



AWARENESS AND SCREENING PRACTICES OF GLAUCOMA AMONG HIGH-RISK INDIVIDUALS ATTENDING A TERTIARY CARE HOSPITAL IN NORTH INDIA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Glaucoma is a leading cause of irreversible blindness worldwide, with early detection being critical for preventing vision loss. However, awareness and screening practices remain suboptimal, particularly in developing countries like India. High-risk groups require special attention due to their increased susceptibility to the disease.

Objectives: To assess the level of awareness and screening practices of glaucoma among high-risk individuals attending a tertiary care hospital in North India and to identify factors associated with awareness.

Methods: A hospital-based cross-sectional study was conducted from July 2013 to December 2013 among 86 high-risk individuals aged ≥ 40 years attending the ophthalmology outpatient department. Data were collected using a pretested semi-structured questionnaire assessing socio-demographic details, awareness of glaucoma, sources of information, and screening practices. Statistical analysis was performed using SPSS version 21.0. Associations were evaluated using the Chi-square test, with $p < 0.05$ considered statistically significant.

Results: Out of 86 participants, only 32.6% were aware of glaucoma, while 27.9% had undergone prior screening. Healthcare professionals were the primary source of information among those aware. Hypertension and diabetes mellitus were the most common risk factors. Awareness was significantly associated with urban residence ($p = 0.01$) and higher educational status ($p = 0.002$), whereas age and gender showed no significant association. Screening practices were generally poor, with irregular follow-up even among those previously screened.

Conclusion: Awareness and screening practices for glaucoma among high-risk individuals are inadequate. There is a need for targeted educational interventions, improved accessibility to screening services, and integration of glaucoma screening into routine clinical practice to facilitate early detection and reduce preventable blindness.

Keywords: Glaucoma; Awareness; Screening; High-risk groups; Tertiary care; India; Blindness prevention

INTRODUCTION

Glaucoma represents a heterogeneous group of progressive optic neuropathies characterized by irreversible visual field loss and is one of the leading causes of blindness worldwide. It is estimated that over 76 million individuals were affected globally in 2020, with projections suggesting this number will exceed 110 million by 2040 [1]. The asymptomatic nature of early disease and its insidious progression make glaucoma particularly challenging to detect, often resulting in late presentation when significant visual impairment has already occurred [2]. Unlike cataract-related blindness, which is largely reversible, vision loss due to glaucoma is permanent, underscoring the importance of early detection and timely intervention [3].

Low- and middle-income countries bear a disproportionate burden of glaucoma-related blindness, primarily due to limited awareness, inadequate screening infrastructure, and poor health-seeking behavior [4]. In these settings, opportunistic screening often replaces systematic programs, resulting in underdiagnosis, particularly among high-risk populations such as the elderly, individuals with a family history of glaucoma, diabetics, and those with myopia or hypertension [5]. Evidence suggests that awareness levels of glaucoma in developing countries remain suboptimal, ranging between 2% and 20% in community-based studies [6].

India, being home to a significant proportion of the global glaucoma burden, faces unique challenges in addressing this condition. The prevalence of glaucoma in India ranges from 2.6% to 4.1% in adults above 40 years, with primary open-angle glaucoma being the most common subtype [7]. Despite this, population-based studies have consistently demonstrated low levels of awareness and knowledge about glaucoma, even among urban populations [8]. Furthermore, screening practices remain inconsistent and largely dependent on symptomatic presentation, which undermines early diagnosis and management.

In the North Indian context, tertiary care hospitals serve as critical points of contact for patients with ocular complaints, including those belonging to high-risk groups. However, there is limited data on the level of awareness and the extent of screening practices for glaucoma among these populations. Most existing studies focus either on prevalence or clinical profiles, with fewer addressing behavioral aspects such as awareness, knowledge, and screening uptake [9]. Understanding these factors is essential for designing targeted interventions that can improve early detection rates and reduce the burden of avoidable blindness. The gap in literature is particularly evident in hospital-based settings where high-risk individuals are more likely to present but may still lack adequate knowledge or fail to undergo appropriate screening. Identifying barriers to awareness and screening in such settings can provide valuable insights for healthcare providers and policymakers to strengthen preventive ophthalmic services.

Therefore, this study aims to assess the level of awareness and screening practices related to glaucoma among high-risk groups attending a tertiary care hospital in North India. The specific objectives are to evaluate the proportion of individuals aware of glaucoma, identify sources of information, assess the prevalence of prior screening, and determine factors associated with awareness and screening uptake.

METHODOLOGY

Study Design: This was a hospital-based cross-sectional observational study designed in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines to assess awareness and screening practices of glaucoma among high-risk groups.

Study Setting: The study was conducted in the Department of Ophthalmology at a tertiary care teaching hospital in North India, which caters to both urban and rural populations and serves as a referral center for surrounding regions.

Study Duration: The study was carried out over a period of six months, from July 2013 to December 2013.

