

# A Cross-Sectional Study on Prevalence of Diabetic Retinopathy and Its Associated Factor among Diabetic Patients

Salal Khan<sup>1</sup>, Tara Rani<sup>2</sup>, Sana Falak<sup>3</sup>, Labishetty Sai Charan<sup>4</sup>

<sup>1</sup>M. Optometry Scholar, Department of Optometry, Galgotias University, Greater Noida, U.P (India).

<sup>2</sup>Assistant Professor, Department of Optometry, Galgotias University, Greater Noida, U.P (India).

<sup>3</sup>M. Optometry Intern, Goyal Eye Institute, New Delhi (India).

<sup>4</sup>Assistant Professor, Department of Optometry, Chandigarh University, Punjab (India).

Corresponding Author: Salal Khan

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## ABSTRACT

**Aim/Purpose:** The purpose of this study is to assess the prevalence of diabetic retinopathy and its associated factors among diabetic patients at Goyal Eye Institute, New Delhi.

**Methodology:** A cross-sectional descriptive study was conducted among diabetic patients. A total of 345 (mean age: 47±2.53 years) participants- male=192 & female=153, were enrolled in this study. They were selected through systematic sampling procedure. Explanatory data were extracted from medical records and interviews. Blood pressure (BP), Blood sugar, weight, height, and visual acuity and refraction tests were assessed. Retinal examination was performed with a Forus (3nethra) fundus camera. All the collected data was processed and analysed by Chi-square test in SPSS version 21.

**Results:** It was found that out of 345 subjects, 86 (24.9%) had Diabetic retinopathy (DR). Among the diabetic retinopathy patients, 68.4% had the pre-proliferative type. Five in ten (46.3%) of the patients had visual acuity problems and showing DR symptoms. Poor glycemic control (95% CI 1.46–2.41), > 10 years' diabetes duration (95% CI 1.68–3.64), >20 years' diabetes duration (95% CI 1.88–2.72), body-mass index >25 kg/m<sup>2</sup> (95% CI 1.32–3.54), and hypertension (95% CI 1.44–2.62), smoking (95% CI 1.93–2.58) were factors significantly associated with diabetic retinopathy. All factors mentioned were found to be statistically significant (p<0.05) with the Pearson Chi-square in SPSS version 21.

**Conclusion:** This study shows about a-fifth of diabetic patients had diabetic retinopathy. Risk factors of Diabetic retinopathy were significantly associated with poor glycemic control, hypertension, body-mass index (obesity), and duration or onset of illness. Routine blood sugar assessment as well as eye examination and early control of those associated factors may be important in reducing both the prevalence and impact of diabetic retinopathy.

**Keywords:** Eye-care services, Diabetic retinopathy, Avoidable blindness, Diabetes mellitus

## INTRODUCTION

Diabetic retinopathy (DR) is a well-known sight-threatening due to microvascular complication of diabetes mellitus (DM).<sup>1-3</sup> It is characterized by varying degrees of signs like microaneurysm, hemorrhage, soft exudates, hard exudates, venous changes, cotton-wool spots, and new vessel formation

involved in the peripheral retina and macula, or both.<sup>4-7</sup>

Globally, approximately 95 million (35.4%) diabetic patients have DR, of which a third have vision-threatening DR and 7.6% macular edema.<sup>8,9</sup> Global annual incidence of DR is 2.2%-12.7% and progression 3.4%-12.3-%. Progression to proliferative

DR is higher in individuals with mild disease than those with no disease at baseline.<sup>10</sup>

The International Diabetes Federation (IDF) estimated the global population with diabetes mellitus (DM) to be 463 million in 2019 and projected it to be 700 million by 2045.<sup>11</sup> As the most common and specific complication of DM,<sup>12</sup> diabetic retinopathy (DR) also is one of the leading causes of preventable blindness in the adult working population.<sup>13-16</sup>

The Global Burden of Disease Study found that in adults 50 years of age and older, DR was the fifth leading cause of blindness and of moderate and severe vision impairment.<sup>17</sup>

## METHODOLOGY

**Research design-** This study was a cross-sectional survey based study among diabetic patients. The study included all the diabetic patients who agreed to participate in this study. The study was conducted at Goyal Eye Institute, New Delhi.

**Time frame-** It was conducted between March to June month of 2022.

**Sample size-** It was included 345 participants including all the diabetic participants.

**Sampling procedure-** This study was included systematic sampling procedure to collect data. Explanatory data were extracted from medical records and interviews. Blood pressure (BP), Blood sugar, weight, height, and visual acuity and refraction tests were assessed. Retinal examination was performed with a Forus (3nethra) fundus camera.

