sup>[2]</sup>

Blindness is primarily the result of progressive diabetic retinopathy and clinically significant macular edema. The burden of diabetic retinopathy is increasing with the rising prevalence of type 2 diabetes mellitus.<sup>[3]</sup> Numerous studies showed that the risk factors for diabetic retinopathy are abnormal HbA1c level, hypertension, dyslipidemia, duration of diabetes, age of onset, microalbuminuria, and cigarette smoking.

**METHODOLOGY  
SOURCE OF DATA**

The study was conducted on patients attending the outpatient department (OPD) and inpatients admitted in Yenepoya medical college Hospital after obtaining the Ethical committee approval. The study was conducted on 220 type 2 diabetic patients who were more than 5 years from diagnosis. Informed written consent was obtained for participation in the study and for conduction of investigations. The study was conducted between the period of May 2017 to May 2018.

**STUDY DESIGN**

Observational cross sectional study

**MATERIALS AND METHODS**

Patients included in the study are those who were detected to be diabetic by ADA guidelines. A structured, pre-prepared case Pro forma was used to enter the clinical history, physical examination findings and investigations findings. Detailed history regarding age, gender, place, duration of diabetes, antidiabetic medications,

history of hypertension, coronary artery disease, cerebrovascular disease, peripheral vascular disease, smoking and alcoholism were noted. Physical examination with respect to height, weight, body mass index, blood pressure and fundus examination were done. Investigations done for each patient includes complete blood count, fasting and post prandial blood glucose, HbA1c, serum creatinine, eGFR, serum total cholesterol, triglyceride, HDL, LDL, urine routine examination, urine dipstick test for proteinuria, morning spot urinary albumin-creatinine ratio, 24 hour urine protein when indicated, ECG, 2-dimensional echocardiography. Estimated glomerular filtration rate (eGFR) was calculated from the serum creatinine using the Modification of Diet in Renal Disease equation formula:

$$eGFR = [186.3 \times (\text{serum creatinine [mg/dL]}^{-1.154}) \times (\text{age}^{-0.203}) \times (0.742 \text{ if female})].$$

Conventional 2 D Echocardiography was used to assess the left ventricular function and geometry.

**SAMPLE SIZE**

Sample size, n=220

Around 1800 patients are admitted with type 2 diabetes of more than 5 year duration in our hospital. Assuming nephropathy for hospitalised patients with type 2 diabetes of more than 5 year duration is 20%, a sample size of 220 was calculated with 95% Confidence Interval. Design effect-1. Sample size was calculated using OpenEpi, Version 3.

**INCLUSION CRITERIA**

Patients who have been diagnosed with type 2 diabetes mellitus by ADA guidelines, of more than 5 years from diagnosis.

**EXCLUSION CRITERIA**

Patients with diabetes of <5 years from diagnosis and those with type 1 Diabetes Mellitus were excluded. Patients with significant valvular heart disease, obvious renal disease like chronic kidney disease on dialysis, glomerulonephritis, polycystic kidney disease and obstructive uropathy, overt pulmonary disease, urinary tract infection, pregnancy were also excluded.

**BIOSAFETY ISSUES**

Not applicable

**STATISTICAL ANALYSIS**

Continuous variables are expressed in terms of mean and standard deviation and categorical variables presented in frequency and percentages.

Independent t-test is used to compare all the continuous variables between the groups.

Chi square test is used to find whether there is any association between two categorical variables.

A p-value < 0.05 is considered significant. Data visualization is done using appropriate charts. All the analysis is done using SPSS version 22 software and Microsoft excel.

**ETHICS**

This study was conducted after ethical clearance from the Ethical committee and University as per standard protocols and guidelines.

**RESULTS**

The mean age of the patients was 59.60 ± 11.145 years and the mean duration of diabetes was 10.08 ± 5.38 years. The mean body mass index was 25.46 ± 5.53 kg/m<sup>2</sup>. The mean systolic blood pressure and diastolic blood pressure were 126.86 ± 22.57 and 79.05 ± 13.84 mm Hg, respectively. The mean fasting blood sugar and HbA1c levels were 182.57 ± 80.65 mg/dL and 9.545 ± 2.60%, respectively. The mean serum triglyceride and cholesterol levels were 143.11 ± 71.03 and 153.22 ± 41.26 mg/dL, respectively. The mean serum creatinine and blood urea were 1.32 ± 1.08 and 36.61 ± 22.70 respectively. The mean eGFR level was 74.10 ± 33.56 mL/min/1.73m<sup>2</sup> and the mean ejection fraction was 54.31 ± 12.73 %. In the study population 51.4 % had systemic hypertension, 20.5% had past history of CAD, 6.4% patients had past history of CVA and 4.5 % had history of PVD.

