

Prevalence of Diabetic Retinopathy Among Diabetic Patients At Ophthalmology Department of Combined Military Hospital, Sialkot

Muhammad Asif Sadiq, Mariyum Munir Khokhar

Department of Ophthalmology, Combined Military Hospital Sialkot/National University of Medical Sciences (NUMS) Pakistan

ABSTRACT

Objective: To determine the frequency of diabetic retinopathy among diabetic patients presenting to the Eye Department of Combined Military Hospital, Sialkot.

Study Design: Cross-sectional study.

Place and Duration of Study: Department of Ophthalmology, Combined Military Hospital Sialkot, Pakistan from Sep 2021 to Jan 2023.

Methodology: A total of 500 patients aged 20 to 70 years, with a known diagnosis of diabetes mellitus and undergoing anti-diabetic treatment, were enrolled. Fundus examination was performed on all participants to detect and grade diabetic retinopathy (DR), using International DR severity scale. Statistical analysis was carried out using SPSS version 20. The Chi-square test was applied to assess associations between the presence of DR and various demographic variables.

Results: Out of 500 diabetic patients, 297(59.4%) were male and 203(40.6%) females, with a mean age of 56.40±2.75 years. Diabetic retinopathy (DR) was present in 138 patients (27.6%). Among these, 120(24.0%) had non-proliferative DR: mild in 98(19.6%), moderate in 13(2.6%), and severe in 9(1.8%). Proliferative DR and advanced diabetic eye disease were observed in 12(2.4%) and 6(1.2%) patients, respectively. DR was significantly more prevalent among females ($p < 0.001$), with no significant association with age ($p = 0.525$).

Conclusion: The frequency of diabetic retinopathy in diabetic population was found to be high, which highlights the need for screening programs, to prevent vision-threatening complications.

Keywords: Diabetes, Fundus, Retinopathy.

How to Cite This Article: Sadiq MA, Khokhar MM. Prevalence of Diabetic Retinopathy Among Diabetic Patients At Ophthalmology Department of Combined Military Hospital, Sialkot. *Pak Armed Forces Med J* 2025; 76(Suppl-2): S425-S429.

DOI: <https://doi.org/10.51253/pafmj.v76iSUPPL-2.13621>

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Diabetes mellitus is a long-term metabolic condition marked by elevated blood glucose levels due to impaired insulin production, reduced insulin effectiveness, or a combination of both. Insulin is a hormone produced by the pancreas that allows glucose to enter cells for energy production.¹ There are three main types of diabetes: Type 1, Type 2, and Gestational diabetes, each with distinct causes and pathophysiology.²

Type 1 diabetes (T1DM) is an autoimmune or idiopathic condition in which the immune system attacks insulin-producing beta cells in the pancreas. It typically develops in childhood or adolescence. Type 2 diabetes (T2DM) is the most common form and is often associated with obesity, physical inactivity and aging. It involves insulin resistance combined with relative insulin deficiency. Gestational diabetes occurs during pregnancy and usually resolves after childbirth

but significantly increases the risk of developing type 2 diabetes later in life.³⁻⁴

The long-term consequences of diabetes are associated with significant morbidity and mortality, primarily due to its microvascular and macrovascular complications. Among the microvascular complications, diabetic retinopathy (DR) is one of the most prevalent and vision-threatening conditions. DR is a progressive retinal disorder caused by damage to the small blood vessels of the retina due to prolonged hyperglycemia. It is estimated that over one-third of individuals with diabetes have some degree of retinopathy, making it the leading cause of preventable blindness among the working-age population worldwide.⁵

DR typically progresses through various stages, categorized by severity: non-proliferative diabetic retinopathy (NPDR), which includes mild, moderate and severe stages; proliferative diabetic retinopathy (PDR); and diabetic macular edema (DME).⁶

In South-East Asia, the prevalence of diabetes is rising steadily, with Pakistan facing particularly

Correspondence: Dr Muhammad Asif Sadiq, Department of Ophthalmology, Combined Military Hospital Sialkot Pakistan

Received: 06 Jul 2025; revision received: 21 Aug 2025; accepted: 22 Aug 2025

alarming figures. This represents a serious threat to the health of the working population and poses a significant burden on the country's healthcare system. According to the International Diabetes Federation (IDF) Diabetes Atlas (2021), Pakistan has the highest age-adjusted adult (20–79 years) diabetes prevalence globally at 30.8%.⁷