Study Population: The study population comprised adult patients belonging to high-risk groups for glaucoma attending the ophthalmology outpatient department (OPD) during the study period.

Inclusion Criteria

- Patients aged ≥ 40 years
- Individuals with one or more risk factors for glaucoma, including:
 - Family history of glaucoma
 - Diabetes mellitus
 - Hypertension
 - High myopia (≥ -6 diopters)
- Patients willing to participate and provide informed consent

Exclusion Criteria

- Patients previously diagnosed with glaucoma and currently on treatment
- Patients with severe visual impairment preventing interview
- Patients with cognitive impairment or inability to comprehend the questionnaire
- Patients unwilling to participate

Sample Size: The sample size was calculated using the formula for estimating a proportion in a cross-sectional study:

$$n = Z^2 \times p \times q / d^2$$

Where:

$Z = 1.96$ (for 95% confidence interval)

p = anticipated awareness of glaucoma (assumed 20% based on previous studies)

$q = 1 - p = 80\%$

d = absolute precision of 10%

$$n = (1.96)^2 \times 0.20 \times 0.80 / (0.10)^2$$

$$n \approx 61$$

Considering a non-response rate of approximately 20%, the final sample size was adjusted to 73. However, a total of 86 participants were included to improve study power and reliability.

Sampling Technique: A consecutive sampling technique was employed, wherein all eligible patients attending the ophthalmology OPD during the study period were approached and enrolled until the desired sample size was achieved.

Data Collection Tools & Procedure: Data were collected using a pretested, semi-structured questionnaire administered through face-to-face interviews. The questionnaire included sections on socio-demographic details, awareness of glaucoma (definition, risk factors, consequences), sources of information, and history of prior glaucoma screening. The tool was initially prepared in English and translated into the local language for better comprehension, followed by back-translation to ensure accuracy. Prior to the main study, a pilot test was conducted on a small subset of patients to validate clarity and reliability. After obtaining informed consent, participants were interviewed in a private setting. Clinical records were reviewed where necessary to confirm the presence of risk factors.

Study Variables: Independent variables included age, gender, educational status, occupation, residence (urban/rural), and presence of risk factors such as diabetes, hypertension, family history of glaucoma, and myopia. Dependent variables included awareness of glaucoma (categorized as aware/not aware), level of knowledge (basic understanding of disease and risk factors), and screening practices (history of prior eye examination specifically for glaucoma).

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 21.0. Descriptive statistics such as frequencies and percentages were used to summarize categorical variables. Continuous variables were expressed as mean $\pm$ standard deviation where appropriate. The association between independent variables and

awareness/screening practices was assessed using the Chi-square test or Fisher's exact test as applicable. A p-value of <0.05 was considered statistically significant.

Ethical Considerations: Written informed consent was obtained from all participants prior to enrollment. Confidentiality of participant information was strictly maintained, and data were anonymized during analysis. The study adhered to the ethical principles outlined in the Declaration of Helsinki. Participants were informed about the purpose of the study and were free to withdraw at any point without any impact on their treatment.

RESULTS

A total of 86 participants belonging to high-risk groups for glaucoma were included in the study. The majority of participants were aged ≥ 60 years (41.8%), with a slight male predominance (55.8%). Most participants were from rural areas (60.5%), and educational status was fairly distributed across categories (Table 1)

Table 1: Socio-demographic characteristics of study participants (n = 86)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	40–49	22	25.6
	50–59	28	32.6
	≥ 60	36	41.8
Gender	Male	48	55.8
	Female	38	44.2
Residence	Urban	34	39.5
	Rural	52	60.5
Education Status	Illiterate	30	34.9
	Primary	26	30.2
	Secondary & above	30	34.9

Hypertension (46.5%) and diabetes mellitus (37.2%) were the most common risk factors observed among participants, followed by high myopia and family history of glaucoma (Table 2)

Table 2: Distribution of glaucoma risk factors among participants (n = 86)

Risk Factor	Frequency (n)	Percentage (%)
Diabetes mellitus	32	37.2
Hypertension	40	46.5
Family history of glaucoma	14	16.3
High myopia	18	20.9

(Note: Some participants had more than one risk factor)

Only 32.6% of participants were aware of glaucoma, indicating a low level of awareness in the study population. Among those aware, healthcare professionals were the primary source of information (50%), followed by media and social contacts (Table 3)

Table 3: Awareness and sources of information about glaucoma (n = 86)

Variable	Category	Frequency (n)	Percentage (%)
Awareness of glaucoma	Aware	28	32.6
	Not aware	58	67.4
Source of information (n=28)	Doctor/healthcare	14	50.0

	Media (TV/Radio)	6	21.4
	Friends/relatives	5	17.9
	Others	3	10.7

Regarding screening practices, only 27.9% of participants reported having undergone prior glaucoma screening, and among them, less than half reported regular eye check-ups (Table 4)

