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Original Research Article

Clinical Profile and Risk Factors of Diabetic Retinopathy in Type 2 Diabetes Mellitus Patients

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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 among the working-age population worldwide. Early detection and identification of associated risk factors are essential for timely management and prevention of visual impairment. The present study aimed to evaluate the clinical profile and risk factors associated with diabetic retinopathy in patients with Type 2 Diabetes Mellitus.

Materials and Methods: This prospective observational study was conducted among 150 patients diagnosed with Type 2 Diabetes Mellitus over a period of 18 months. Detailed ophthalmic examination including visual acuity assessment, slit lamp examination, fundus examination, and grading of diabetic retinopathy was performed. Demographic profile, duration of diabetes, glycemic status, hypertension, lipid profile, body mass index, smoking history, and associated systemic illnesses were recorded. Statistical analysis was performed using SPSS software version 25, and $p<0.05$ was considered statistically significant.

Results: Among 150 diabetic patients, diabetic retinopathy was observed in 62 patients (41.3%). Non-proliferative diabetic retinopathy (NPDR) was the most common presentation. The prevalence of diabetic retinopathy increased significantly with longer duration of diabetes, poor glycemic control, hypertension, and dyslipidemia. Patients with diabetes duration greater than 10 years demonstrated significantly higher incidence of retinopathy ($p<0.001$). Visual impairment was more common among patients with proliferative diabetic retinopathy and diabetic macular edema.

Conclusion: Diabetic retinopathy is strongly associated with duration of diabetes, uncontrolled blood glucose levels, hypertension, and dyslipidemia. Early ophthalmic screening and strict systemic control are essential to reduce vision-threatening complications and improve quality of life in diabetic patients.

Keywords: Diabetic Retinopathy, Type 2 Diabetes Mellitus, Risk Factors, Visual Impairment, Diabetic Macular Edema, Fundus Examination.

Introduction

Diabetes mellitus is a major global public health problem with rapidly increasing prevalence worldwide. Chronic hyperglycemia associated with diabetes leads to various microvascular and macrovascular complications involving the retina, kidneys, nerves, heart, and blood vessels. Among these complications, diabetic retinopathy (DR) remains one of the leading causes of preventable blindness among adults worldwide.[1]

Diabetic retinopathy is a progressive microangiopathy characterized by retinal vascular changes including microaneurysms, hemorrhages, capillary non-perfusion, neovascularization, and macular edema.[2] Prolonged hyperglycemia results in retinal ischemia, endothelial dysfunction, increased vascular permeability, and retinal neurodegeneration, ultimately leading to visual impairment if left untreated.[3] The prevalence of diabetic retinopathy is increasing in parallel with the rising burden of Type 2 Diabetes Mellitus, particularly in developing countries.[4] The risk of developing diabetic retinopathy is influenced by several factors including duration of diabetes, poor glycemic control, hypertension, dyslipidemia, obesity, smoking, nephropathy, and genetic predisposition.[5] Duration of diabetes and elevated glycated hemoglobin (HbA1c) levels are considered the most significant predictors of diabetic retinopathy progression.[6]

Diabetic retinopathy is broadly classified into non-proliferative diabetic retinopathy (NPDR) and proliferative diabetic retinopathy (PDR). NPDR is

characterized by microaneurysms, retinal hemorrhages, cotton wool spots, and venous abnormalities, whereas PDR is associated with retinal neovascularization and severe vision-threatening complications such as vitreous hemorrhage and tractional retinal detachment.[7] Diabetic macular edema may occur at any stage and is a major cause of visual loss in diabetic patients.

Early stages of diabetic retinopathy may remain asymptomatic, making regular ophthalmic screening essential for early diagnosis and intervention.[8] Advances in retinal imaging, optical coherence tomography, fluorescein angiography, laser photocoagulation, intravitreal anti-VEGF therapy, and vitreoretinal surgery have significantly improved the management and prognosis of diabetic retinopathy.[9] Identification of clinical profile and associated risk factors is important for early detection, prevention, and timely treatment of diabetic retinopathy. Therefore, the present study was undertaken to evaluate the clinical characteristics and risk factors associated with diabetic retinopathy in patients with Type 2 Diabetes Mellitus.

Aim: To evaluate the clinical profile and risk factors associated with diabetic retinopathy in patients with Type 2 Diabetes Mellitus.

Materials and Methods

This prospective observational study was conducted over a period of 18 months among patients diagnosed with Type 2 Diabetes Mellitus. A total of 150 diabetic patients attending the ophthalmology department were included in the study. Patients aged above 35 years with confirmed diagnosis of Type 2 Diabetes Mellitus and willing to participate were included.

