ORIGINAL ARTICLE

Prevalence of Diabetic Retinopathy among Diabetic Patients Attending a Tertiary Care Hospital in Nepal: An Observational Study

Sundip Dware Chhetri[1], Meena Kunwar[1], Ashish Thapa[2], Apurba Shrestha[3], Dayanand Prasad Sah[3], Kriti Lamichhane[4]

[1] Department of Ophthalmology, Nepal Armed Police Force Hospital, Balambu, Kathmandu, Nepal
[2] Department of General Practice and Emergency Medicine, Nepal Armed Police Force Hospital, Balambu, Kathmandu, Nepal
[3] Department of Internal Medicine, Nepal Armed Police Force Hospital, Balambu, Kathmandu, Nepal
[4] Bhaktapur Cancer Hospital, Bhaktapur, Nepal

Corresponding Author:
Dr. Sundip Dware Chhetri
Department of Ophthalmology,
Nepal Armed Police Force Hospital,
Balambu, Kathmandu, Nepal.
Email: milandcpkr@gmail.com

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Abstract

Introduction: The global rise of type II diabetes has increased the number of individuals at risk for retinal complications such as diabetic retinopathy, a leading cause of vision impairment. In Nepal, a significant number of patients are diagnosed with diabetic retinopathy only at advanced stages. Diabetic retinopathy is commonly linked to longer duration of diabetes, uncontrolled blood sugar, and elevated blood pressure. Timely detection and management are crucial to prevent irreversible vision loss. This study aimed to assess the prevalence of diabetic retinopathy among diabetic patients visiting a tertiary care hospital.

Methods: A hospital-based observational study was conducted between September 1, 2025 and December 26, 2025, at a tertiary care hospital. Ethical approval was obtained from the Institutional Review Committee (Reference number: NAPFH-041/2025). Detailed demographic, clinical, and ocular examination findings were recorded. A purposive sampling technique was used. Data were analyzed with Microsoft Excel and Statistical Package for the Social Sciences version 17.

Results: Out of 195 diabetic patients, the mean age was 54.7±10.17 years. The overall prevalence of diabetic retinopathy was 18 (9.23%) patients, of whom 17 (8.71%) had non-proliferative diabetic retinopathy, and 1 (0.51%) had proliferative diabetic retinopathy. Diabetic macular edema was present in 1 (0.51%) of cases. Diabetic retinopathy was more common in patients with longer duration of diabetes and associated complications, including nephropathy.

Conclusions: Diabetic retinopathy continues to be a major complication among patients with diabetes in Nepal, with many cases identified late due to inadequate prior eye screening. Regular monitoring and early treatment are vital to avoid vision-threatening consequences.

Keywords: *diabetes mellitus; diabetic retinopathy; proliferative diabetic retinopathy; non-proliferative diabetic retinopathy.*

Introduction

Diabetes mellitus (DM), particularly type II, is a growing global health concern. Globally, 589 million people are affected by diabetes, and this number is projected to increase to 853 million by 2050.[1] In developing countries such as Nepal, diabetic retinopathy (DR) ranks among the primary causes

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of visual disability. Chronic hyperglycemia damages retinal vasculature, leading to progressive retinal alterations that may significantly impair vision if left untreated.[2] The overall prevalence of DR is 34.60%, with 6.96% for proliferative diabetic retinopathy (PDR) and 6.81% for diabetic macular edema (DME) among patients with diabetes.[2] In Nepal, a previous study reported a DR prevalence of 13.2%.[3] Early detection and timely treatment can prevent or reduce visual impairment and permanent blindness.[4]

The risk of developing DR increases with longer duration of diabetes.[4,5] Additional risk factors include hypertension, suboptimal glycemic control, and proteinuria, whereas the impact of BMI and serum lipid levels remains inconsistent.[6] Considering the growing diabetes burden in Nepal, it is necessary to assess the prevalence of DR and its relationship with comorbidities, particularly hypertension. Assessing these associations will help identify high-risk patients, improve screening strategies, and guide timely interventions to prevent vision loss.

The objective of this study was to assess the prevalence of DR among diabetic patients visiting a tertiary care hospital.

