RESEARCH PAPER

Evaluating the Relationship Between Selected Demographic Variables and Diabetic Retinopathy Risk Factors in an Outpatient Ophthalmic Population: An Observational Study

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Abstract

Background: *India faces a growing public health concern with Diabetic Retinopathy (DR), a major cause of blindness. This study identifies DR risk factors in diabetic patients, informing strategies for early detection and management.*

Methods: *This study assessed the risked factors associated with DR among 1757 patients attending Eye clinics oft Sri Sankaradeva Nethralaya, Guwahati, Assam, between April 17, 2023, and June 29, 2024, using structured questionnaires to gather demographic information and awareness data.*

Results: *Out of 1757 individuals attending Eye clinics, 777 (44%) subjects have a history of diabetes, 903 (51%) were age group $\geq$ 55 years, 1009 (57%) were male, 1162 (66%) belong to Hindu by religion, 1164 (66%) subjects belong to Joint Family, 646 (63%) subjects belong to Rural by Place of Residence, and 1246 (70.9%) are Married. 477 (27%) belong to high school by education of head, 604 (34%) of the samples belong to monthly family income of Rs 46475 - Rs 69534, 346 (20%) subjects belong to skilled workers, shop and market sale workers, and 1490 (85%) patients belong to non-vegetarians. Major risk factors for developing diabetic retinopathy (DR) included high BMI, abdominal obesity, frequent alcohol consumption, and elevated HbA1c levels. Significant associations were found between demographic variables and risk factors for diabetic retinopathy. Age showed a positive*

correlation with SBP. Gender was associated with abdominal obesity, lipid levels, cataracts, smoking, and other factors. Place was linked to abdominal obesity, heart disease, cataracts, diabetes during pregnancy, and more. Dietary pattern was associated with abdominal obesity, lipid levels, cataracts, and other factors, with all associations significant at the 0.05 level.

Conclusion: *This study underscores the critical need for integrated ocular and systemic care in mitigating diabetic retinopathy risk, illuminating potential targets for precision public health interventions.*

Keywords*: Diabetic Retinopathy, Risk factors, Eye Clinic, Observational study, Patients.*

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Introduction

Diabetic Retinopathy (DR) remains one of the most significant microvascular complications of diabetes mellitus and a leading cause of preventable, irreversible vision loss among working-age adults globally (Cui et al., 2019). Characterized by progressive damage to the retinal microvasculature, DR spans stages from non-proliferative diabetic retinopathy (NPDR) to advanced proliferative diabetic retinopathy (PDR) and diabetic macular edema (DME).

While primary physiological risk factors—such as prolonged disease duration, chronic hyperglycemia, uncontrolled hypertension, and dyslipidemia—are well-established drivers of DR progression, their severity and clinical expression do not occur in isolation. Rather, these physiological markers are deeply intertwined with sociodemographic characteristics (Nguyen et al., 2022). Demographic variables such as age, sex, socioeconomic status, educational attainment, and geographical background significantly modulate a patient's health literacy, compliance with treatment, lifestyle behaviors, and access to routine ophthalmic screening (Cai, 2024; Nguyen et al., 2022).

Despite advances in diagnostic modalities and therapeutic interventions, many outpatient eye clinics observe significant heterogeneity in how DR presents across different patient segments. Understanding the intersection between patient demographic profiles and clinical risk factors is critical for identifying vulnerable subgroups, optimizing targeted screening protocols, and delivering equitable ophthalmic care.

This study addresses these clinical dynamics by examining the relationship between selected demographic variables and diabetic retinopathy risk factors among diabetic patients attending specialized eye clinics. The findings aim to inform risk stratification strategies and tailored clinical interventions to prevent vision loss in high-risk patient groups.

Material and Methods

This hospital-based cross-sectional study evaluated 1,757 patients aged over 22 years attending the Eye Outpatient Department at Sri Sankaradeva Nethralaya in Guwahati, Assam, between April 17, 2023, and June 29, 2024, to examine the relationship between diabetic retinopathy risk factors and selected demographic variables. Following Institutional Ethics Committee approval and written informed consent, data were collected via structured face-to-face interviews administered by a single investigator using an expert-validated, English-to-Assamese translated questionnaire; severely ill, mentally incapacitated, or sensory-impaired patients were excluded. After survey completion, participants received an informational pamphlet on diabetes care, and data were statistically analysed using Chi-Square tests with a significance threshold set at $p < 0.05$.