Patients with Type 1 Diabetes Mellitus, gestational diabetes, retinal diseases unrelated to diabetes, ocular trauma, previous retinal surgery, dense cataract preventing fundus examination, and media opacities were excluded from the study. Detailed clinical history including duration of diabetes, treatment history, hypertension, smoking history, and systemic comorbidities was recorded. General physical examination and laboratory investigations including fasting blood sugar, postprandial blood sugar, HbA1c, and lipid profile were performed.

Comprehensive ophthalmic evaluation included visual acuity assessment using Snellen chart, slit lamp examination, intraocular pressure measurement, and dilated fundus examination using indirect ophthalmoscopy and slit lamp biomicroscopy with 90D lens. Diabetic retinopathy was graded according to the Early Treatment Diabetic Retinopathy Study (ETDRS) classification into mild, moderate, severe NPDR, and PDR. Presence of diabetic macular edema was also documented.

Data regarding demographic profile, duration of diabetes, glycemic control, blood pressure, lipid abnormalities, body mass index, smoking history, visual acuity, and retinal findings were recorded in a standardized proforma. Statistical analysis was performed using SPSS software version 25. Continuous variables were expressed as mean ± standard deviation and categorical variables as frequencies and percentages. Chi-square test and Student's t-test were used for analysis, and $p<0.05$ was considered statistically significant.

Results

A total of 150 patients with Type 2 Diabetes Mellitus were included in the study. The mean age of the study population was 56.8 ± 9.4 years. Male patients constituted 58% of the study population, while females accounted for 42%. Diabetic retinopathy was observed in 62 patients (41.3%), whereas 88 patients (58.7%) showed no evidence of retinopathy on fundus examination.

The prevalence of diabetic retinopathy increased significantly with increasing duration of diabetes. Among patients with diabetes duration greater than 10 years, 67.7% demonstrated evidence of retinopathy compared to only 18.5% among patients with diabetes duration less than 5 years ($p<0.001$). Poor glycemic control was strongly associated with diabetic retinopathy, with mean HbA1c levels significantly higher among patients with retinopathy compared to those without retinopathy.

Non-proliferative diabetic retinopathy was the most common retinal finding and was observed in 48 patients (77.4%) with diabetic retinopathy. Proliferative diabetic retinopathy was noted in 14 patients (22.6%). Diabetic macular edema was present in 18 patients and was associated with reduced visual acuity. Hypertension and dyslipidemia were significantly more common among patients with diabetic retinopathy. Smoking history and obesity also demonstrated positive association with the severity of retinal changes. Visual impairment was significantly greater in patients with proliferative diabetic retinopathy and diabetic macular edema. Overall, longer duration of diabetes, poor glycemic control, hypertension, and dyslipidemia emerged as the major risk factors associated with diabetic retinopathy in the present study.

Table 1: Demographic and Clinical Characteristics of Study Population

Variables	Total Patients (n=150)
Mean Age (years)	56.8 ± 9.4
Male	87 (58%)
Female	63 (42%)
Mean Duration of Diabetes (years)	9.6 ± 4.8
Hypertension	72 (48%)
Dyslipidemia	58 (38.7%)
Smoking History	40 (26.7%)
Obesity (BMI >30 kg/m²)	36 (24%)

Table 2: Prevalence and Classification of Diabetic Retinopathy

Retinal Findings	Number of Patients	Percentage
No Diabetic Retinopathy	88	58.7%
Non-Proliferative Diabetic Retinopathy (NPDR)	48	32%
Proliferative Diabetic Retinopathy (PDR)	14	9.3%
Total Diabetic Retinopathy	62	41.3%
Diabetic Macular Edema	18	12%

Table 3: Association between Duration of Diabetes and Diabetic Retinopathy

Duration of Diabetes	Patients with DR	Patients without DR	p-value
<5 Years	10 (18.5%)	44 (81.5%)	
5–10 Years	24 (46.1%)	28 (53.9%)	
>10 Years	28 (67.7%)	16 (32.3%)	<0.001

Table 4: Association of Risk Factors with Diabetic Retinopathy

Risk Factors	Patients with DR (n=62)	Patients without DR (n=88)	p-value
Mean HbA1c (%)	9.2 ± 1.4	7.1 ± 1.2	<0.001
Hypertension	40 (64.5%)	32 (36.4%)	<0.01
Dyslipidemia	34 (54.8%)	24 (27.3%)	<0.01
Smoking History	22 (35.5%)	18 (20.5%)	<0.05
Obesity	18 (29%)	18 (20.5%)	>0.05

Table 5: Visual Impairment in Patients with Diabetic Retinopathy

Visual Acuity	NPDR (n=48)	PDR (n=14)
≥6/18	36 (75%)	4 (28.6%)
6/24 – 6/60	10 (20.8%)	6 (42.8%)
<6/60	2 (4.2%)	4 (28.6%)

Discussion

Diabetic retinopathy is one of the most important microvascular complications of diabetes mellitus and remains a major cause of preventable blindness worldwide. The present study evaluated the clinical profile and associated risk factors of diabetic retinopathy among patients with Type 2 Diabetes Mellitus.