Methods

A hospital-based observational study was conducted between September 1, 2025 and December 26, 2025, at Nepal Armed Police Force Hospital, Kathmandu, Nepal. Ethical approval was obtained from the Institutional Review Committee (Reference number: NAPFH-041/2025). A purposive sampling technique was used. All individuals with diabetes aged 18 years or older attending the Ophthalmology Outpatient Department (OPD) during the study period were included in the study. Individuals with Type 1 DM, gestational diabetes mellitus, and patients unwilling to participate were excluded from the study. Informed consent was obtained from all participants.

The sample size was calculated using the formula

$n= (Z^2 \times p \times q) / e^2$

Where,

n= sample size

Z= 1.96 at 95% confidence interval

p= 13.20%, the prevalence of diabetic retinopathy reported in a previous study conducted in the Far-Western Province of Nepal.[3]

q= 1-p

e= allowable error of 5% adjusted for potential non-response rate.

The final sample size was 195.

Detailed clinical history (demographics, symptoms, family history of DM, medical/ocular history) and ocular examinations were conducted by the principal investigator. Best-corrected visual acuity was assessed using Snellen's or Tumbling E charts. Fundus examination was performed after pupil dilation using slit-lamp biomicroscopy (90D lens) and indirect ophthalmoscopy (20D lens).

DME diagnosis: Spectral-domain optical coherence tomography (OCT) was used to detect DME and to confirm or rule out clinically suspected cases.

DR grading: According to the Early Treatment Diabetic Retinopathy Study (ETDRS)-modified classification.[7]

- **Mild non-proliferative diabetic retinopathy (NPDR):** at least one microaneurysm only
- **Moderate NPDR:** presence of intraretinal hemorrhages, microaneurysms, soft exudates, venous beading, or intraretinal microvascular abnormalities (IRMA) not meeting criteria for severe NPDR
- **Severe NPDR (4-2-1 rule):** intraretinal hemorrhages and microaneurysms in ≥4 quadrants, venous beading in ≥2 quadrants, or IRMA in ≥1 quadrant in the absence of PDR
- **PDR:** neovascularization of the disc or elsewhere with or without vitreous or preretinal hemorrhage

DME Assessment: DME was assessed clinically using ETDRS criteria and classified as:

- **DME absent:** no apparent retinal thickening or hard exudates in the posterior pole
- **DME present:** retinal thickening and/or hard exudates within one disc diameter of the foveal center
- **Clinically significant macular edema (CSME):** retinal thickening and/or hard exudates at or within 500 μm of the foveal center, or retinal thickening ≥ one disc area with any part within one disc diameter of the foveal center

Other systemic diseases, such as hypertension and diabetes complications (neuropathy, nephropathy), were recorded.

Data were analyzed with Microsoft Excel and Statistical Package for the Social Sciences version 17. Descriptive statistical methods were used to delineate the basic characteristics of the study population: numbers and percentages were reported for each variable. Results were expressed as mean ± SD, and a P value less than 0.05 was considered to indicate statistical significance. For the categorical variables, we used the χ^2 test.

Results

A total of 195 patients diagnosed with diabetes mellitus were enrolled in this study. The mean age of the participants was 54.7±10.17 years. The gender distribution revealed male predominance, with 103 (52.82%) male patients and 92 (47.18%) females. Out of 195 patients, 94 (48.20%) had secondary education, 38 (19.49%) had higher education, 37 (18.98%) had primary education, 24 (12.31%) had higher secondary education, and only 2 (1.02%) were illiterate.

Table 1: Age Distribution (n=195)

Age in years	n(%)
< 40	11(5.64)
40-49	44(22.57)
50-59	96(49.23)
60-69	27(13.85)
≥70	17(8.71)

In terms of family history, 112 (57.43%) patients reported no family history, while 83 (42.57%) had a positive family history of diabetes mellitus. The majority of patients, 128 (65.64%) reported no prior fundus examination for DR, whereas 67 (34.36%) had undergone at least one prior fundus evaluation. The duration of diabetes was less than 5 years in 89 (45.64%), between 5 and 10 years in 62 (31.80%), and more than 10 years in 44 (22.56%) of the total patients. DR prevalence increased with longer diabetes duration. Distribution of DR cases across duration groups showed 4 (4.50%) of 89 patients in the <5 year group, 7 (11.30%) of 62 in the 5-10 year group, and 7 (15.90%) of 44 in the >10 year group. Patients with more than ten years of diabetes had significantly higher odds of DR compared with those with less than five years (OR: 4.02; 95% CI: 1.11-14.60; p=0.04). Comparison between 5-10 years and <5 years revealed higher but non-significant odds (OR: 2.70; 95% CI: 0.75-9.65; p=0.17).