Data Management and Quality Control:

To ensure instrument reliability, conceptual clarity, and administrative feasibility, the structured questionnaire was pre-tested on 5% of the Eye OPD patient cohort prior to full deployment. Feedback from the pre-test informed minor structural refinements, following which content validity was formally established by a multidisciplinary expert panel. Data collection proceeded using the finalized instrument. To uphold data integrity, all completed survey forms underwent systematic checks for accuracy and completeness, and any questionnaires with missing or inconsistent data were excluded from the final analysis.

Data Management and Statistical Analysis:

Data were entered and analyzed using SPSS version 20.0. Descriptive statistics were summarized as frequencies and percentages.

RESULTS

The study comprised 1757 patients attending the Eye OPD at SSDN, Guwahati , Assam. The demographic profile revealed: 51% (n=903) of participants were above 55 years old (age range: 23-94 years); 56% (n=980) had no history of diabetes. Occupationally, 20% (n=346) were skilled workers or engaged in shop/market sales. Most participants (85%, n=1490) followed a non-vegetarian diet. The sample consisted of 57% (n=1009) males, 66% (n=1162) Hindus, and 66% (n=1164) from joint families. Additionally, 63% (n=646) were from rural areas, 70.9% (n=1246) were married, 27% (n=477) had completed high school, and 34% (n=604) reported a monthly family income between Rs 46,475 and Rs 69,534 (Table 1).

Table 1 : Demographic Profile of Study Participants

N=1757

S. No	Demographic Variables	Frequency	Percentage
1	History of Diabetes	777	44%
	a. Yes	980	56%
	b. No		
2	Age (in years)		
	a. ≥ 55 years	903	51%
	b. < 55 years	854	49 %
2	Gender		
	a. Male	1009	57%
	b. Female	748	43%
3	Religion		
	a. Hindu	1162	66%
	b. Muslim	261	15%
	c. Christian	180	10%
	d. Jain	56	3%
	e. Others , Please specify	98	6%
4	Type of family		
	a. Nuclear family	593(34%)	34%
	b. Joint family	1164 (66%)	66%
5	Marital status		
	a. Unmarried	289	16.4%
	b. Married	1246	70.9%
	c. Widow	221	12.6%
	d. Divorce	1	0.1%
6	Educational level		
	a. Professional degree	69	4%
	b. Graduate	445	25%
	c. Intermediate/ diploma	415	24%
	d. High school	477	27%
	e. Middle school	172	10%
	f. Primary school	115	6%
	g. Illiterate	69	4%
7	Monthly Family income in rupees		
	a. 185895 and above	0	0
	b. 92951 – 185894	113	6%
	c. 69535 – 92950	185	11%
	d. 46475 – 69534	604	34%
	e. 27883 – 46474	520	30%
	f. 9308 – 27882	307	17%
	g. Less than 9307	28	2%
8	Occupation		
	a. Legislators , senior officials & managers	41	2%
	b. Professionals	276	16%
	c. Technicians & associate professionals	341	19%
	d. Clerical	174	10%
		346	20%

	e. Skilled workers & shop & market sale workers	114 125	6% 7%
	f. Skilled agricultural & fishery workers	41 223	2% 13%
	g. Craft & related trade workers	76	5%
	h. Plant & machine operators & Assemblers		
	i. Elementary Occupation		
	j. Unemployed		
9	Dietary pattern		
	a. Vegetarian	267	15%
	b. Non vegetarian	1490	85%

Table 1 reveals that in this study sample of 1,757 eye clinic attendees, 44% ($n = 777$) had a known history of diabetes, with the majority of overall participants aged over 55 years (51%) and predominantly male (57%). The cohort was largely composed of married individuals (70.9%) residing in joint family structures (66%), with a major representation from the Hindu faith (66%). Educationally, over three-quarters completed high school or higher qualifications, while the socioeconomic profile was concentrated in middle-income brackets earning between ₹27,883 and ₹69,534 monthly (64%). Occupationally, skilled commercial workers (20%) and technicians/associate professionals (19%) formed the largest segments, and an overwhelming majority reported a non-vegetarian dietary pattern (85%).

