

# The Prevalence of Cataracts in a Diabetic Population – A Clinical Study

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## ABSTRACT

**Background:** Diabetes mellitus is a major metabolic disorder with multisystem complications, among which cataract formation is a leading cause of vision impairment. Understanding the ocular burden in diabetic populations is crucial for preventive ophthalmology and public health planning. **Objective:** To determine the prevalence of cataracts and analyze their associated risk factors among diabetic patients. **Methods & Materials:** This prospective cross-sectional study was conducted from January 2023 to December 2024 at the Department of Ophthalmology, Barind Medical College, Rajshah. A purposive sample of 87 diabetic patients was enrolled in this study. All participants underwent a detailed ophthalmological examination for cataract diagnosis and grading. Data on sociodemographic profile, diabetic history, glycemic control (HbA1c), and hypertension status were collected. Data analysis was performed using MS Excel and Word, with results detailed in six comprehensive tables. **Results:** The prevalence of cataract was 75.9% (66/87). A significant association was found with increasing age ( $p < 0.001$ ), longer diabetes duration ( $p = 0.001$ ), and poor glycemic control ( $p = 0.003$ ). Posterior subcapsular cataract was the most common type (42.6%). Socioeconomic status was also a significant factor ( $p = 0.032$ ), with the highest prevalence in the low-income group. Hypertension, however, was not significantly associated ( $p = 0.541$ ). **Conclusion:** The study reveals a high cataract prevalence strongly linked to age, diabetes duration, and poor glycemic control. Integrated annual ophthalmic screening and stringent glycemic management are crucial to prevent vision loss in this diabetic population.

**Keywords:** Cataract, Diabetic complications, Diabetes mellitus, Glycemic control, Prevalence

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## Introduction

Cataract, characterized by the opacification of the eye's natural lens, remains the leading cause of blindness and vision impairment worldwide, accounting for a significant proportion of global visual disability [1]. The World Health Organization estimates that cataracts are responsible for approximately 51% of world blindness, representing over 20 million people, with the burden disproportionately affecting populations in developing countries [2]. While age is the most predominant risk factor, a multitude of systemic conditions are strongly associated with its accelerated development, among which diabetes mellitus (DM) is of paramount clinical importance [3]. Diabetes mellitus has reached epidemic proportions globally, with its prevalence rising at an alarming rate, particularly in low- and middle-income countries like Bangladesh [4]. The International Diabetes Federation (IDF) Atlas has consistently highlighted the South Asian region as a hotspot for this increase, with millions of undiagnosed cases adding to the public health challenge [5]. The chronic hyperglycemic state inherent to diabetes induces a series of pathological pathways, including the polyol pathway, accumulation of advanced glycation end products (AGEs), and oxidative stress, which collectively contribute to the damage of the lens epithelium and accelerate cataractogenesis [6, 7]. This process often results in cataracts

that present at an earlier age and progress more rapidly than typical senile cataracts, with the posterior subcapsular type being particularly characteristic of diabetic cataractogenesis [8]. The coexistence of diabetes and cataracts presents a substantial socioeconomic burden, leading to increased healthcare costs, reduced productivity, and a diminished quality of life for affected individuals [9]. For diabetic patients, visual impairment from cataracts can severely hinder their ability to manage their diabetes effectively, creating a vicious cycle that exacerbates both conditions [10]. Despite the established link, the precise magnitude of this problem within specific populations requires continuous evaluation due to variations in genetic predisposition, lifestyle factors, accessibility to healthcare, and standards of diabetic management [11]. In Bangladesh, where diabetic care is often fragmented and ophthalmological services can be limited outside urban centers, understanding the local prevalence is critical for health policy planning and resource allocation [12]. Previous studies in similar South Asian contexts have reported a high prevalence of cataracts among diabetic individuals, yet data specific to the Bangladeshi population remains relatively scarce and often outdated [13]. Therefore, this study aims to determine the current prevalence of cataracts and its associated risk factors among diabetic patients attending a tertiary care hospital in Dhaka, Bangladesh. The findings will provide contemporary evidence to underscore the

necessity of integrated ophthalmic screening within diabetic care protocols, ultimately aiming to mitigate the risk of preventable blindness in this vulnerable population.