**Inclusion criteria-** It was included only diabetic patients who agreed to participate in this study.

**Exclusion criteria-** It was excluded non diabetic patients, and who not agreed to participate in this study.

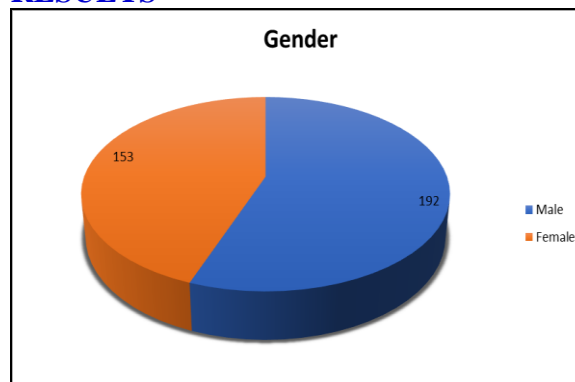
**Data Analysis-** Data were captured and analysed with the Statistical Programme of Social Sciences (SPSS) version 21. Descriptive statistics were used to analyse values such as frequencies, mean, standard deviation, cross tabulation and percentage of

collected data. Chi-square test were used to analyse association between relevant variables. A p-value of <0.05 was considered statistically significant.

**Table 1: Demographic data diabetic participants (N=345).**

Characteristics	Rural	
	N=345	Percentage (%)
Age		
35-40	54	15.7
41-45	59	17.1
46-50	108	31.3
51-55	68	19.7
56-60	56	16.2
Gender		
Male	192	55.7
Female	153	44.3
Literacy		
Literate	196	56.8
Illiterate	149	43.2
Family history of Diabetes mellitus		
Yes	86	24.9
No	259	75.1

## RESULTS



**Figure 1: Gender distribution**

It was found that out of 345 subjects, 86 (24.9%) had Diabetic retinopathy (DR). Among the diabetic retinopathy patients, 68.4% had the pre-proliferative type. Five in ten (46.3%) of the patients had visual acuity problems and showing DR symptoms. Poor glycemic control (95% CI 1.46–2.41), >10 years' diabetes duration (95% CI 1.68–3.64), >20 years' diabetes duration (95% CI 1.88–2.72), body-mass index >25 kg/m<sup>2</sup> (95% CI 1.32–3.54), and hypertension (95% CI 1.44–2.62), smoking (95% CI 1.93–2.58) were factors significantly associated with diabetic retinopathy.

The commonest symptoms including; Blurred vision (89%), Floaters (8.6%), Fluctuating vision (18.4%), dark or empty area in your vision (34.2%), Vision loss (2.1%). All factors mentioned were found to

be statistically significant ( $p < 0.05$ ) with the Pearson Chi-square test in SPSS version 21.

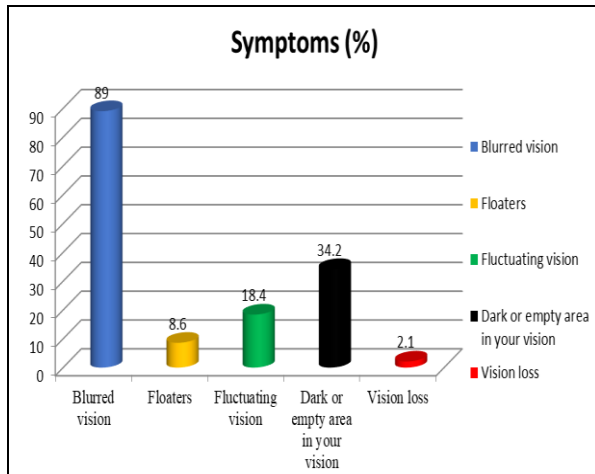


Figure 2: Frequency of DR symptoms.

Table 2: Participants responses on risk factors of diabetic retinopathy.

Risk Factors	Diabetic retinopathy		P-value
	N	%	
Poor glycemic control	108	31.3	<0.05
Body mass index (Obesity)	34	9.9	<0.05
Smoking	32	9.3	<0.05
Heredity	6	1.7	<0.05
Hypertension	53	15.4	<0.05
>10 years duration of DM	44	12.6	<0.05
>20 years duration of DM	68	19.8	<0.05

Table 3: Clinical, behavioral, and diabetes care-related variables of participants (N=345)