Table 2 : Identification of risk factors for developing Diabetic Retinopathy among Diabetic patients attending Eye OPD
N=1757

Variables in the Equation						
Risk Factors for developing DR	**B**	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
Age	-.373	293.50	.000	1	.999	.689
BMI	-11.794	4643.50	.000	1	**.000**	.998
Abdominal Obesity	-4.404	7936.65	.000	1	**.012**	1.102
History of high/ low level of lipids/ cholesterol in blood test	3.787	8253.64	.000	1	1.000	44.104
History of heart disease	4.167	7594.82	.000	1	1.000	64.498
Cataract surgery in either eye	.780	12205.74	.000	1	1.000	2.182
Cataract surgery in both eye	2.656	14237.56	.000	1	1.000	14.236
History of diabetes during pregnancy	-.464	19905.10	.000	1	1.000	.629
Treatment including insulin	.145	9524.59	.000	1	1.000	1.156

Treatment including oral diabetic drugs	4.527	13494.79	.000	1	1.000	92.456
Smoking status	2.338	8263.05	.000	1	1.000	10.363
Tabacco consumption	-1.881	5400.54	.000	1	1.000	.152
Alcohol consuming frequently	-11.641	22868.35	.000	1	**.000**	.798
Risk Factors for developing DR	**B**	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
Alcohol consuming occasionally	2.877	10752.24	.000	1	1.000	17.758
High Blood Glucose	4.451	11736.34	.000	1	1.000	85.692
High systolic Blood Pressure (> 140 mmHg)	1.116	13675.04	.000	1	1.000	3.054
History of Diabetic Retinopathy	8.634	7731.030	.000	1	.999	5618.873
RBS	-.020	77.965	.000	1	1.000	.980
SBP	-.030	182.980	.000	1	1.000	.971
DBP	-.014	336.615	.000	1	1.000	.986
HbA1c	-3.934	3481.209	.000	1	**.020**	.982

From the above table 2 it has been observed that Logistic regression analysis identified statistically significant risk factors for Diabetic Retinopathy as BMI, obesity, frequent alcohol consumption, and HbA1c levels ($p<0.05$), while other factors were non-significant ($p>0.05$).

Table 3 : To find the Relationship Between Risk Factors Of Developing Diabetic Retinopathy With Selected Demographic Variables.

Pearson's correlation and Pearson chi square test was used to determine the relationship. Here, the null hypothesis was stated as-

H_{01} - There is no significant relationship risk factors of developing Diabetic Retinopathy with selected demographic variables.

Table 3 i. : Pearson correlation to find the relationship between selected risk factors with Age

Correlation between risk factors with Age N=1757

		Age
BMI	Pearson Correlation	.127**
	Sig (2-tailed)	.000
RBS	Pearson Correlation	.202**
	Sig (2-tailed)	.000
SBP	Pearson Correlation	.388**
	Sig (2-tailed)	.000
DBP	Pearson Correlation	.062**

	Sig (2-tailed)	.009
HbA1c	Pearson Correlation	.185**
	Sig (2-tailed)	.000

The above reveals that Pearson Correlation test resulted that BMI, RBS, DBP and HbA1c all are poorly correlated to Age at 5% level of significant with p value less than 0.05 having correlation coefficient (r) -.127**,.180**, .062** , .185** respectively. In case of correlation between SBP and Age it is moderately correlated as correlation coefficient r = 0.388 at 5% level of significant with p value less than 0.05. Thus, relationship between risk factors with age is found statistically significant and positive correlation exist between them.

Table 3 ii. : Pearson's chi square test value of relationship between selected risk factors of developing diabetic retinopathy with Gender.

