



RESEARCH PAPER

Prevalence and awareness of diabetes and risk factors for developing diabetic retinopathy: a cross-sectional study

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Dutta N*

Address for correspondence:

*Associate Professor
Royal School of Nursing
The Assam Royal Global University,
Betkuchi, Guwahati- 35,
Email:duttanabajani@gmail.com
Mobile: +917896183497

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ABSTRACT

Background and aims: This study assessed the prevalence of diabetes, awareness of diabetes and risk factors for developing diabetic retinopathy among patients attending eye OPD (Outpatient Department). Risk factors for the development of diabetic retinopathy are also assessed. **Methods:** Using convenient sampling, a hospital-based cross-sectional pilot study was used among 125 patients. The pre-tested, structured questionnaire was adopted along with some modifications to gather the necessary information on demographic characteristics, the IRDS (Indian Diabetes Risk Score), and awareness questionnaires on DM (Diabetic Mellitus) and DR (Diabetic Retinopathy). **Results:** 125 patients consented to participate and were included in the study. Most participants were aged 51–60, comprising 41 (32.8%) of the total, and 67 (53.6%) were female. The majority, 94 (75.2%), identified as Hindu, and 87 (69.6%) came from nuclear families. A significant portion, 92 (73.6%), were married, while 41 (32.8%) were illiterate. Regarding family income, 57 (45.6%) fell within the Rs 11,837 to Rs 17,755 bracket, and 82 (65.6%) were unemployed. Dietary habits leaned towards non-vegetarian, with 102 (81.6%) participants following such a diet. In terms of diabetes risk, 69 (55.2%) were at moderate risk, and 52 (41.6%) had a known history of diabetes mellitus. Study findings show that risk factors for developing DR are a history of diabetes with a duration of ≤ 5 years and type II Diabetes, physical inactivity, history of cataract surgery, insulin/oral diabetic treatment, tobacco consumption, RBS (Random blood sugar) (101–200mg/dl), level of cholesterol (200–239 mg/dl) and urea level (26–35mg/dl). There is a significant association between awareness and age, marital status, education, family income, knowledge of diabetic eyes, and frequency of eye checkups. There is also a significant association between awareness and gender, religion, type of family, marital status, and education, which was significant at $p < 0.05$. **Conclusion:** A majority of the participants had moderate risk for DM as well as moderate awareness regarding DM. Health education and promotion will also help increase awareness regarding diabetes in the country.

Keywords: Prevalence; awareness; diabetes; risk factors; diabetic retinopathy.

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INTRODUCTION

Diabetes is a heterogeneous group of diseases characterised by a state of chronic

hyperglycemia, resulting from a diversity of aetiologies and environmental and genetic factors. Uncontrolled diabetes leads to

significant macrovascular and microvascular complications. Diabetic Retinopathy (DR) is a well-known microvascular complication of diabetes and the foremost cause of blindness.¹

According to several community-based studies conducted in India, 16.1% and 71.3% of people were aware of diabetic retinopathy (DR) and other associated visual problems.²⁻⁴ This shows that people living in different parts of the country have varying levels of awareness regarding DR. By 2030, that number will increase to 10.2% (578 million); by 2045, it will reach 700 million cases. The prevalence is higher in high-income countries (10.4%) than in low-income countries (4.0%) and in urban regions (10.8%) than in rural areas (7.2%). Of those with diabetes, one in two (50.1%) are unaware that they have the disease.⁵

WHO established the Global Diabetes Compact in April 2021 as a worldwide effort to enhance diabetes care and prevention, emphasising assisting low- and middle-income nations.⁶ There has been an increase in the incidence of diabetes in recent years throughout the world, especially in the Indian subcontinent. This study aims to provide insight into the extent of the disease burden among patients with eye OPD by assessing the risk factors for diabetic retinopathy, patients' awareness of the condition, and the prevalence of diabetes.