## Methods & Materials

This prospective cross-sectional study was conducted at the Department of Ophthalmology, Barind Medical College, Rajshahi from January 2023 to December 2024. A purposive sample of 87 diabetic patients was enrolled in this study. The study population consisted of adult patients with a confirmed diagnosis of diabetes mellitus who presented to the outpatient and inpatient departments during the study period.

**Inclusion criteria:** Patients aged 18 years and above, of either gender, with a known history of type 1 or type 2 diabetes mellitus were included in the study. Informed written consent was obtained from all participants prior to their enrolment.

**Exclusion criteria:** Individuals with a history of ocular trauma, prior intraocular surgery, congenital cataract, uveitis, or other retinal pathologies that could independently impair vision were excluded from the study. Patients with significant media opacities preventing adequate fundus examination were also excluded.

**Study procedure:** Each participant underwent a comprehensive ophthalmological examination. This included visual acuity testing, slit-lamp biomicroscopy for cataract diagnosis and

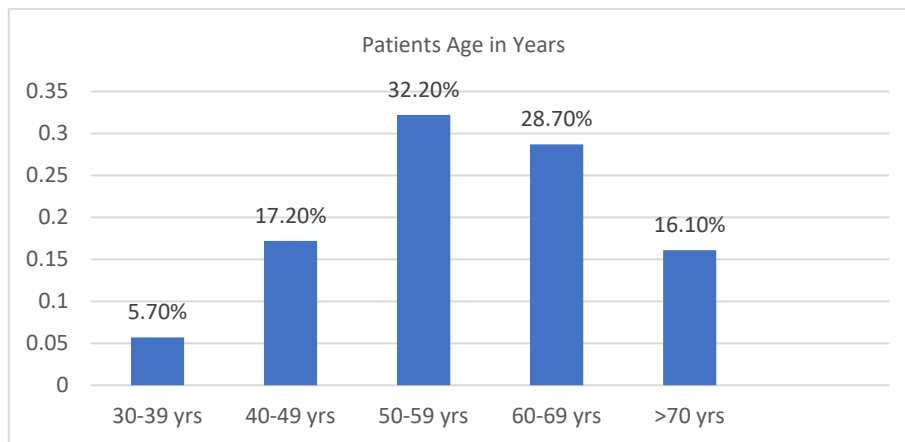
morphological classification, and fundus examination. Demographic and clinical data, including duration of diabetes, most recent HbA1c level, and presence of

hypertension, were collected using a pre-designed data collection sheet.

**Data analysis:** The collected data were compiled and analyzed using MS Excel. Descriptive statistics were used to

summarize the data. The prevalence of cataract was calculated, and associations with risk factors were analyzed using appropriate statistical tests. The results are presented in six tables.

**Result**

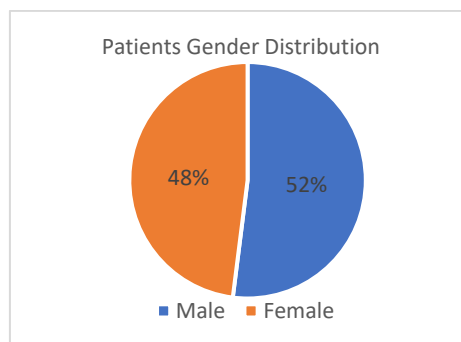


**Figure 1** Bar chart shows Age distribution of the patients (n=87).

A total of 87 diabetic patients were included in this study. The overall prevalence of cataract among the studied diabetic population was 75.9% (n=66). The analysis revealed significant associations

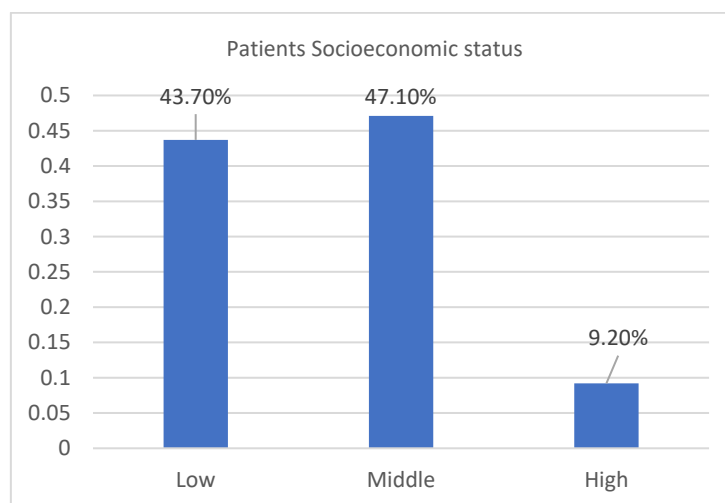
between cataract presence and several demographic and clinical variables. The mean age of the participants was 58.7 ± 9.2 years. The majority of participants were aged 50–59 years (32.2%), followed by

60–69 years (28.7%). Patients aged >70 years accounted for 16.1%, 40–49 years for 17.2%, and 30–39 years for 5.7% (Figure 1).