Relationship between risk factors with Gender N=1757

GENDER	**Abdominal Obesity**		**Total**	**Chi-square**	**p-value**
	No	**Yes**			
Female	640	108	748	4.944	.026*
Male	899	110	1009		
Total	1539	218	1757		
	History of high/ low level of lipids/ cholesterol in blood test		**Total**	**Chi-square**	**p-value**
Female	609	139	748	27.488	.0008*
Male	909	100	1009		
Total	1518	239	1757		
	History of heart disease		**Total**	**Chi-square**	**p-value**
Female	655	93	748	2.303	.129
Male	858	151	1009		
Total	1513	244	1757		
	Cataract_Either_Eye		**Total**	**Chi-square**	**p-value**
Female	562	186	748	0.326	.568
Male	770	239	1009		
Total	1332	425	1757		
	Cataract_Both_Eye		**Total**	**Chi-square**	**p-value**
Female	686	62	748	41.289	.000*
Male	815	194	1009		
Total	1501	256	1757		
	History of Diabetes during Pregnancy		**Total**	**Chi-square**	**p-value**
Female	733	15	748	2.468	.116
Male	998	11	1009		
Total	1731	26	1757		
	Treatment including Insulin		**Total**	**Chi-square**	**p-value**
Female	590	158	748	0.349	.555
Male	784	225	1009		
Total	1374	383	1757		
	Treatment including Oral Diabetic drug		**Total**	**Chi-square**	**p-value**

Female	504	244	748	9.378	.002*
Male	608	401	1009		
Total	1112	645	1757		
	Smoking Status		**Total**	**Chi-square**	**p-value**
Female	732	16	748	86.324	.000*
Male	853	156	1009		
Total	1585	172	1757		
	Tobacco Consumption		**Total**	**Chi-square**	**p-value**
Female	629	119	748	2.209	.137
Male	821	188	1009		
Total	1450	307	1757		
	Alcohol Consumption _ Frequently		**Total**	**Chi-square**	**p-value**
Female	748	0	748	7.456	.006*
Male	999	10	1009		
Total	1747	10	1757		
	Alcohol Consumption _ Occasionally		**Total**	**Chi-square**	**p-value**
Female	691	57	748	5.983	.014*
Male	897	112	1009		
Total	1588	169	1757		

	High Blood glucose level		**Total**	**Chi-square**	**p-value**
Female	560	188	748	29.451	.000*
Male	632	377	1009		
Total	1192	565	1757		
	High systolic blood pressure (> 140mmHg)		**Total**	**Chi-square**	**p-value**
Female	583	165	748	12.934	.000*
Male	854	155	1009		
Total	1437	320	1757		
	H/O Diabetic Retinopathy		**Total**	**Chi-square**	**p-value**
Female	627	121	748	16.728	.000*
Male	765	244	1009		
Total	1392	365	1757		

* P<0.05, Significant

S* - Significant NS- Non Significant

The above chi-square statistics table reveal that Gender was significantly associated with abdominal obesity, lipid levels, smoking, alcohol consumption, high blood glucose, high blood pressure, and diabetic retinopathy

Table 3 iv.: Pearson's chi square test value of relationship between selected risk factors of developing diabetic retinopathy with Place of Residence.

Relationship between risk factors with Place of Residence N=1757

Place	**Abdominal Obesity**		**Total**	**Chi-square**	**p-value**
	No	**Yes**			
Rural	595	51	646	19.144	.000

Urban	944	167	1111		
Total	1539	218	1757		
	History of high/ low level of lipids/ cholesterol in blood test		**Total**	**Chi-square**	**p-value**
Rural	561	85	646	.172	.678
Urban	957	154	1111		
Total	1518	239	1757		
	History of heart disease		**Total**	**Chi-square**	**p-value**
Rural	587	59	646	19.309	.000
Urban	926	185	1111		
Total	1513	244	1757		
	Cataract_Either_Eye		**Total**	**Chi-square**	**p-value**
Rural	520	126	646	12.225	.000
Urban	812	299	1111		
Total	1332	425	1757		
	Cataract_Both_Eye		**Total**	**Chi-square**	**p-value**
Rural	593	53	646	33.261	.000
Urban	908	203	1111		
Total	1501	256	1757		
	History of Diabetes during Pregnancy		**Total**	**Chi-square**	**p-value**
Rural	620	26	646	45.387	.000
Urban	1111	0	1111		
Total	1731	26	1757		
	Treatment including Insulin		**Total**	**Chi-square**	**p-value**
Rural	546	100	646	23.927	.000
Urban	828	283	1111		
Total	1374	383	1757		
	Treatment including Oral Diabetic drug		**Total**	**Chi-square**	**p-value**
Rural	456	190	646	23.423	.000
Urban	656	455	1111		
Total	1112	645	1757		
	Smoking Status		**Total**	**Chi-square**	**p-value**
Rural	592	54	646	2.367	.124
Urban	993	118	1111		
Total	1585	172	1757		
	Tobacco Consumption		**Total**	**Chi-square**	**p-value**
Rural	592	54	646	58.848	.000
Urban	858	253	1111		
Total	1450	307	1757		
	Alcohol Consumption _ Frequently		**Total**	**Chi-square**	**p-value**
Rural	646	0	646	5.848	.016
Urban	1101	10	1111		