MATERIALS AND METHODS

Study design: Patients undergoing outpatient department (OPD) at ESIC Model Hospital Beltola were the subjects of a cross-sectional pilot study conducted in the hospital from December 16, 2022, to February 21, 2023. The data-gathering process was conducted with a code applied to each participant's identity to ensure their anonymity and ethical clearance. Convenient sampling was used to obtain the data, and samples were verbally educated on the goals and procedures of the data collection process. Participants in the study gave their full consent, and the data was collected anonymously.

Eligibility criteria: Individuals who attended the outpatient department (OPD) of the ESIC model hospital in Guwahati, whether or not they had diabetes mellitus (DM), agreed to complete questionnaires using the study's self-reporting technique.

Sample size and sampling technique: Data was collected from patients attending eye OPD at ESIC Model Hospital Beltola using a convenient sampling technique. The intention was to include the maximum number of patients. The sample size was 125 for data collection in the pilot study.

Data collection process: The pre-tested, structured questionnaire was adopted. Data was started by collecting demographic data through the self-reporting method. IDRS to assess the prevalence of risk for diabetes, followed by RBS checking with a glucometer by observation, and clinical and behavioural data assessment to identify various risk factors for developing DR by using a BP apparatus, measuring tape, weighing machine, and a structured awareness questionnaire for DM and DR by the self-reporting and interview technique. The study was conducted after obtaining permission from the Institutional Ethical Committee of Sri Sankardeva Netralaya, Beltola, on 12/01/2019, vide ref no. SSN/IEC/JANUARY/2019/21 dated: 12/01/2019. Informal consent was obtained from the participants before collecting data. The data collection period was from December 16, 2022, to February 21, 2023. The study setting was the Eye OPD of the ESIC model hospital, Guwahati. The data were analysed using the software package SPSS 24.0.

Data quality control and management: The data collection tool was pre-tested for accuracy, completeness, completeness and consistency on 5% of patients attending eye OPD before data collection. The data collection commenced after some modifications were made to the tool based on the pre-test results and content validity. The data with incomplete information provided by the participants was excluded to avoid any errors.

Data processing and analysis: Data were entered and analysed using the statistical software SPSS 24.0 version. Descriptive data were presented in frequencies and percentages.

RESULTS

One hundred twenty-five people (n = 125) participated in the study. The majority, 41(32.8%), were aged 51- 60 years, 67(53.6%) were female, 94(75.2%) were Hindu, 87(69.6%) were in a nuclear family,

92(73.6 %) were married, 41(32.8%) were illiterate, 57(45.6%) had an income of Rs 11837-17755 per month, 82(65.6%) were unemployed, 102(81.6%) were non-vegetarian, 63(50.4%) had knowledge regarding diabetic eye disease, 80(64%) were referred by doctors for eye screening, Majority 43(34.4%) had frequency of eye checkup at once a month and 72(57.6%) had other associated disease like angina, thyroid disorder, gastritis(**Table 1**).

Table 1 Frequency and Percentage Distribution of Demographic Variables (N=125)

S. No	Demographic Variables	Frequency	Percentage
1	Age in years		
	20-30	5	4
	31-40	9	7.2
	41-50	37	29.6
	51-60	41	32.8
	61-70	25	20
	> 70	8	6.4
2	Gender		
	Male	58	46.4
	Female	67	53.6
3	Religion		
	Hindu	94	75.2
	Muslim	29	23.2
	Christian	2	1.6
4	Type of family		
	Nuclear family	87	69.6
	Joint family	38	30.4
5	Marital status		
	Unmarried	11	8.8
	Married	92	73.6
	Widow	20	16
	Divorce	2	1.6
6	Education		
	Professional Degree	0	0
	Graduate	9	7.2
	Intermediate/ diploma	22	17.6
	High school	33	26.4
	Middle school	0	0
	Primary school	20	16
	Illiterate	41	32.8
7	Family income		
	Rs 47348 and above	2	1.6
	Rs 23674 - 23673	12	9.6
	Rs 17756 - 23673	40	32
	Rs 11837 - 17755	57	45.6
	Rs 7102 - 11836	0	0
	Rs 2391 - 7101	14	11.2
	Less than RS 2391	0	0