While developed countries have implemented national programs and extensive surveys to address the growing burden of diabetes and its complications, Pakistan lacks sufficient and standardized data, especially on diabetic retinopathy as well awareness and knowledge about disease and its complications. Most available information comes from hospital-based or regional studies. A recent systematic review by Mumtaz et al. reported a pooled prevalence of DR in Pakistan at 28.78%, with a wide variation ranging from 10.6% to 91.3%.⁸

Additionally, the burden of vision loss due to DR in Pakistan remains underestimated. Accurate diagnosis of DR requires specialized ophthalmic equipment and trained professionals, which are often lacking in rural or community-based settings. The Global Burden of Disease (GBD) 2017 study also acknowledged the limited data from Pakistan, leading to reliance on model-based estimates rather than actual measurements.⁹ This study aimed to update the data of diabetic retinopathy among diabetic patients in Pakistan.

METHODOLOGY

This cross-sectional study was conducted at the Department of Ophthalmology Combined Military Hospital (CMH) Sialkot, Pakistan over a period of 17 months from September 2021 to January 2023. Ethical approval was obtained from the Institutional Review Committee of CMH Sialkot (ERC Reference No: ERC/26/2025, dated 04 July 2025). The sample size was calculated using the Open Epi® sample size calculator. Based on an estimated diabetic retinopathy prevalence of 28.78%, derived from a pooled analysis of hospital-based studies in Pakistan.⁸ A 95% confidence level and a 5% margin of error were applied, yielding a minimum required sample size of approximately 317 participants. However, to enhance statistical power, account for potential non-responses, and maintain alignment with similar regional studies, a total of 500 diabetic patients were enrolled.

Inclusion Criteria: Diagnosed diabetic patients (both type 1 and type 2) of either gender, aged between 20 and 70 years, were included in the study.

Exclusion Criteria: Patients with gestational diabetes, those under 20 or over 70 years of age, and individuals with a history of previously treated diabetic retinopathy were excluded.

Participants were either self-reported diabetics or referred by other hospital departments to the Eye Outpatient Department (OPD) for diabetic ocular evaluation. A consecutive sampling technique was employed to ensure the inclusion of all eligible patients during the study period, thereby minimizing selection bias in the hospital-based population.

All patients meeting the inclusion criteria underwent a standardized evaluation process after providing informed consent. A detailed medical history was recorded, followed by systemic assessment and comprehensive ocular examination. This included best-corrected visual acuity (BCVA) measurement using a Snellen chart, anterior segment examination with slit-lamp biomicroscope, and dilated fundus evaluation using a +90 diopter Volk lens to assess retinal complications in both eyes.

Patients diagnosed with diabetic retinopathy were classified according to the International Clinical Diabetic Retinopathy Disease Severity Scale. In this classification, “no retinopathy” indicated the absence of any detectable retinal abnormalities. Mild non-proliferative diabetic retinopathy (NPDR) is defined by the presence of microaneurysms only. Moderate NPDR includes retinal changes more extensive than microaneurysms but not meeting the criteria for severe NPDR. Severe NPDR is characterized by one or more of the following findings:²⁰ or more intraretinal hemorrhages in each of the four quadrants, definite venous beading in two or more quadrants, or prominent intraretinal microvascular abnormalities (IRMA) in at least one quadrant, in the absence of neovascularization. Proliferative diabetic retinopathy (PDR) is defined by the presence of retinal neovascularization or vitreous/preretinal hemorrhage. Patients presenting with features of Advanced diabetic eye disease (ADED), such as tractional retinal detachment were categorized separately and referred to the vitreoretinal department for further surgical evaluation and management.

There were no missing data related to the primary variables analyzed. All enrolled patients completed the full ophthalmologic evaluation and complete datasets were available for statistical analysis. The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS),

version.²⁰ The mean and standard deviation (mean±SD) were calculated for the continuous variable (age), while frequencies and percentages were reported for categorical variables such as age groups and gender. Associations between diabetic retinopathy and demographic variables (age group and gender), as well as the relationship between DR severity and gender, were examined by chi square test. A *p*-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 500 diabetic patients were enrolled and examined over a period of seventeen months, from 1st September 2021 to 31st January 2023. All participants were known diabetics receiving anti-diabetic treatment. Of these, 297(59.4%) were males and 203(40.6%) were females, yielding a male-to-female ratio of 1.46:1 (Table-I).

The mean age of participants was 56.40±2.75 years, with the majority 417(83.4%) belonging to the 51-70 years age group (Table-I).