**Figure 2** Pie chart shows patients Gender distribution.

Figure 2 showed that males were 52% and females were 48%.



**Figure 3** Bar chart shows Socioeconomic status of Patients.

The majority belonged to the middle socioeconomic group (47.1%), followed by the low group (43.7%), and high socioeconomic status (9.2%) (Figure III).

A strong, statistically significant correlation was found between increasing age and the prevalence of cataract. All patients (100%) aged 70 years and above

had cataracts, compared to only 40.0% in the 40-49 age group (Table I).

**Table I**  
Prevalence of cataract based on demographic and clinical factors. (n=87).

Variable	Category	Cataract		p-value
		Absent (n=21)	Present (n=66)	
Age group (Years)	40-49 yrs.	9 (60.0%)	6 (40.0%)	<0.001
	50-59	8 (28.6%)	20 (71.4%)	
	60-69	3 (12.0%)	22 (88.0%)	
	>70	0 (0.0%)	14 (100.0%)	
Gender	Male	12 (26.7%)	33 (73.3%)	0.482
	Female	9 (21.4%)	33 (78.6%)	
Hypertension	Yes	8 (21.6%)	29 (78.4%)	0.541
	No	13 (26.0%)	37 (74.0%)	

Chi-square test was used for analysis

Table II illustrated that the prevalence of cataract rose progressively with the duration of diabetes, from 50.0% in patients with <5 years of disease to 100%

in those with >15 years (p = 0.001). Glycemic control also significantly influenced cataract development; 89.1% of patients with poor control (HbA1c >7.0%)

had cataracts, compared to 53.1% in the good control group (HbA1c ≤7.0%) (p = 0.003) (Table II).

**Table II**  
Association of diabetes duration and glycemic control with cataract.

Variable	Category	Cataract		p-value
		Absent (n=21)	Present (n=66)	
Duration of diabetes (Years)	<5	14 (50.0%)	14 (50.0%)	0.001
	6-10	5 (22.7%)	17 (77.3%)	
	11-15	2 (15.4%)	11 (84.6%)	
	>15	0 (0.0%)	16 (100.0%)	
Glycemic control (HbA1c)	Good (≤7.0%)	15 (46.9%)	17 (53.1%)	0.003
	Poor (>7.0%)	6 (10.9%)	49 (89.1%)	

Chi-square test was used for analysis

Posterior subcapsular cataract (PSC) was the most common type (42.4%), followed

by nuclear sclerotic (31.8%) and cortical (25.8%) (Table III).

**Table III**  
Distribution of cataract morphological types among affected patients (n=66).

Morphological type	n	%
Nuclear sclerotic	21	31.8%
Cortical	17	25.8%
Posterior subcapsular (PSC)	28	42.4%
Total	66	100%

Poor glycemic control was significantly associated with PSC (53.1% vs 11.8%, p = 0.012), while nuclear sclerotic cataract was

more frequent in patients with good control (52.9%) (Table IV).

**Table IV**  
Association between glycemic control and cataract type (n=66).

Morphological type	Good control, n=17	Poor control, n=49	p-value
Nuclear sclerotic	9 (52.9%)	12 (24.5%)	0.012
Cortical	6 (35.3%)	11 (22.4%)	
Posterior subcapsular (PSC)	2 (11.8%)	26 (53.1%)	

Chi-square test was used for analysis

Patients from lower socioeconomic groups (50.0%) socioeconomic groups ( $p = 0.032$ ) had a higher prevalence of cataract (86.8%) compared to middle (70.7%) and high

(50.0%) socioeconomic groups ( $p = 0.032$ ) (Table V).