8	Occupation		
	Employed	43	34.4
9	Unemployed	82	65.6
	Dietary pattern		
9	Vegetarian	23	18.4
	Non-vegetarian	102	81.6
10	Do you know about diabetic eye disease		
	Yes	63	50.4
11	No	62	49.6
	Reason for eye screening		
11	Referred by doctor	80	64
	Self-awareness	18	14.4
12	Diminision of vision	22	17.6
	Others	5	4
12	Frequency of eye checkups		
	Once a month	43	34.4
13	Once in 6 months	37	29.6
	Once a year	23	18.4
13	Once in 2 years	22	17.6
	Once in 5 years	0	0
13	Not necessary	0	0
	Other associated disease		
13	Yes	72	57.6
	No	53	42.4

Among the 125 samples, it has been revealed that the majority, 69 (55.2%), had a medium prevalence, followed by 53 (42.4%) with a high prevalence, and only 3 (2.4%) had a low prevalence of diabetes among patients attending Eye OPD (**Figure 1**).

N=125

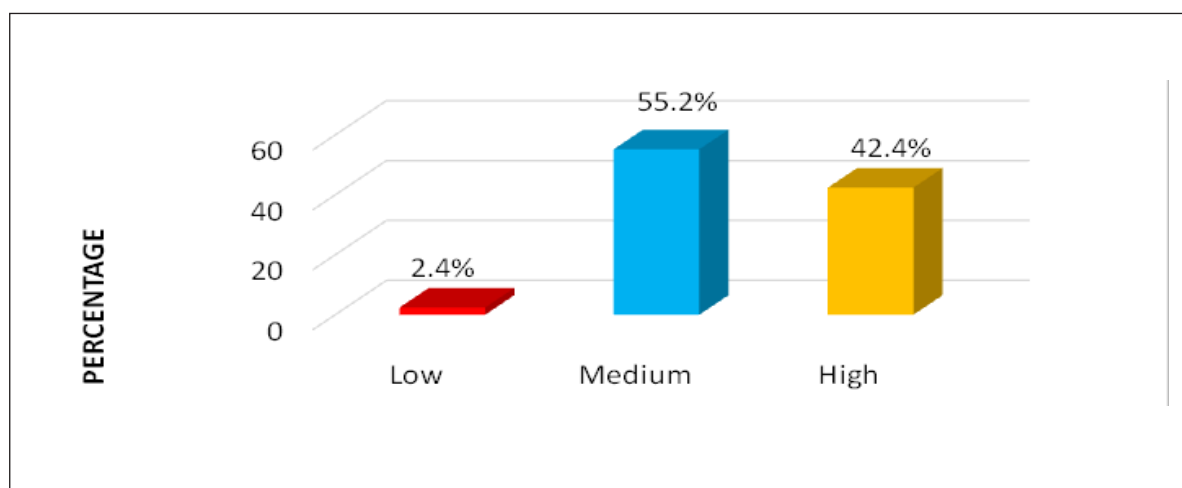


Figure 1 Prevalence of diabetes among patients attending Eye OPD

Most of the patients attending eye OPD Data based on **Figure 3** depicts the awareness regarding diabetic retinopathy among patients attending Eye OPD, revealing that a maximum of 59 (47.2%) had moderate awareness, 46 (36.8%) had good awareness, and 20 (16%) had low awareness of diabetic retinopathy among patients attending Eye OPD, with a score range of 0–30 (30), a median score of 18, a mean score of 17.74 with an SD of 7.754, and a mean percentage of 59.13%