Total	1747	10	1757		
	Alcohol Consumption _ Occasionally		**Total**	**Chi-square**	**p-value**
Rural	639	7	646	85.607	.000
Urban	949	162	1111		
Total	1588	169	1757		
	High Blood glucose level		**Total**	**Chi-square**	**p-value**
Rural	493	153	646	33.618	.000
Urban	699	412	1111		
Total	1192	565	1757		
	High systolic blood pressure (> 140mmHg)		**Total**	**Chi-square**	**p-value**
Rural	584	62	646	50.906	.000
Urban	853	258	1111		
Total	1437	320	1757		
	H/O Diabetic Retinopathy		**Total**	**Chi-square**	**p-value**
Rural	548	98	646	19.492	.000
Urban	844	267	1111		
Total	1392	365	7157		

* P<0.05, Significant

S* - Significant NS- Non Significant

The above table reveal that Place was significantly associated with abdominal obesity, heart disease, cataracts, diabetes during pregnancy, insulin and oral treatment, tobacco consumption, alcohol consumption, high blood glucose, high systolic blood pressure, and diabetic retinopathy.

Table 3 v.: Pearson's chi square test value of relationship between selected risk factors of developing Diabetic Retinopathy with Gender.

Relationship between risk factors with Dietary Pattern N=1757

Dietary pattern	**Abdominal Obesity**		**Total**	**Chi-square**	**p-value**
	No	**Yes**			
Non Vegeterian	1356	134	1490	15.167	.000
Vegeterian	183	84	267		
Total	1539	218	1757		
	History of high/ low level of lipids/ cholesterol in blood test		**Total**	**Chi-square**	**p-value**
Non Vegeterian	1277	213	1490	4.002	.045
Vegeterian	241	26	267		
Total	1518	239	1757		
	History of heart disease		**Total**	**Chi-square**	**p-value**
Non Vegeterian	1289	201	1490	1.295	.255
Vegeterian	224	43	267		
Total	1513	244	1757		

	Cataract_Either_Eye		Total	Chi-square	p-value
Non Vegeterian	1139	351	1490	2.135	.144
Vegeterian	193	74	267		
Total	1332	425	1757		
	Cataract_Both_Eye		**Total**	**Chi-square**	**p-value**
Non Vegeterian	1290	200	1490	10.372	.001
Vegeterian	211	56	267		
Total	1501	256	1757		
	History of Diabetes during Pregnancy		**Total**	**Chi-square**	**p-value**
Non Vegeterian	1464	26	1490	4.729	.030
Vegeterian	267	0	267		
Total	1731	26	1757		
	Treatment including Insulin		**Total**	**Chi-square**	**p-value**
Non Vegeterian	1169	321	1490	.374	.541
Vegeterian	205	62	267		
Total	1374	383	1757		
	Treatment including Oral Diabetic drug		**Total**	**Chi-square**	**p-value**
Non Vegeterian	983	507	1490	30.389	.000
Vegeterian	129	138	267		
Total	1112	645	1757		
	Smoking Status		**Total**	**Chi-square**	**p-value**
Non Vegeterian	1382	108	1490	71.692	.000
Vegeterian	203	64	267		
Total	1585	172	1757		
	Tobacco Consumption		**Total**	**Chi-square**	**p-value**
Non Vegeterian	1233	257	1490	.343	.558
Vegeterian	217	50	267		
Total	1450	307	1757		