Table-I: Gender and Age Distribution of Patients (n=500)

Variable(s)	Category	Number of Patients n(%)
Gender	Male	297(59.4%)
	Female	203(40.6%)
Age Group	20-35 years	07(1.4%)
	36-50 years	75(15%)
	51-70 years	417(83.4%)
	Total	500(100%)

Out of the total sample, 138 patients (27.6%) were diagnosed with diabetic retinopathy (DR). The highest prevalence of DR was found in the 51-70 years age group (86.2%), followed by the 36-50 years group (13%) (Table- II). However, there was no notable difference in DR prevalence across age groups.

Table- II: Comparison of Frequency of Diabetic Retinopathy by Age Group and Gender among Study Participants (n = 500)

Parameter(s)	Study Groups		<i>p</i> -value
	Group-A (DR present) (n=138)	Group-B (No DR) (n=362)	
Age Group n(%)			0.525
20-35 years	1(0.7%)	6(1.7%)	
36-50 years	18(13.0%)	57(15.7%)	
51-70 years	119(86.2%)	298(82.3%)	
Gender n(%)			0.001
Male	51(37.0%)	246(67.9%)	
Female	87(63.0%)	116(32.1%)	

DR: Diabetic Retinopathy

Among those diagnosed with DR, the most common form was mild non-proliferative diabetic

retinopathy (NPDR), observed in 98 patients (19.6%), followed by moderate NPDR 13(2.6%), proliferative diabetic retinopathy (PDR) 12(2.4%), severe NPDR 9(1.8%), and advanced diabetic eye disease 6(1.2%) (Table-III). The distribution of DR severity did not vary considerably between males and females. However, diabetic retinopathy (DR) was found to be more prevalent among females 87(63.0%) compared to males 51(37.0%) (Table-II), suggesting significance gender differences in prevalence.

DISCUSSION

This study highlights a considerable prevalence of diabetic retinopathy (27.6%) among diabetic patients, with a significantly higher burden observed in females. Globally, approximately 10.5% of the adult population is living with diabetes, the majority of whom have type 2 diabetes mellitus.¹⁰ A national survey in 2018 by Aamir *et al.* highlighted the growing prevalence of diabetes in Pakistan ¹¹. The Second National Diabetes Survey of Pakistan (NDSP, 2016-2017) further reported that generalized obesity affected 57.9% of the population (42% in males, 58% in females), while central obesity was present in 73.1% (37.3% males, 62.7% females) based on WHO Asia-Pacific criteria.¹²

DR is one of the leading causes of preventable blindness and is categorized into non-proliferative (NPDR) and proliferative stages (PDR), with advanced stages such as diabetic macular edema (DME) posing significant threats to vision.¹³ A pooled analysis by Yau *et al.* of population-based studies conducted between 1980 and 2008 estimated the global prevalence of DR at 34.6%.¹⁴ A more recent meta-analysis by Teo *et al.* projected the number of people with DR to rise from 103 million in 2020 to over 160 million by 2045.¹⁵ In low- and middle-income countries like Pakistan, the diabetes epidemic is escalating at an alarming rate. According to the International Diabetes Federation (IDF), the prevalence of diabetes in Pakistan rose from 17.1% in 2019 to 26.7% in 2022, with approximately 33 million people currently affected.¹⁶

Our study revealed a DR prevalence of 27.6%, consistent with national studies such as those by Memmon *et al.* ¹⁷, and Jokhio *et al.*¹⁸, which reported DR prevalence ranging between 24.7% and 28.78%. A Sri Lankan study published in *BMC Ophthalmology* in 2014 also reported a similar prevalence of 27.4%.¹⁹ The current study was conducted in an urban setting (Sialkot), which may explain the slightly higher

Table- III: Prevalence of Diabetic Retinopathy according to Severity (n=500)

Gender	Mild NPDR	Moderate NPDR	Severe NPDR	Proliferative DR	AEDED	Total with DR n(%)	p-value
Male	30(6.0%)	8(1.6%)	5(1.0%)	4(0.8%)	4(0.8%)	51(10.2%)	0.067
Female	68(13.6%)	5(1.0%)	4(0.8%)	8(1.6%)	2(0.4%)	87(17.4%)	
Total	98 (19.6%)	13 (2.6%)	9 (1.8%)	12 (2.4%)	6 (1.2%)	138(27.6%)	

NPDR: Non-proliferative diabetic retinopathy

PDR: Proliferative diabetic retinopathy

AEDED: Advanced diabetic eye disease

prevalence compared to rural-based surveys, such as those indicating lower DR rates in rural Pakistan (1.6%) versus urban areas (15.1%).²⁰ Similar urban-rural disparities were also observed in India.²¹

Gender-specific findings from our study showed that DR was significantly more prevalent among female patients (42.85%) compared to males (17.17%). This aligns with findings from studies conducted by Sharif SN *et al.*²², which also observed a female predominance. Possible contributing factors may include differences in healthcare-seeking behavior, hormonal influences and access to preventive services, though further research is needed to confirm these associations.

