



Original Article

Prevalence of Diabetic Retinopathy Among Type 2 Diabetes Mellitus Patients: A Hospital-Based Study

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ABSTRACT

Introduction: Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by persistent hyperglycaemia resulting from insulin resistance and relative insulin deficiency. It has become one of the most significant non-communicable diseases worldwide due to its rapidly increasing prevalence, long disease duration, and association with multiple systemic complications.

Aims & objectives: The aim of the present study was to determine the prevalence of diabetic retinopathy among patients with Type 2 Diabetes Mellitus attending a tertiary care hospital and to evaluate its association with various clinical and biochemical risk factors such as duration of diabetes, glycaemic control, and hypertension.

Materials & Methods: The present study was a hospital-based cross-sectional observational study conducted in the Department of Ophthalmology, Narayana Medical College and Hospital, Chinthareddypalem, Nellore, Andhra Pradesh, India, over a period of one year. A total of 100 patients with Type 2 Diabetes Mellitus Result: Duration of diabetes demonstrated a strong and significant association with DR ($p = 0.0004$), with the highest prevalence observed in patients with disease duration exceeding 10 years, highlighting the cumulative effect of chronic hyperglycemia on retinal vasculature.

Conclusion: We concluded that involving 100 patients with Type 2 Diabetes Mellitus revealed that the overall prevalence of diabetic retinopathy was 32%, indicating a substantial burden of microvascular complications among diabetic patients. The study demonstrated that diabetic retinopathy was more frequently observed in older age groups, although the association with age was not statistically significant.

Keywords: Type 2 Diabetes Mellitus, Diabetic Retinopathy, Prevalence, Microvascular Complications, Glycaemic Control, HbA1c, Hypertension

INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by persistent hyperglycaemia resulting from insulin resistance and relative insulin deficiency. It has become one of the most significant non-communicable diseases worldwide due to its rapidly increasing prevalence, long disease duration, and association with multiple systemic complications. The global burden of diabetes continues to rise, particularly in developing countries like India, where lifestyle changes, urbanization, and genetic predisposition have contributed significantly to the increasing incidence [1]. Among the various complications of diabetes mellitus, diabetic retinopathy (DR) is one of the most important microvascular complications and a leading cause of preventable blindness in adults [2]. Diabetic retinopathy is a progressive disorder of the retinal microvasculature caused by chronic hyperglycaemia, leading to capillary basement membrane thickening, pericyte loss, microaneurysm formation, vascular leakage, retinal ischemia, and in advanced stages, neovascularization [3]. If not detected and treated early, it can progress to irreversible vision loss, significantly affecting the quality of life of patients. The early stages of diabetic retinopathy are often asymptomatic, which makes regular screening essential for timely diagnosis and intervention [4]. The duration of diabetes is considered one of the most

important risk factors, with longer disease duration significantly increasing the likelihood of developing retinopathy. Poor glycaemic control, as reflected by elevated HbA1c levels, is also strongly associated with the onset and progression of diabetic retinopathy [5]. In addition, systemic conditions such as hypertension and dyslipidaemia further exacerbate retinal vascular damage and increase disease severity [6]. Globally, the prevalence of diabetic retinopathy among diabetic patients varies widely, ranging from 20% to 40%, depending on population characteristics, duration of diabetes, and screening methods used [7]. In India, where the diabetic population is rapidly expanding, the burden of diabetic retinopathy is also increasing, posing a major public health challenge. Studies have reported that a significant proportion of patients present late with advanced stages of retinopathy due to lack of awareness and inadequate screening facilities. Early detection through regular ophthalmic examination, including fundus evaluation, plays a crucial role in preventing vision-threatening complications. Hospital-based studies are particularly useful in assessing the prevalence and risk factors of diabetic retinopathy in clinical settings, thereby helping in the development of targeted screening and management strategies.

MATERIALS AND METHODS

Type of Study: Hospital-based cross-sectional observational study.

Place of Study: Department of Ophthalmology, Narayana Medical College and Hospital, Chinthareddypalem, Nellore, Andhra Pradesh, India.

