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Original Research Article

Association Between Duration of Diabetes and Severity of Diabetic Retinopathy Among Patients with Type 2 Diabetes Mellitus: A Cross-Sectional Study

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Abstract

Background: Diabetic retinopathy (DR) is one of the most common microvascular complications of diabetes mellitus and remains a leading cause of preventable blindness. Duration of diabetes has been identified as a major risk factor for the development and progression of DR.

Objectives: To evaluate the association between duration of diabetes mellitus and severity of diabetic retinopathy among patients with type 2 diabetes mellitus.

Methods: A hospital-based cross-sectional study was conducted among 200 patients with type 2 diabetes mellitus attending the ophthalmology outpatient department. Fundus examination was performed after pupillary dilatation and DR was graded according to the Early Treatment Diabetic Retinopathy Study (ETDRS) classification. Patients were categorized based on duration of diabetes into <5 years, 5–10 years, 11–15 years, and >15 years. Chi-square test and Spearman correlation were used for statistical analysis.

Results: The prevalence of diabetic retinopathy increased significantly with increasing duration of diabetes ($p<0.001$). Severe forms of DR, including proliferative diabetic retinopathy, were predominantly observed among patients with diabetes duration exceeding 15 years. A strong positive correlation was observed between duration of diabetes and severity of diabetic retinopathy (Spearman's rho = 0.68, $p<0.001$).

Conclusion: Longer duration of diabetes mellitus is significantly associated with increased severity of diabetic retinopathy. Early screening and strict glycemic control are essential to prevent progression of visual impairment.

Keywords: Diabetic Retinopathy, Duration of Diabetes, Type 2 Diabetes Mellitus, Blindness, Microvascular Complications.

Introduction

Diabetes mellitus is a major global health problem affecting millions of individuals worldwide. Diabetic retinopathy (DR) is among the most common microvascular complications and represents a leading cause of visual impairment in working-age adults. The prevalence and severity of DR are influenced by several factors including duration of diabetes, glycemic control, hypertension, dyslipidemia, and nephropathy. [1,2]

The Wisconsin Epidemiologic Study of Diabetic Retinopathy demonstrated that the prevalence of retinopathy increases progressively with increasing duration of diabetes. Previous studies have shown that nearly all patients with type 1 diabetes and over 60% of patients with type 2 diabetes develop some degree of retinopathy after 20 years of disease duration. [3,4] Early detection of diabetic retinopathy through regular ophthalmic screening can reduce the risk of severe vision loss. [5,6] Therefore, understanding the relationship between duration of diabetes and severity of retinopathy remains clinically important. To assess the association between duration of diabetes mellitus and severity of diabetic retinopathy among patients with type 2 diabetes mellitus.

Materials and Methods

This hospital-based cross-sectional study was conducted in the Department of Ophthalmology of a tertiary care teaching hospital over a period of one year. A total of 200 patients diagnosed with Type 2

Diabetes Mellitus were included in the study after obtaining informed written consent. Patients aged above 40 years with a confirmed diagnosis of Type 2 Diabetes Mellitus were enrolled consecutively from the ophthalmology outpatient department. Patients with gestational diabetes, retinal diseases unrelated to diabetes, significant media opacity preventing fundus examination, previous retinal surgery, or ocular trauma were excluded from the study.

Detailed demographic and clinical data, including age, gender, duration of diabetes, and treatment history, were collected using a structured proforma. All participants underwent comprehensive ophthalmic evaluation comprising visual acuity assessment, slit-lamp examination, intraocular pressure measurement, and dilated fundus examination. Pupillary dilatation was achieved using 1% tropicamide eye drops. Fundus examination was performed using indirect ophthalmoscopy and slit-lamp biomicroscopy with a 90D lens. Diabetic retinopathy was graded according to the Early Treatment Diabetic Retinopathy Study (ETDRS) classification into No Diabetic Retinopathy, Mild Non-Proliferative Diabetic Retinopathy (NPDR), Moderate NPDR, Severe NPDR, and Proliferative Diabetic Retinopathy (PDR). Based on disease duration, patients were categorized into four groups: less than 5 years, 5–10 years, 11–15 years, and more than 15 years.

Data were entered into Microsoft Excel and analyzed using SPSS version 22.0. Descriptive statistics were expressed as frequencies and percentages. The association between duration of diabetes and severity of diabetic retinopathy was assessed using the Chi-square test. Spearman's correlation coefficient was used to determine the relationship between duration of diabetes and severity of diabetic retinopathy. A p-value of less than 0.05 was considered statistically significant.

Results

Table no 1 shows that A total of 200 patients with Type 2 Diabetes Mellitus were included in the study. The mean age of the study population was 58.4 ± 9.6 years. Among them, 118 (59%) were males and 82 (41%) were females.