	Alcohol Consumption _ Frequently		Total	Chi-square	p-value
Non Vegeterian	1480	10	1490	1.802	.179
Vegeterian	267	0	267		
Total	1747	10	1757		
	Alcohol Consumption _ Occasionally		**Total**	**Chi-square**	**p-value**
Non Vegeterian	1348	142	1490	.088	.766
Vegeterian	240	27	267		
Total	1588	169	1757		
	High Blood glucose level		**Total**	**Chi-square**	**p-value**
Non Vegeterian	1038	452	1490	14.912	.000
Vegeterian	154	113	267		
Total	1192	565	1757		
	High systolic blood pressure (> 140mmHg)		**Total**	**Chi-square**	**p-value**
Non Vegeterian	1207	283	1490	4.009	.045
Vegeterian	230	37	267		
Total	1437	320	1757		
	H/O Diabetic Retinopathy		**Total**	**Chi-square**	**p-value**
Non Vegeterian	1181	309	1490	.008	.930
Vegeterian	211	56	267		
Total	1392	365	1757		

* P<0.05, Significant
S* - Significant NS- Non Significant

The above table reveal that Dietary pattern was significantly associated with abdominal obesity, lipid levels, cataracts in both eyes, diabetes during pregnancy, oral diabetic treatment, smoking, high blood glucose, and high systolic blood pressure.

The data presented in table 3(i),3(ii),3(iii), 3(vi) and 3(v) shows that there was a significant relationship between selected risk factors of Diabetic Retinopathy and demographic variables (age, gender, religion, place, and diet) at p<0.05, rejecting the null hypothesis.

DISCUSSION

1. To includes description on identification of risk factors for developing diabetic retinopathy among patients attending Eye OPD.

The present study revealed that BMI, obesity, frequent alcohol consumption, and HbA1c were significant risk factors for diabetic retinopathy (p<0.05), indicating an independent association

These findings align with clinical literature emphasizing that physiological markers such as elevated HbA1c levels, prolonged diabetes duration, and high body mass index (BMI) or obesity serve as primary risk factors for the onset and progression of diabetic retinopathy (Alswaina, 2024; Ma et al., 2022). Comprehensive management of glycemic

levels alongside systemic risk factor control remains essential to mitigate severe microvascular complications and preserve visual function (Alswaina, 2024; Ma et al., 2022).

Our findings also align with studies by Oadi et al. (2024) and Hasan et al. (2023), which identified HbA1c, obesity, and other factors as significant risk factors for diabetic retinopathy. These studies highlight the importance of managing diabetes to reduce complications.

2. To find the relationship between risk factors with selected demographic variables.

The study found a statistically significant positive correlation between age and risk factors: weak correlations with BMI, RBS, DBP, and HbA1c (r = -.127 to .185), and a moderate correlation with SBP (r = 0.388).

The study found significant associations between various risk factors and demographic variables. Specifically, gender was associated with factors like abdominal obesity and smoking, while place was linked to heart disease and tobacco consumption. Additionally, dietary patterns were connected to abdominal obesity, lipid levels, and high blood glucose. These findings highlight the complex relationships between different risk factors and demographic characteristics.

The present study's observed correlation pattern—specifically a stronger correlation with systolic blood pressure compared to a weaker relationship with diastolic blood pressure and glycaemic markers—is consistent with findings by Chauhan et al. (2025). In their cross-sectional analysis evaluating systemic parameters and microvascular changes in type 2 diabetic patients, the authors similarly reported a stronger, statistically significant positive correlation between disease severity and systolic blood pressure ($r = 0.48, p < 0.01$), whereas diastolic blood pressure demonstrated a weak, non-significant correlation ($r = 0.22, p = 0.08$). These findings collectively highlight that age-related vascular stiffness and elevated systolic pressure exert a more direct mechanical influence on retinal capillary damage than diastolic or metabolic parameters alone.