Study Duration: 1 year

Sample Size: 100 patients

Inclusion Criteria:

- Diagnosed cases of Type 2 Diabetes Mellitus
- Patients aged ≥ 30 years
- Patients attending the hospital during the study period
- Patients who gave informed consent
- Patients undergoing complete ophthalmic (fundus) examination

Exclusion Criteria:

- Type 1 Diabetes Mellitus patients
- Gestational diabetes mellitus patients
- Patients with other retinal diseases not related to diabetes
- Patients with previous retinal laser therapy or retinal surgery
- Patients with incomplete clinical or ophthalmic records

Study Variables:

- Age
- Gender
- Duration of Type 2 Diabetes Mellitus
- Glycaemic control (HbA1c level)
- Presence of hypertension
- Presence or absence of diabetic retinopathy

Statistical Analysis:

Data were entered into Excel and subsequently analyzed using SPSS and GraphPad Prism. Continuous variables were summarized as means with standard deviations, while categorical variables were presented as counts and percentages. Comparisons between independent groups were performed using two-sample t-tests, and paired t-tests were applied for correlated (paired) data. Categorical data were compared using chi-square tests, with Fisher's exact test applied when expected cell counts were small. A p-value of ≤ 0.05 was considered statistically significant.

RESULT

Table 1: Age-wise Distribution of Diabetic Retinopathy

Age Group (years)	DR Present	DR Absent	Total	p-value
30–40	2	10	12	0.077
41–50	6	18	24	
51–60	12	22	34	
>60	12	18	30	
Total	32	68	100	

Table 2: Prevalence of Diabetic Retinopathy among Study Population (n = 100)

Diabetic Retinopathy Status	No. of Patients	Percentage (%)	P-value
Present	32	32	0.0005
Absent	68	68	
Total	100	100	

Table 3: Duration of Diabetes and Diabetic Retinopathy

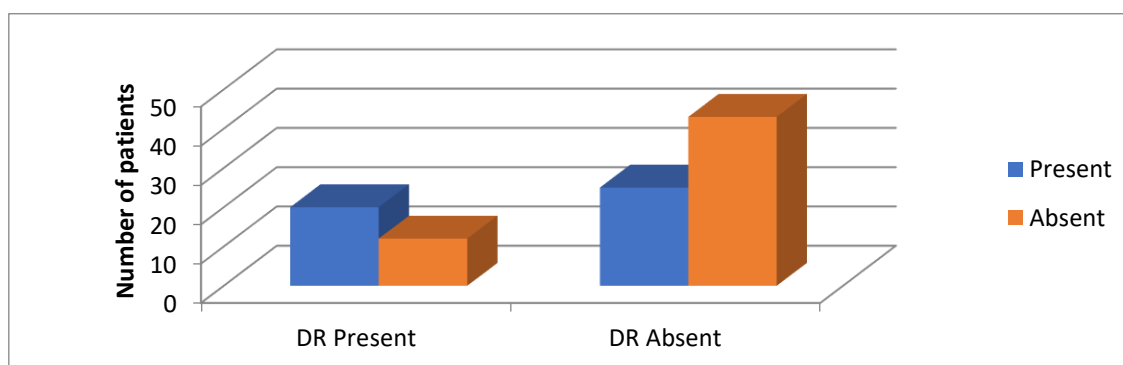
Duration (years)	DR Present	DR Absent	Total	p-value
<5	4	28	32	0.0004
5–10	10	22	32	
>10	18	18	36	
Total	32	68	100	

Table 4: Glycemic Control (HbA1c) and Diabetic Retinopathy

HbA1c Level	DR Present	DR Absent	Total	p-value
<7%	5	30	35	0.0033
7–8.9%	10	20	30	
≥9%	17	18	35	
Total	32	68	100	

Table 5: Hypertension and Diabetic Retinopathy

Hypertension Status	DR Present	DR Absent	Total	p-value
Present	20	25	45	0.022
Absent	12	43	55	
Total	32	68	100	