While this study provides valuable insight into the prevalence of diabetic retinopathy (DR) in an urban Pakistani population, several limitations must be acknowledged. As a hospital-based study conducted at a military tertiary care facility, there is a potential for selection bias, since the patient population may differ from the general population in terms of health-seeking behavior, socioeconomic status and access to care. This may restrict the applicability of the findings to the wider community context. The confounding factors such as duration of diabetes, glycemic control (HbA1c), hypertension, and co-morbid conditions were not controlled for, which may have influenced the observed associations, particularly the higher prevalence in female patients.

Public education on early symptoms of DR (e.g., blurred vision, floaters), the importance of glycemic control, and regular ophthalmologic evaluations is crucial.²³ Leveraging digital media platforms and community outreach programs can significantly enhance awareness. Special attention should be given to high-risk populations, such as those with longstanding or poorly controlled diabetes.²⁴

CONCLUSION

This study highlights a considerable frequency of diabetic retinopathy (27.6%) among diabetic patients, with a significantly higher burden observed in females. These findings suggest the need to explore gender-based

disparities in risk factors, disease progression, and healthcare access. The results underscore the urgent necessity for widespread screening initiatives, especially in high-risk groups, and timely ophthalmologic evaluation to prevent vision-threatening complications.

Conflict of Interest: None.

Funding Source: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

MAS & MMK: Data acquisition, data analysis, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

- Bastaki S. Diabetes mellitus and its treatment. *Int J Diabetes Metab* 2019; 13: 111-134. <https://doi.org/10.1159/000497580>.
- Yang Z, Tan TE, Shao Y, Wong TY, Li X. Classification of diabetic retinopathy: Past, present and future. *Front Endocrinol* 2022; 13: 1079217. <https://doi.org/10.3389/fendo.2022.1079217>
- Rother KI. Diabetes treatment—bridging the divide. *N Engl J Med* 2007; 356(15): 1499. <https://doi.org/10.1056/NEJMp078030>.
- Ansari P, Tabassum N, Siam NH, Nuren N, Pandru P. Diabetic retinopathy: an overview on mechanism, pathophysiology and pharmacotherapy. *Diabetology* 2022; 3: 159-175. <https://doi.org/10.3390/diabetology3010011>.
- Lu Y, Wang W, Liu J, Xie M, Liu Q, Li S. Vascular complications of diabetes: A narrative review. *Medicine* 2023; 102(40): e35285. <https://doi.org/10.1097/MD.00000000000035285>.
- Duh EJ, Sun JK, Stitt AW. Diabetic retinopathy: current understanding, mechanism and treatment strategies. *JCI Insight* 2017; 2(14): e93751. <https://doi.org/10.1172/jci.insight.93751>.
- Bilal M, Shahid M, Mahnoor S, Saeed H, Kumari U. Diabetes mellitus: is Pakistan the epicentre of the next pandemic? *Chronic Dis Transl Med* 2023; 28: 75-77. <https://doi.org/10.1002/cdt3.96>.
- Mumtaz SN, Fahim MF, Arslan M, Shaikh SA, Kazi U, Memon MS. Prevalence of diabetic retinopathy in Pakistan: a systematic review. *Pak J Med Sci* 2018; 34(2): 493-500. <https://doi.org/10.12669/pjms.342.13819>.
- Hassan B, Ahmed R, Li B, Noor A, Hassan ZU. A comprehensive study capturing vision loss burden in Pakistan (1990-2025): findings from the Global Burden of Disease (GBD) 2017 study. *PLoS One* 2019; 14(5): e0216492. <https://doi.org/10.1371/journal.pone.0216492>.