Variables	Diabetic retinopathy				Total	
	Yes		No		N	%
	N	%	N	%		
Hypertension						
Yes	45	13.0	32	9.3	77	22.3
No	26	7.5	242	70.1	268	77.7
Smoking						
Yes	68	19.7	42	12.2	110	31.9
No	36	10.4	199	57.7	235	68.1
Glycemic control						
Good	14	4.1	166	48.1	180	52.2
Poor	72	20.9	93	27.0	165	47.8
Duration of DM illness						
<10 years	16	4.6	178	51.6	194	56.2
>10 years	56	16.2	95	27.5	151	43.8
Type of diabetes						
Type-1	16	4.6	132	38.3	148	42.9
Type-2	47	13.6	145	42.0	192	55.7
Both	3	0.9	2	0.6	5	1.4
Chronic heart disease						
Yes	12	3.5	3	0.9	15	4.3
No	53	15.4	277	80.2	330	95.7
Chronic kidney disease						
Yes	4	1.2	3	0.9	7	2.0
No	68	19.7	270	78.3	338	98.0
Follow-up frequency						
Every 1 months	22	6.4	85	24.6	107	31.0
Every 2 months	28	8.1	63	18.3	91	26.4
Every 3 months	31	9.3	50	14.5	81	23.5
>Every 3 months	35	10.1	31	9.0	66	19.1
Routine DR eye screening						
Yes	36	10.4	45	13.1	81	23.5
No	49	14.2	215	62.3	264	76.5

## DISCUSSION

The findings of the current study showed that one in five (24.9%) DM patients had Diabetic retinopathy. This is consistent with similar studies conducted in Brazil (15%)<sup>18</sup> and India (21.2%)<sup>19</sup> and meta-analyses in

China (18.45%).<sup>20</sup> It is higher than studies conducted in Beijing (8.1%)<sup>21</sup> and Arbannech General Hospital (13%),<sup>22</sup> but lower than studies conducted in Armenia (36.2%),<sup>23</sup> Zimbabwe (28.4%),<sup>24</sup> Khartoum (82.6%),<sup>25</sup> and Jimma, Ethiopia (41.4%).<sup>26</sup>

**Table 4: Discussion**

Present study	Melkamu Telahun et al. <sup>27</sup>
1. Study conducted in New Delhi (India).	1. Study conducted in Northwest Ethiopia.
2. Cross-sectional survey based study (March-June 2022).	2. Cross-sectional survey based study (2019).
3. It was included 345 participants.	3. It was included 302 participants.
4. In this study out of 345, 86 (24.9%) had diabetic retinopathy.	4. In this study out of 302, 57 (18.9%) had diabetic retinopathy.
5. However it was indicated Five in ten (46.3%) of the patients had visual acuity problems and showing DR symptoms. Poor glycemic control (95% CI 1.46–2.41), > 10 years' diabetes duration (95% CI 1.68–3.64), >20 years' diabetes duration (95% CI 1.88–2.72), body-mass index >25 kg/m <sup>2</sup> (95% CI 1.32–3.54), and hypertension (95% CI 1.44–2.62), smoking (95% CI 1.93–2.58) were factors significantly associated with diabetic retinopathy.	5. It was indicated Four in ten (37.7%) of the patients had visual acuity problems. Poor glycemic control (AOR 4.58, 95% CI 1.86–11.31), > 10 years' diabetes duration (AOR 3.91, 95% CI 1.86–8.23), body-mass index >25 kg/m <sup>2</sup> (AOR 3.74, 95% CI 1.83–7.66), and hypertension (AOR 3.39, 95% CI 1.64–7.02) were factors significantly associated with diabetic retinopathy.
6. Data analysis was performed using Chi square test by SPSS version 21.	6. Data analysis was performed using Chi square test by SPSS version 20.
7. A 'p' value of < 0.05 was considered as significant.	7. A 'p' value of < 0.05 was considered as significant.

## CONCLUSION

This current study showed that prevalence of Diabetic retinopathy was 24.9%. Three quarters (75.4%) of DR patients had non-proliferative DR and a quarter (24.6%) proliferative DR. Poor glycemic control, hypertension, overweight, body mass index (obesity), and longer DM duration were significantly associated with DR. We recommend that health workers also provide sustainable health information to diabetic patients on possible risk factors of DR (hypertension, overweight/obesity, and poor glycemic control), as these were evidenced in the current study.

It is also recommended for researchers to conduct further similar studies among diabetic patients and consider different methods to spread knowledge and awareness about the diabetes and its complication.

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**Author contributions:** All authors contributed in data collection, analysis and drafting the manuscript, reviewed and edited the manuscript, study design, gathering relevant research papers, conceptualisations, read and approved the final manuscript.

## Declarations

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Conflict of Interest: The Authors declare that they have no conflict of interest.

Ethical Approval: Approved

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