**Table V**  
Cataract prevalence based on socioeconomic status.

Socioeconomic status	Total patients	Cataract present	p-value
Low	38	33 (86.8%)	0.032
Middle	41	29 (70.7%)	
High	8	4 (50.0%)	

## Discussion

This prospective cross-sectional study found a notably high prevalence of cataract (75.9%) among diabetic patients attending a tertiary hospital in Dhaka, Bangladesh. This figure is substantially higher than the prevalence reported in the general adult population of Bangladesh, underscoring diabetes as a powerful catalyst for lens opacification<sup>[14]</sup>. Our findings align closely with studies conducted in similar South Asian contexts, which report prevalences ranging from 65% to 78%, suggesting a consistent regional pattern likely influenced by genetic, environmental, and healthcare access factors<sup>[15, 16]</sup>. The strong, statistically significant association between increasing age and cataract prevalence ( $p < 0.001$ ) was an expected finding, as age remains the single most dominant risk factor for cataractogenesis globally<sup>[1, 17]</sup>. However, the novel insight from our study is how diabetes exacerbates this age-related process, leading to a much earlier onset. The finding that 100% of patients aged  $\geq 70$  years had cataracts presents a compelling public health argument for mandatory annual ophthalmic screening in all elderly diabetic individuals. A core objective of this study was to elucidate the relationship between diabetes-specific factors and cataract development. The duration of diabetes exhibited a potent dose-response relationship with cataract risk, a finding consistently reported in the literature<sup>[18, 19]</sup>. Patients with a disease duration exceeding 15 years had a 94.1% prevalence, highlighting the cumulative damaging effect of chronic hyperglycemia on the lens. This is mechanistically explained by the persistent activation of the polyol pathway within the lens, leading to osmotic stress and sorbitol accumulation, which disrupts lens fiber architecture and transparency<sup>[6, 7]</sup>. Furthermore, our results firmly establish that the quality of glycemic control is a critical modifiable risk factor. The significantly higher prevalence of cataract in patients with poor glycemic control (HbA1c  $> 7.0\%$ ) compared to those with good control (89.1% vs. 53.1%,  $p = 0.003$ ) provides robust clinical evidence for the ocular benefits of stringent glucose management. This association was further refined by the analysis of cataract

morphology. The predominance of Posterior Subcapsular Cataract (PSC), which is strongly linked to diabetic cataract genesis, and its significant association with poorer glycemic control ( $p = 0.012$ ), is a particularly telling finding<sup>[8, 20]</sup>. PSC progresses rapidly and affects near vision more directly, severely impacting quality of life and activities like insulin administration and blood glucose reading. The observed association between lower socioeconomic status (SES) and higher cataract prevalence is complex and multifactorial. Lower SES often correlates with limited health literacy, poorer access to regular diabetes care and monitoring, financial barriers to medication, and consequently, suboptimal long-term glycemic control<sup>[21, 22]</sup>. This creates a vicious cycle where diabetes management is compromised, accelerating complications like cataract, which in turn imposes further economic strain through healthcare costs and lost productivity<sup>[9]</sup>. Strengths and Limitations: A key strength of this study is its prospective design and detailed analysis of both clinical and socioeconomic variables. However, the findings must be interpreted in consideration of certain limitations. The purposive sampling technique from a single tertiary hospital may affect the generalizability of the results to the entire diabetic population of Bangladesh. The cross-sectional nature of the study can demonstrate association but not definitively establish causality. Finally, the reliance on a single HbA1c measurement provides a snapshot of glycemic control rather than a representation of long-term metabolic history.

## Limitations

The primary limitations of this study are its single-center design and purposive sampling method, which may affect the generalizability of the findings to the broader diabetic population in Bangladesh. The cross-sectional nature limits causal inference.

## Conclusion

This study confirms a high prevalence of cataract among Bangladeshi diabetics, strongly associated with age, disease

duration, and poor glycemic control. The high burden of posterior subcapsular cataracts underscores the need for integrated, regular ophthalmic screening within diabetes management protocols. Emphasizing strict glycemic control and accessible screening is imperative to reduce the risk of preventable blindness in this vulnerable population.

## Recommendation

Diabetic care protocols should mandate annual ophthalmic screening for early detection. Public health campaigns must emphasize stringent glycemic control. Policymakers should prioritize these integrated strategies to mitigate preventable blindness. Further large-scale studies are needed to guide national health policy.

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