**Figure 1: Hypertension and Diabetic Retinopathy**

In the present study involving 100 patients with type 2 diabetes mellitus, the overall prevalence of diabetic retinopathy (DR) was 32%, while 68% of patients were free from retinopathy, indicating a considerable burden of microvascular complications. Age-wise analysis showed a higher number of DR cases in older age groups, particularly in patients aged 51–60 years and >60 years, although the association between age and DR was not statistically significant ($p = 0.077$). Duration of diabetes demonstrated a strong and significant association with DR ($p = 0.0004$), with the highest prevalence observed in patients with disease duration exceeding 10 years, highlighting the cumulative effect of chronic hyperglycemia on retinal vasculature. Similarly, poor glycemic control was significantly associated with DR ($p = 0.0033$), as patients with HbA1c $\geq 9\%$ showed a higher proportion of retinopathy compared to those with better control ($<7\%$). Hypertension was also found to be significantly associated with DR ($p = 0.022$), with a higher prevalence among hypertensive patients, indicating the additive vascular risk posed by coexisting hypertension. Overall, the findings suggest that longer duration of diabetes, poor glycemic control, and hypertension are important significant risk factors for the development of diabetic retinopathy, whereas age shows a non-significant but positive trend toward increased risk.

DISCUSSION

The present hospital-based study evaluated the prevalence of diabetic retinopathy (DR) among 100 patients with type 2 diabetes mellitus and found an overall prevalence of 32%, indicating a considerable burden of microvascular complications. Similar prevalence has been reported in previous studies, where DR ranges from 20% to 40% depending on population

characteristics, duration of diabetes, and glycemic control [8,9]. Studies by Raman et al. and Klein et al. have also demonstrated comparable prevalence rates, highlighting that DR remains a common and clinically significant complication among diabetic patients [10,11]. In the present study, age-wise distribution showed a higher frequency of DR in older age groups, particularly 51–60 years and >60 years, although the association was not statistically significant ($p = 0.077$). This finding is consistent with earlier studies which reported that increasing age is associated with higher DR prevalence; however, age often loses significance when adjusted for duration of diabetes and metabolic control [12]. Thus, age may act more as a contributing factor rather than an independent predictor of DR. A strong and statistically significant association was observed between duration of diabetes and DR ($p = 0.0004$), with the highest prevalence seen in patients with more than 10 years of disease duration. This finding is in agreement with the DCCT Research Group and UKPDS studies, which established duration of diabetes as one of the most important risk factors for development and progression of diabetic retinopathy due to prolonged exposure to hyperglycemia-induced microvascular damage [13,14]. Similarly, poor glycemic control showed a significant association with DR ($p = 0.0033$). Patients with HbA1c $\geq 9\%$ had a higher prevalence of retinopathy compared to those with better glycemic control. This observation is consistent with Stratton et al., who demonstrated that improved glycemic control significantly reduces the risk of development and progression of diabetic retinopathy [14]. Hyperglycemia plays a central role in endothelial dysfunction, oxidative stress, and capillary damage, thereby accelerating retinal changes [15]. Hypertension was also significantly associated with DR ($p = 0.022$), with higher prevalence among hypertensive patients. This is in accordance with findings from the Wisconsin Epidemiologic Study of Diabetic Retinopathy (WESDR), which reported systemic hypertension as an important risk factor contributing to progression of retinal vascular damage in diabetic individuals [16]. Coexistence of hypertension and diabetes has been shown to have an additive effect on microvascular complications. The findings of the present study are consistent with existing literature, confirming that longer duration of diabetes, poor glycemic control, and hypertension are major risk factors for diabetic retinopathy, whereas age shows a weaker association. These results emphasize the importance of regular screening and strict control of blood glucose and blood pressure to prevent vision-threatening complications in patients with type 2 diabetes mellitus.

CONCLUSION

We concluded that involving 100 patients with Type 2 Diabetes Mellitus revealed that the overall prevalence of diabetic retinopathy was 32%, indicating a substantial burden of microvascular complications among diabetic patients. The study demonstrated that diabetic retinopathy was more frequently observed in older age groups, although the association with age was not statistically significant. A strong and statistically significant relationship was found between duration of diabetes and diabetic retinopathy, with higher prevalence seen in patients with longer disease duration, especially those with more than 10 years of diabetes. Poor glycaemic control, as indicated by elevated HbA1c levels, was also significantly associated with the development of retinopathy. In addition, hypertension emerged as an important associated risk factor. The study concludes that longer duration of diabetes, inadequate glycaemic control, and hypertension are major determinants for the development of diabetic retinopathy, emphasizing the need for regular screening and early intervention.

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