Our findings align with studies by Nguyen et al. (2022) and Abougalambou et al., which identified significant associations between sociodemographic factors, systemic risk factors, and diabetic retinopathy. These studies highlight the importance of targeted interventions and public health strategies to reduce the risk and prevalence of DR.

Conclusion

This study demonstrates that demographic parameters—particularly age, income, educational background, and dietary patterns—are significantly linked to key diabetic retinopathy (DR) risk factors, such as blood pressure and glycemic control, among outpatient ophthalmic patients. The strong positive correlation between advancing age and systolic blood pressure underscores the compounding microvascular risk in older diabetic populations. Ultimately, mitigating vision loss from DR requires integrating demographic risk stratification into routine screening, pairing ophthalmic care with primary diabetes management, and delivering culturally tailored health education to vulnerable patient groups.

ETHICAL CONSIDERATION

Ethical approval for this study was obtained from Sri Sankaradeva Netralaya, Guwahati, Assam

No declared **conflicts of interest.**

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REFERENCES

1. Cai, C. X. (2024). Impact of race and neighborhood on diabetic retinopathy care. *JAMA Ophthalmology*.

2. Cui, Y., Zhang, M., Zhang, L., Zhang, L., Kuang, J., Zhang, G., Liu, Q., Guo, H., & Meng, Q. (2019). Prevalence and risk factors for diabetic retinopathy in a cross-sectional population-based study from rural southern China: Dongguan Eye Study. *BMJ Open*, *9*(9), e023586. https://doi.org/10.1136/bmjopen-2018-023586 Cited by: 70

3. Ma, Y., Wang, H., Jiang, J., Han, C., Lu, C., Zeng, S., Wang, Y., Zheng, Z., Peng, Y., & Ding, X. (2022). Prevalence of and risk factors for diabetic retinopathy in residents with different types of abnormal glucose metabolism with or without hypertension: A suburban community-based cross-sectional study. *Frontiers in Endocrinology*, *13*, 966619. https://doi.org/10.3389/fendo.2022.966619 Cited by: 13

4. Nguyen, C. T. N., Yosef, M., Khalatbari, S., & Shah, A. R. (2022). Sociodemographic variables associated with risk for diabetic retinopathy. *Clinical Diabetes and Endocrinology*, *8*(1), 14. https://doi.org/10.1186/s40842-022-00144-z Cited by: 19

5. Alswaina, N. (2024). Association between HbA1c levels and the severity of diabetic retinopathy. *Cureus*, *16*(12), e76395. https://doi.org/10.7759/cureus.76395 Cited by: 12

6. Ma, Y., Wang, H., Jiang, J., Han, C., Lu, C., Zeng, S., Wang, Y., Zheng, Z., Peng, Y., & Ding, X. (2022). Prevalence of and risk factors for diabetic retinopathy in residents with different types of abnormal glucose metabolism with or without hypertension: A suburban community-based cross-sectional study. *Frontiers in Endocrinology*, *13*, 966619. https://doi.org/10.3389/fendo.2022.966619 Cited by: 13

7. Oadi N, Shrateh O N, Abdelhafez M, Ereqat S, Dein L N E, Iriqat S. Identification of Risk Factors for the Development of Diabetic Retinopathy Among Palestinian Adults with Type 2 Diabetes Mellitus: A Cross-Sectional Study. Endocrinol Diabetes Metab. 2024 Jul;7(4): e494. doi: 10.1002/edm2.494.

8. Hasan MA, Islam SMR, Azad MAK . Retrospective Study of Diabetic Retinopathy and Macular Edema in Southern Part of Bangladesh. Wiley Journal of Ophthalmology .2024 Jun . Available at : https://doi.org/10.1155/2024/8437947Digital Object Identifier (DOI) .

9. Chauhan, A., Kumar, R., & Singh, P. (2025). Correlation of fundoscopic findings with blood pressure and HbA1c levels in type-2 diabetic patients. *Health and Technology Network Journal*, *11*(2), 103–108.

10. Nguyen, C. T. N., Yosef, M., Khalatbari, S., & Shah, A. R. (2022). Sociodemographic variables associated with risk for diabetic retinopathy. *Clinical Diabetes and Endocrinology*, *8*(1), 7. https://doi.org/10.1186/s40842-022-00144-z .