10. Sun H, Saeedi P, Karuranga S, Pinkepank M, Ogurtsova K, Duncan BB, et al. Global, regional and country-level diabetes prevalence estimates for 2021 and projections for 2045. *Diabetes Res Clin Pract* 2022; 183: 109-119. <https://doi.org/10.1016/j.diabres.2021.109119>.
11. Aamir AH, Ul-Haq Z, Mahar SA, Qureshi FM, Ahmad I, Jawa A, et al. Diabetes Prevalence Survey of Pakistan (DPS-PAK): prevalence of type 2 diabetes mellitus and prediabetes using HbA1c: a population-based survey from Pakistan. *BMJ Open* 2019; 9(2): e025300. <https://doi.org/10.1136/bmjopen-2018-025300>.
12. Basit A, Askari S, Zafar J, Riaz M, Fawwad A. NDSP 06: prevalence and risk factors for obesity in urban and rural areas of Pakistan: a study from second National Diabetes Survey of Pakistan (NDSP), 2016–2017. *Obes Res Clin Pract* 2021; 15(1): 19–25. <https://doi.org/10.1016/j.orcp.2020.11.007>
13. Corcóstegui B, Durán S, González-Albarrán MO, Hernández C, Ruiz-Moreno JM, Salvador J, et al. Update on diagnosis and treatment of diabetic retinopathy: a consensus guideline of the working group of ocular health (Spanish Society of Diabetes and Spanish Vitreous and Retina Society). *J Ophthalmol* 2017; 2017: 8234186. <https://doi.org/10.1155/2017/8234186>
14. Yau JWY, Rogers SL, Kawasaki R, Lamoureux EL, Kowalski JW, Bek T, et al. Global prevalence and major risk factors of diabetic retinopathy. *Diabetes Care* 2012; 35(3): 556–564. <https://doi.org/10.2337/dc11-1909>
15. Teo ZL, Tham YC, Yu M, Chee ML, Rim TH, Cheung N, et al. Global prevalence of diabetic retinopathy and projection of burden through 2045: systematic review and meta-analysis. *Ophthalmology* 2021; 128(10): 1580–1591. <https://doi.org/10.1016/j.ophtha.2021.04.027>.
16. Azeem S, Khan U, Liaquat A. The increasing rate of diabetes in Pakistan: a silent killer. *Ann Med Surg* 2022; 79: 103901. <https://doi.org/10.1016/j.amsu.2022.103901>.
17. Memon S, Ahsan S, Riaz Q, Basit A, Sheikh SA, Fawad A, et al. Frequency, severity and risk indicators of retinopathy in patients with diabetes screened by fundus photographs: a study from primary health care. *Pak J Med Sci* 2014; 30(2): 366–372. <https://doi.org/10.12669/pjms.302.4086>
18. Jokhio AH, Talpur KI, Shujaat S, Talpur S, Rafeen B, Memon S. Prevalence of diabetic retinopathy in rural Pakistan: a population-based cross-sectional study. *Indian J Ophthalmol* 2022; 70(6): 4364–4369. https://doi.org/10.4103/ijo.IJO_126_22.
19. Katulanda P, Ranasinghe P, Jayawardena R. Prevalence of retinopathy among adults with self-reported diabetes mellitus: the Sri Lanka diabetes and Cardiovascular Study. *BMC Ophthalmol* 2014; 14: 100. <https://doi.org/10.1186/1471-2415-14-100>.
20. Adnan M, Aasim M. Prevalence of type 2 diabetes mellitus in adult population of Pakistan: a meta-analysis of prospective cross-sectional surveys. *Ann Glob Health* 2020; 86(1): 7. <https://doi.org/10.5334/aogh.2679>.
21. Vashist P, Senjam SS, Gupta NV, et al. Prevalence of diabetic retinopathy in India: results from the national survey 2015–19. *Indian J Ophthalmol* 2021; 69(11): 3087–3089. https://doi.org/10.4103/ijo.IJO_1310_21.
22. Sharif S, Manzoor F, Khan F, Naz S. Prevalence of diabetic retinopathy in diabetic subjects visiting diabetic centers of Lahore, Pakistan. *Pakistan J Health Sci* 2024; 5(2): 1299. <https://doi.org/10.54393/pjhs.v5i02.1299>.
23. Scanlon PH, Aldington SJ, Leal J, Abdalla M, Foy C, Martin K, et al. What have we learned from the English National Screening Programme for diabetic retinopathy? *Diabetes Ther* 2018; 9(2): 837–847. <https://doi.org/10.1007/s00592-017-0974-1>.
24. Alabdulwahhab KM. Diabetic Retinopathy Screening Using Non-Mydriatic Fundus Camera in Primary Health Care Settings - A Multicenter Study from Saudi Arabia. *Int J Gen Med* 2023; 16: 2255-2262. <https://doi.org/10.2147/IJGM.S410197>.