Hypertension was present in 77 (39.48%) patients, while 118 (60.52%) reported no such comorbidity. Among them, 10 (12.98%) of 77 had DR compared with 8 (6.77%) of 118 without hypertension. The association between hypertension and DR was not statistically significant (OR: 2.05; 95% CI: 0.76-5.52; p= 0.19). In terms of diabetes-related complications, 3 (1.53%) participants had diabetic nephropathy, of whom 2 (66.66%) had DR. DR was significantly associated with nephropathy (OR: 22.0; 95% CI: 1.89-255.8; p=0.01). Only 2 (1.02%) participants had neuropathy, with DR observed in 1 (0.51%) case; this association was not statistically significant (OR: 10.35; 95% CI: 0.60-179.9; p=0.21).

DR was identified in 18 (9.23%) of the 195 patients, while 177 (90.77%) had no signs of DR (Table 2). CSME was observed in 1 (0.51%).

Table 2: Type of Diabetic Retinopathy (n=18)

Type of Diabetic Retinopathy	n (%)
Proliferative Diabetic Retinopathy	1 (5.56)
Non-Proliferative Diabetic Retinopathy	17 (94.44)
• Mild NPDR	11 (61.11)
• Moderate NPDR	5 (27.77)
• Severe NPDR	1 (5.56)

Discussion

In this study, conducted at a tertiary care hospital in Nepal, the prevalence of DR among patients with diabetes mellitus was found to be 9.23%, with NPDR (8.71%) being more common than PDR (0.51%). Additionally, CSME was detected in 0.51% of patients. These findings are somewhat lower than the DR prevalence reported in prior studies in Nepal, such as Bhatta et al., who found a prevalence of 13.2% in the Far-Western Province of Nepal.[3] The variation may be due to differences in regional healthcare access, diabetes control, and screening programs.

Globally, the prevalence of DR varies, with a comprehensive meta-analysis by Yau et al. reporting an overall DR prevalence of 34.60%.[2] In the United States, the prevalence of DR was reported to be 28.50% between 2005 and 2008, reflecting the high burden even in developed healthcare systems.[8] However, this higher figure likely reflects the inclusion of both type 1 and type 2 diabetes and varied population characteristics. Our findings are also lower than the global diabetes projections published by the International Diabetes Federation, which indicate rising diabetes and DR burden, especially in low- and middle-income countries.[1]

Our findings support the established association between diabetes duration and DR, with most cases occurring in patients with diabetes for more than five years, consistent with the Wisconsin Epidemiologic Study and other epidemiologic reports.[4,9] Patients with >10 years of diabetes had significantly higher odds of DR compared with those with <5 years (OR: 4.02; 95% CI: 1.11-14.60; p=0.04). This supports the biological model in which prolonged hyperglycemia produces cumulative microvascular retinal injury, facilitating progression from mild and moderate NPDR toward severe NPDR and ultimately PDR.

Although 39.48% of participants had hypertension, its prevalence was higher among those with DR, highlighting its role as a modifiable risk factor, but the association was not statistically significant (OR: 2.05; 95% CI: 0.76-5.52; p=0.19), reaffirming its role as an important modifiable risk factor in DR

development.[5,10]

While only a small number of participants had nephropathy or neuropathy, literature indicates that such microvascular complications often coexist, reflecting more advanced systemic involvement. DR was strongly and significantly associated with diabetic nephropathy (OR: 22.0; 95% CI: 1.89-255.8; p= 0.01), suggesting that retinal disease mirrors more advanced systemic microvascular involvement. Neuropathy showed higher but non-significant odds (OR: 10.35; 95% CI: 0.60-179.9; p= 0.21). Existing literature shows that systemic microvascular complications tend to co-occur, indicating more advanced systemic disease.[11]

Notably, 65.64% of patients had no previous fundus examination, a trend commonly observed in resource-limited settings. For instance, Singh et al. from North India reported poor awareness and low screening rates among diabetic patients.[4] Additionally, systematic reviews in low- and middle-income countries reveal that barriers such as cost, lack of knowledge, and inadequate access to ophthalmic services continue to hinder early DR detection.[12]

The 0.51% prevalence of CSME may be underestimated, as early macular changes can be missed without OCT evaluation.[13] This may have resulted in an underestimation of macular involvement in our study.