Table 1: Distribution According to Duration of Diabetes

Duration (Years)	Number (%)
<5	50 (25%)
5–10	60 (30%)
11–15	45 (22.5%)
>15	45 (22.5%)
Total	200

Table 2: Severity of Diabetic Retinopathy According to Duration of Diabetes

Severity	<5 yrs	5–10 yrs	11–15 yrs	>15 yrs
No DR	40	28	10	5
Mild NPDR	8	15	10	5
Moderate NPDR	2	12	15	10
Severe NPDR	0	4	7	12
PDR	0	1	3	13

Chi-square = 82.6 p <0.001

Table no 2 shows that Out of 200 participants, 117 patients (58.5%) showed evidence of diabetic retinopathy, whereas 83 patients (41.5%) had no retinopathy. A statistically significant association was observed between duration of diabetes and severity of diabetic retinopathy ($p < 0.001$). Patients with diabetes duration less than 5 years predominantly had either no retinopathy or mild NPDR. In contrast, severe NPDR and proliferative diabetic retinopathy were more frequently observed among patients with diabetes duration greater than 15 years.

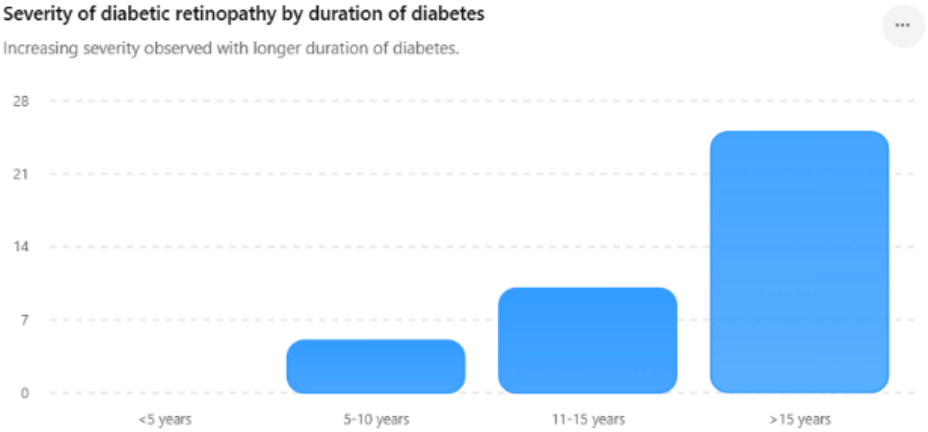

Figure 1. Severity of DR According to Duration of Diabetes

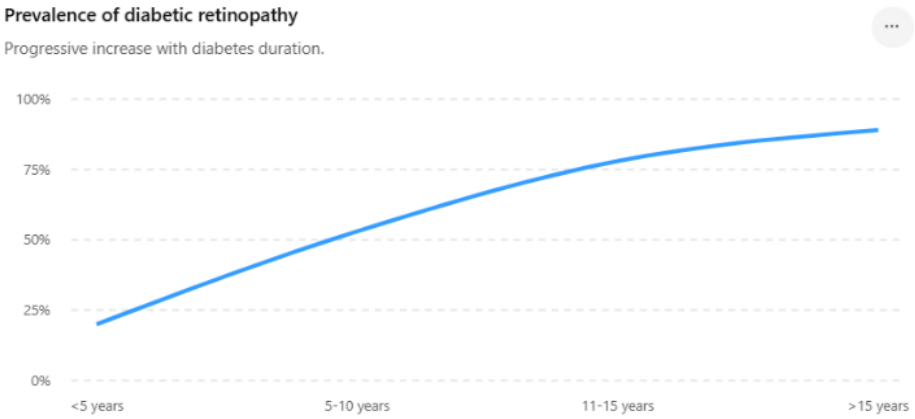

Figure 2. Prevalence of Diabetic Retinopathy by Duration of Diabetes

Discussion

The present study demonstrated a statistically significant association between duration of diabetes mellitus and severity of diabetic retinopathy. Patients with longer duration of diabetes exhibited a greater prevalence of severe NPDR and proliferative diabetic retinopathy. [8,9] The findings are consistent with the Wisconsin Epidemiologic Study of Diabetic Retinopathy, which reported increasing prevalence of retinopathy with increasing disease duration. Klein et al. observed that duration of diabetes is among the strongest predictors of retinopathy progression. [6] Mohan et al. reported similar findings among South Indian diabetic patients, demonstrating a higher prevalence of DR among individuals with diabetes duration exceeding ten years. [10,11] The pathophysiological basis may be explained by prolonged exposure of retinal capillaries to chronic hyperglycemia, resulting in endothelial dysfunction, capillary basement membrane thickening, microaneurysm formation, retinal ischemia, and neovascularization. [12,13] Our findings reinforce recommendations for annual retinal screening and stricter glycemic control among patients with long-standing diabetes.

Conclusion

Duration of diabetes mellitus is significantly associated with severity of diabetic retinopathy. Patients with diabetes duration exceeding 10 years showed substantially higher rates of advanced diabetic retinopathy. Regular ophthalmic screening, early diagnosis, and strict glycemic control are essential for preventing visual impairment among diabetic patients.

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