In the current study, diabetic retinopathy was observed in 41.3% of diabetic patients. Similar prevalence rates have been reported in previous epidemiological studies conducted among diabetic populations.[10] The increasing prevalence of diabetic retinopathy reflects the growing burden of diabetes mellitus globally. The present study demonstrated a strong association between duration of diabetes and development of diabetic retinopathy. Patients with diabetes duration greater than 10 years had significantly higher prevalence of retinopathy. Similar findings were reported by Klein et al., who identified duration of diabetes as one of the strongest predictors for diabetic retinopathy progression.[11]

Poor glycemic control was another major risk factor identified in the study. Elevated HbA1c levels were significantly associated with diabetic retinopathy severity. Chronic hyperglycemia leads to retinal capillary damage, oxidative stress, and microvascular dysfunction, ultimately contributing to retinal ischemia and neovascularization.[12]

Non-proliferative diabetic retinopathy was the most common form observed in the present study. Similar findings have been reported in previous hospital-based studies.[13] Early identification of NPDR is important because timely intervention and systemic control can prevent progression to vision-threatening proliferative stages. Hypertension and dyslipidemia were significantly associated with

diabetic retinopathy in the present study. Systemic hypertension aggravates retinal vascular damage and accelerates progression of retinal ischemia.[14] Dyslipidemia has also been associated with hard exudate formation and diabetic macular edema.

Visual impairment was significantly higher among patients with proliferative diabetic retinopathy and diabetic macular edema. These advanced stages are associated with severe retinal vascular changes and macular involvement leading to marked reduction in visual acuity.[15]

The findings of the present study emphasize the importance of regular ophthalmic screening, early diagnosis, strict glycemic control, and management of systemic risk factors in diabetic patients to reduce vision-threatening complications.

Conclusion

Diabetic retinopathy is a common microvascular complication of Type 2 Diabetes Mellitus and is strongly associated with longer duration of diabetes, poor glycemic control, hypertension, and dyslipidemia. Non-proliferative diabetic retinopathy was the most common clinical presentation. Early ophthalmic screening and comprehensive management of systemic risk factors are essential for prevention of visual impairment and progression to advanced diabetic retinopathy.

References

1. Wild S, Roglic G, Green A, et al. Global prevalence of diabetes. Diabetes Care. 2004;27 (5):1047-1053.
2. Cheung N, Mitchell P, Wong TY. Diabetic retinopathy. Lancet. 2010;376(9735):124-136.
3. Antonetti DA, Klein R, Gardner TW. Mechanisms of diabetic retinopathy. N Engl J Med. 2012; 366(13):1227-1239.
4. Yau JW, Rogers SL, Kawasaki R, et al. Global prevalence of diabetic retinopathy. Diabetes Care. 2012;35(3):556-564.
5. Klein R, Klein BE, Moss SE, et al. The Wisconsin epidemiologic study of diabetic retinopathy. Arch Ophthalmol. 1984;102(4):5 20-526.
6. Stratton IM, Kohner EM, Aldington SJ, et al. UKPDS study on diabetic retinopathy. BMJ. 2001;321(7258):405-412.
7. Early Treatment Diabetic Retinopathy Study Research Group. ETDRS report number 10. Ophthalmology. 1991;98(5 Suppl):786-806.
8. Aiello LP. Perspectives on diabetic retinopathy. Am J Ophthalmol. 2003;136(1): 122-135.
9. Virgili G, Parravano M, Evans JR, et al. Anti-VEGF therapy for diabetic macular edema. Cochrane Database Syst Rev. 2018;10:CD 007419.
10. Raman R, Rani PK, Reddi Rachepalle S, et al. Prevalence of diabetic retinopathy in India. Ophthalmology. 2009;116(2):311-318.
11. Klein R, Klein BE, Moss SE. Relation of glycemic control to diabetic retinopathy. Diabetes Care. 1998;21(1):123-128.
12. Brownlee M. The pathobiology of diabetic complications. Diabetes. 2005;54(6):1615-1625.
13. Dandona L, Dandona R, Naduvilath TJ, et al. Population-based assessment of diabetic retinopathy. Ophthalmology. 1999;106(2):406-412.
14. Wong TY, Cheung N, Tay WT, et al. Prevalence and risk factors for diabetic retinopathy. Ophthalmology. 2008;115(11):1 869-1875.
15. Moss SE, Klein R, Klein BE. Visual impairment in diabetic retinopathy. Ophthalmo logy. 1988;95(10):1340-1348.