N=125

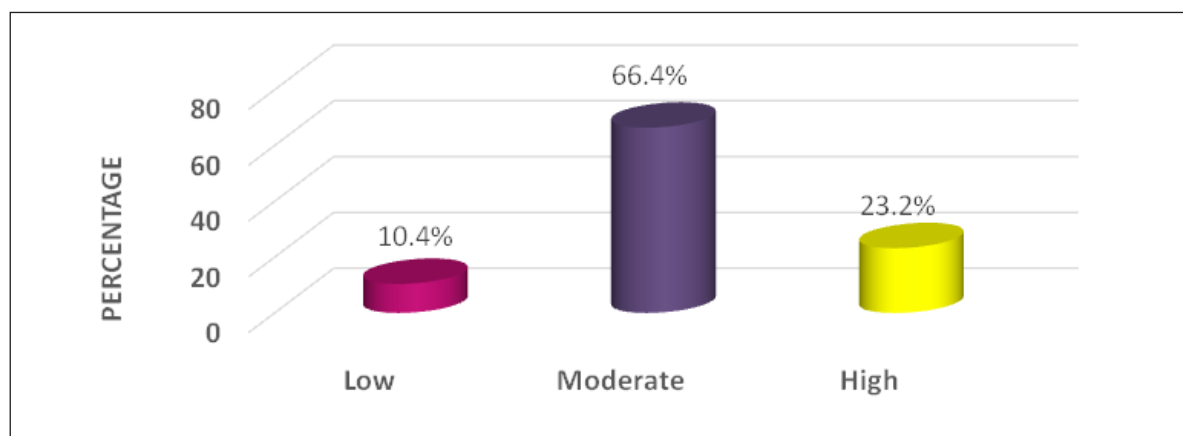


Figure 2 Awareness regarding Diabetes among patients attending Eye OPD

Most of the patients attending eye OPD Data based on **Figure 3** depicts the awareness regarding diabetic retinopathy among patients attending Eye OPD, revealing that a maximum of 59 (47.2%) had moderate awareness, 46 (36.8%) had good awareness, and 20 (16%) had low awareness of diabetic retinopathy among patients attending Eye OPD, with a score range of 0–30 (30), a median score of 18, a mean score of 17.74 with an SD of 7.754, and a mean percentage of 59.13%

N=125

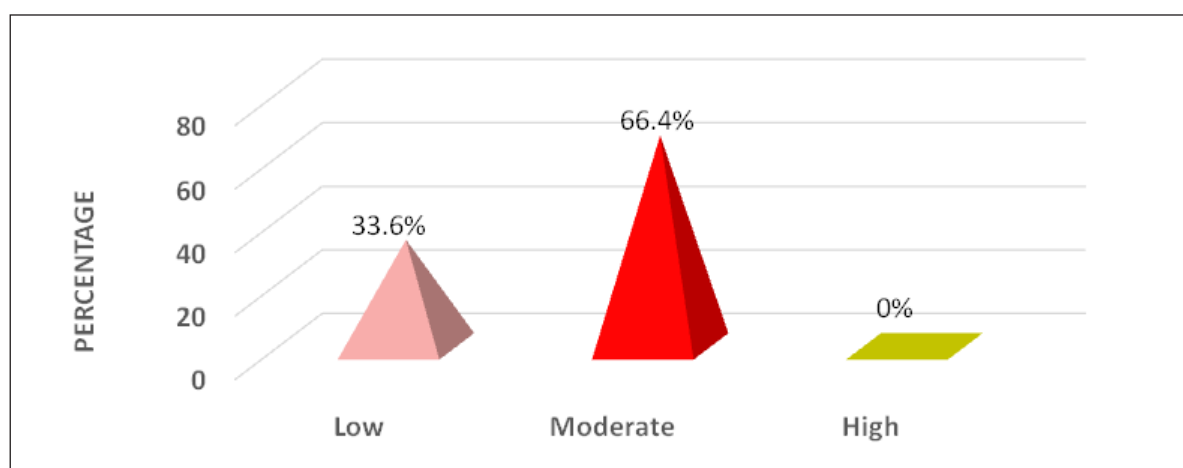


Figure 3 Awareness regarding risk factors of Diabetic Retinopathy among patients attending Eye OPD

DISCUSSION

This study assessed the prevalence and awareness regarding diabetes and risk factors for developing diabetic retinopathy among patients attending eye OPD. Of the 125 samples, 32.8% were in the age group of 51-60. Most were female and Hindu by religion, and staying in Nuclear Families were Married. As per the data collection done for the pilot study, it has been found that 32.8% were illiterate and had an income of Rs 11837–Rs 17755 per month, and the majority were unemployed. Almost all samples have moderate knowledge regarding diabetic eye disease. They are mainly referred by doctors for eye screening and complain of other associated diseases like angina, thyroid disorder, and gastritis.