Our study has some limitations. This was a single-center study with a relatively small sample size and a lack of investigator blinding, which may limit the generalizability of the findings. With the rising global diabetes burden projected to affect over 850 million people by 2050, the incidence of DR is expected to rise proportionally.[8] Thus, the need for structured, periodic retinal screening, public awareness, and integration of eye care into diabetic care protocols is more important than ever, especially in Nepal.

Conclusions

Diabetic retinopathy continues to be a major complication among diabetic patients in Nepal, with many cases identified late due to inadequate prior eye screening. In our study, DR was significantly associated with longer diabetes duration and nephropathy, whereas hypertension and neuropathy showed no significant association. Regular screening and timely intervention remain essential to prevent vision loss.

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Conflict of Interest: None

Authors' Contribution and ORCID iDs

Dr. Sundip Dware Chhetri: concept, design, intellectual content, literature search, clinical studies, data acquisition, data analysis, statistical analysis, manuscript preparation, manuscript editing, manuscript review.

: https://orcid.org/0009-0003-7344-0576

Dr. Meena Kunwar: design, intellectual content, clinical studies, data analysis, manuscript editing, manuscript review.

: https://orcid.org/0009-0007-2990-2744

Dr. Ashish Thapa: concept, design, intellectual content, clinical studies, data analysis, manuscript editing, manuscript review.

: https://orcid.org/0000-0002-5944-4517

Dr. Apurba Shrestha: data acquisition, manuscript editing, manuscript review.

: https://orcid.org/0009-0002-6990-625X

Dr. Dayanand Prasad Sah: data acquisition, manuscript editing, manuscript review.

: https://orcid.org/0009-0000-4094-4979

Dr. Kriti Lamichhane: data analysis, manuscript preparation, manuscript editing, manuscript review.

: https://orcid.org/0009-0006-2870-1644

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Bios

Dr. Sundip Dware Chhetri is a Consultant Ophthalmologist at Nepal APF Hospital, Kathmandu, Nepal. He completed his MD in Ophthalmology from the Tilganga Institute of Ophthalmology. His clinical and research interests include ocular trauma, retinal pathology, and outcome-based research.

Email: milandcpkr@gmail.com

Dr. Meena Kunwar is a Consultant Ophthalmologist and Medical Retina and Uvea Specialist at Nepal APF Hospital, Kathmandu, Nepal. She is currently serving as the Deputy Director of Nepal APF Hospital. Her clinical and research interests include uveitis and ocular immunology, as well as retinal pathology.

Email: drmeenakunwar@gmail.com

Dr. Ashish Thapa is a Consultant General Practitioner and Emergency Physician at Nepal APF Hospital. He is currently serving as the Head of the General Practice and Emergency Medicine Department. His clinical and research interests include clinical research, emergency and trauma care and diabetes care.

Email: docashishthapa@gmail.com

Dr. Apurba Shrestha is an Assistant Professor of Internal Medicine and serves as a Consultant Internist at Nepal APF Hospital. He is currently pursuing a Fellowship in Endocrinology and Metabolism at Sir Ganga Ram Hospital, New Delhi, India. In addition to diabetes mellitus and thyroid disorders, his clinical interests include the management of bone mineral density disorders and obesity.

Email: shresthaapurba@gmail.com

Dr. Dayanand Prasad Sah is currently a DM Endocrinology resident at Chitwan Medical College, Bharatpur, Nepal. He has a strong clinical and academic interest in diabetes mellitus, thyroid disorders, metabolic disorders, and clinical research.

Email: dayanandsahdps@gmail.com

Dr. Kriti Lamichhane is working as a House Officer in the Department of Surgical Oncology at Bhaktapur Cancer Hospital. She graduated with an MBBS degree from the Patan Academy of Health Sciences. She has a keen interest in medical oncology, neurology, and clinical research.

Email: kritilamichhane111@gmail.com