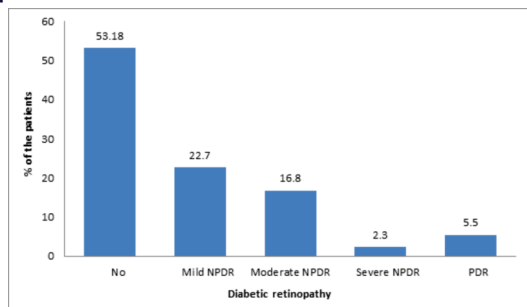
Out of study population, major number of people were taking only OHA (61.4%), 24.5 % takes both insulin and OHA, 10% population takes only insulin and 4.09% were on diet control or alternative therapy.

**Table 1: Prevalence Of Diabetic Retinopathy In The Study Population**

Diabetic retinopathy	Number of patients (%)
No	117 (53.18)
Mild NPDR	50 (22.7)
Moderate NPDR	36 (16.4)
Severe NPDR	5 (2.3)
PDR	12 (5.5)

In our study, 53.18% had no diabetic retinopathy. Mild, moderate and severe NPDR was found in 22.7%, 16.4%, 2.3% respectively. 5.5% had evidence of PDR.

**Graph 1: Prevalence Of Diabetic Retinopathy In The Study Population**



**Table 2: Factors Correlating With Diabetic Retinopathy**

Parameters Mean(SD)	Diabetic retinopathy		P value
	No	Yes	
Age	58.91 ± 11.81	60.38 ± 10.33	0.329
Duration of diabetes	7.62 ± 3.56	12.87 ± 5.74	<0.0001
BMI	24.96 ± 5.39	26.01 ± 5.65	0.160
SBP	122.14 ± 20.08	132.23 ± 24.09	0.001
DBP	76.15 ± 12.72	82.35 ± 14.37	0.001
FBS	180.64 ± 89.67	184.76 ± 69.36	0.707
PPBS	227.92 ± 91.99	234.51 ± 90.35	0.593
HbA1c	9.45 ± 2.63	9.65 ± 2.58	0.572
Total cholesterol	147.13 ± 36.79	160.14 ± 44.99	0.019

Triglyceride	146.62 ± 77.97	139.14 ± 62.35	0.437
HDL	31.67 ± 10.95	31.76 ± 9.80	0.949
LDL	88.99 ± 35.78	99.81 ± 39.77	0.035
VLDL	26.67 ± 13.03	27.87 ± 11.21	0.466
Serum creatinine	1.12 ± 0.94	1.55 ± 1.19	0.003
Blood urea	32.94 ± 21.83	40.79 ± 23.05	0.01
eGFR	82.74 ± 32.13	64.38 ± 32.61	<0.0001

Using Independent t test, we observed statistically significant correlation of diabetic retinopathy with duration of diabetes, both systolic and diastolic blood pressure, total cholesterol, LDL, serum creatinine, blood urea and eGFR.

**DISCUSSION**

Prevalence of diabetic retinopathy was found to be 46.82% in our study. In a study by Baba et al<sup>[4]</sup> on Prevalence of Diabetic Retinopathy and Correlation with Systemic Risk Factors in Type 2 Diabetes Mellitus in a Tertiary Care Hospital, the prevalence of diabetic retinopathy was 66.8% in type 2 diabetic patients. In our study mean duration of diabetes, both systolic and diastolic blood pressure, total cholesterol, LDL, serum creatinine and blood urea had correlation with diabetic retinopathy which is statistically significant. Other studies regarding factors influencing retinopathy in DM had similar observations. Similarly in another study by Afaf MS Al-Adhansi<sup>[5]</sup> in 165 Kuwaiti subjects with type 2 diabetes it was found that diabetic retinopathy was found in 40% while 20.6% had sight threatening retinopathy. The study also showed that the risk for diabetic retinopathy has increased as duration of diabetes increases and diabetic patients with retinopathy were significantly older, higher systolic blood pressure and had poor glycemic control.

**CONCLUSION**

The present study shows that there is a high prevalence of diabetic retinopathy in the population. And there is significant correlation between the duration of diabetes, both systolic and diastolic blood pressure, total cholesterol, LDL, serum creatinine and blood urea with diabetic retinopathy.

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