The study has shown that diabetes might be linked to genetic and environmental factors.⁷ Based on IDRS score, age, abdominal obesity, physical activity, and family history are generally believed to play a significant role in diabetes prediction. An analysis was done on the prevalence of self-reported diabetes and found the majority had moderate risk (**Figure 1**). A similar study pattern was observed in Mizan-Aman Town, Southwest Ethiopia, among participants aged 15 years, with a prevalence of diabetes of 6.5% (26 out of 402). Of these, 88.5% were previously undiagnosed diabetes mellitus, and 15.9% were prediabetes.⁸ The World Health Organization (WHO) has also reported 24 million cases of diabetic neuropathy, 5 million cases of retinopathy, and 6 million cases of amputation due to diabetes.

Various risk factors identified for the development of Diabetic retinopathy in the current study include a history of diabetes with a duration of < 5 years, known as type II diabetes, which is one of the common risk factors. Other associated risk factors that may be involved are no physical activity to control blood sugar level, history of cataract surgery, history of tobacco consumption, treatment including insulin/ oral diabetic drugs (among diabetic patients), and RBS value is in Prediabetic level

(140-200mg/dl) Biochemical parameters that have been collected from patients profile has found that out of 90 samples, there is high total cholesterol and urea level, i.e., 60(66.6%) and 40(44.5 %) respectively. Between 2001 and 2010, most participants in South India were over 40 years old, accounting for 14.8% of cases (18.4 and 4.7%, respectively, in known and new DM), with a prevalence of DR of 5.1. Systolic blood pressure greater than 140 mm Hg, diabetes for more than five years, and advanced age were higher risk factors for Vision Threatening Diabetic Retinopathy (VTDR).⁹ Studies suggested that active smoking, western dietary habits, fast food, increased intake of carbohydrates, and animal lipids, and reduced consumption of fibres are a likelihood of predisposition to diabetes (due to a high level of impaired glucose tolerance).¹⁰⁻¹⁴ While assessing the awareness regarding diabetes and risk factors for developing diabetic retinopathy among patients attending Eye OPD, it has been observed that patients attending Eye OPD have maximum moderate awareness regarding diabetes and risk factors for developing Diabetic Retinopathy (**Figure 2** and **Figure 3**). A study was conducted by The Indian Council of Medical Research India Diabetes Study (Phase I) on Knowledge and awareness of diabetes in urban and rural India consisted of 213 million people from the four areas of India that reflect the country's North, South, East, and West (2014): Chandigarh, Tamil Nadu, Jharkhand, and Maharashtra. Findings show that urban dwellers' awareness rates were generally greater than those of rural residents, measuring 58.4% against 36.8% at $p < 0.001$. 56.3% and 63.4% of the general and diabetic populations knew the disease could be avoided. In India, there is a shortage of knowledge and awareness of diabetes, especially in rural areas. This emphasises the necessity of extensive diabetes education and awareness campaigns in remote areas.¹⁵

Limitations: This study has some limitations. Many of the patients attending eye OPD could not be included as the duration

of data is approximately 20-25 min for each sample. The present study is also limited to the patients attending eye OPD during the data collection period. Hence, the findings of this study cannot be generalised. Furthermore, being the cross-sectional study design, the causal-effect relationship among different variables was not analysed.

CONCLUSION

The present study suggests that patients attending eye OPD have a medium prevalence of diabetes, whereas 66.4% have moderate awareness of diabetes and risk factors for developing diabetic retinopathy. Study results also identified risk factors for developing diabetic retinopathy, i.e. history of diabetes <5 yrs with type II, no physical activity, history of cataracts, tobacco consumption, and treatment with insulin/ oral diabetic drugs. Metabolic findings like high total cholesterol levels and urea levels also affect the development of diabetic retinopathy. Hence, the study can

conclude that the public in remote areas of the northeast zone should be made aware of early screening methods and facilities given by governments to reduce complications.

Ethical consideration: Ethical approval for this study was obtained from Sri Sankaradeva Netralaya, Guwahati, Assam, Ethical Review Committee (No. SSN/IEC/JANUARY/2019/21 date on issue: 12/01/2019). Informed consent: Explanation to the study subjects shortly about the purpose of the study and its outcome. The Institutional Academic & Research Committee Members of Sri Sankaradeva Netralaya, Guwahati, Assam waived the written informed consent.

Conflict of interest: None declared.

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REFERENCES

1. Park K. Park's textbook of preventive and social medicine. 26th ed. Jabalpur: M/s Banarsidas Bhanot; 2021, p. 438-441.
2. Mohan D, Raj D, Shanthirani CS, Datta M, Unwin NC, Kapur A, et al. Awareness and knowledge of diabetes in Chennai -the Chennai urban rural epidemiology study [CURES - 9]. J Assoc Physicians India. 2005;53:283-72.
3. Dandona R, Dandona L, John RK, McCarty CA, Rao GN. Awareness of eye diseases in an urban population in southern India. Bull World Health Organ. 2001;79:96-102.
4. Namperumalsamy P, Kim R, Kaliaperumal K, Sekar A, Karthika A, Nirmalan PK. A pilot study on awareness of diabetic retinopathy among non-medical persons in South India. The challenge for eye care programmes in the region. Indian J Ophthalmol. 2004;52:247-51.
5. Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, et al. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: results from the international diabetes federation Diabetes Atlas, 9th ed. Diabetes Res Clin Pract. 2019 Nov;157:107843.
6. International Diabetes Federation. IDF Diabetes Atlas. 10th ed. Federation Brussels 2021. [cited 2024 June1]; Available at: [URL:https://www.diabetesatlas.org](https://www.diabetesatlas.org).

7. Papazafiropoulou AK, Papanas N, Melidonis A, Maltezos E. Family history of type 2 diabetes: does having a diabetic parent increase the risk? *Current Diabetes Reviews* 2017;13(1):19-25.
8. Aynalem SB, Zeleke AJ. Prevalence of diabetes mellitus and its risk factors among individuals aged 15 years and above in Mizan-Aman Town, Southwest Ethiopia, 2016: a cross-sectional study. *Int J Endocrinol*. 2018;2018:9317987.
9. Sen S, Ramasamy K, Vignesh TP, Kannan NB, Sivaprasad S, Rajalakshmi R, et al. Identification of risk factors for targeted diabeticretinopathy screening to urgently decrease the rate of blindness in people with diabetes in India. *Indian J Ophthalmol*. 2021;69:3156-64.
10. Willi C, Bodenmann P, Ghali WA, Faris PD, Cornuz J. Active smoking and the risk of type 2 diabetes: a systematic review and meta-analysis. *JAMA* 2007;298(22):2654-2664.
11. Ramachandran A, Mary S, Yamuna A, Murugesan N, Snehalatha C. High prevalence of diabetes and cardiovascular risk factors associated with urbanisation in India. *Diabetes Care*. 2008;31(5):893-898.
12. Arora NK, Pillai R, Dasgupta R, Garg PR. Whole of society monitoring framework for sugar, salt, and fat consumption and non-communicable diseases in India. *Annals of the New York Academy of Sciences*. 2014;1331(1):157-173.
13. Abate N, Chandalia M. The impact of ethnicity on type 2 diabetes. *Journal of Diabetes and its Complications*. 2003;17(1):39-58.
14. Frieden TR. A framework for public health action: the health impact pyramid. *American Journal of Public Health*. 2010;100(4):590-595.
15. Deepa M, Bhansali A, Anjana R, Pradeepa R, Joshi S, Joshi P, et al. Knowledge and awareness of diabetes in urban and rural India: the Indian Council of Medical Research India Diabetes Study (Phase I): Indian Council of Medical Research India Diabetes 4. *Indian J Endocrinol Metabol* 2014;18 (3):379-85.