Table 4: Screening practices among study participants (n = 86)

Variable	Category	Frequency (n)	Percentage (%)
Ever screened for glaucoma	Yes	24	27.9
	No	62	72.1
Frequency of eye check-up (n=24)	Regular	10	41.7
	Occasional	14	58.3

Statistical analysis revealed that awareness of glaucoma was significantly associated with urban residence ($p = 0.01$) and higher educational status ($p = 0.002$). No statistically significant association was found with age or gender (Table 5)

Table 5: Association of socio-demographic factors with awareness of glaucoma (n = 86)

Variable	Category	Aware (n=28)	Not aware (n=58)	p-value
Age (years)	40–49	10	12	0.08
	50–59	9	19	
	≥60	9	27	
Gender	Male	18	30	0.21
	Female	10	28	
Residence	Urban	16	18	0.01*
	Rural	12	40	
Education Status	Illiterate	4	26	0.002*
	Primary	8	18	
	Secondary & above	16	14	

Statistically significant ($p < 0.05$)

DISCUSSION

The present study evaluated awareness and screening practices of glaucoma among high-risk individuals attending a tertiary care hospital in North India. The findings indicate that only about one-third of participants were aware of glaucoma, and less than one-third had undergone prior screening. Awareness was significantly associated with urban residence and higher educational status, while age and gender did not show a significant relationship. These findings highlight important gaps in knowledge and preventive practices even among individuals at increased risk.

The observed awareness level (32.6%) in this study, although higher than some rural-based studies, remains suboptimal. Previous research from India has reported awareness levels ranging from as low as 2% in rural populations to around 13–20% in urban settings [6,8]. The relatively higher awareness in the present study may be attributed to the hospital-based setting, where individuals have greater exposure to healthcare services. However, the fact that nearly two-thirds of high-risk individuals were unaware of glaucoma underscores the persistent gap in public health education.

Consistent with earlier findings, healthcare professionals were the primary source of information among those aware of glaucoma. Similar observations have been reported in other Indian studies, where physician interaction plays a crucial role in disseminating knowledge [8]. This emphasizes the

importance of opportunistic health education during clinical encounters. However, the relatively limited contribution of mass media and community sources suggests underutilization of broader communication channels for awareness generation.

Screening practices were notably poor, with only 27.9% of participants reporting prior glaucoma screening. This aligns with earlier studies indicating low uptake of preventive eye care services in developing countries [5]. The asymptomatic nature of early glaucoma likely contributes to poor screening behavior, as individuals may not perceive the need for evaluation in the absence of symptoms. Additionally, lack of awareness, accessibility issues, and socioeconomic constraints may further limit screening uptake.

A significant association was found between awareness and both educational status and urban residence. Participants with higher education were more likely to be aware of glaucoma, which is consistent with findings from previous studies [8]. Education likely enhances health literacy, enabling individuals to better understand disease processes and the importance of preventive care. Similarly, urban residents demonstrated higher awareness compared to their rural counterparts, possibly due to better access to healthcare facilities, information resources, and media exposure.

No statistically significant association was observed between awareness and age or gender. While some studies have reported higher awareness among younger individuals or males, findings across studies remain inconsistent. This suggests that demographic factors alone may not be reliable predictors of awareness, and targeted interventions should focus more on education and accessibility rather than age or gender alone.

From a public health perspective, the low levels of awareness and screening among high-risk groups are concerning. Given that glaucoma-related vision loss is irreversible but largely preventable through early detection, there is a critical need to strengthen screening strategies. Integrating glaucoma screening into routine ophthalmic examinations, especially for high-risk individuals, could significantly improve early diagnosis rates. Community-based awareness campaigns, use of mass media, and involvement of primary healthcare workers may further enhance outreach, particularly in rural areas.

The strengths of this study include its focus on high-risk individuals and its setting in a tertiary care hospital, which provides insight into a population that is more likely to benefit from targeted interventions. The use of a structured and pretested questionnaire enhances the reliability of the findings. However, certain limitations must be acknowledged. Being a hospital-based study, the findings may not be generalizable to the wider community. The relatively small sample size may limit the power to detect associations with some variables. Additionally, self-reported data on awareness and screening practices may be subject to recall bias. In conclusion, the study highlights significant gaps in awareness and screening practices for glaucoma among high-risk individuals. Addressing these gaps through targeted educational and screening interventions is essential to reduce the burden of preventable blindness due to glaucoma.

CONCLUSION

This study demonstrates that awareness and screening practices for glaucoma among high-risk individuals remain inadequate, even in a tertiary care hospital setting. Only about one-third of participants were aware of glaucoma, and an even smaller proportion had undergone prior screening. Educational status and urban residence were significantly associated with better awareness, highlighting the role of health literacy and accessibility in preventive eye care. The low uptake of screening reflects missed opportunities for early diagnosis, particularly in a condition where timely intervention can prevent irreversible vision loss. These findings emphasize the need for targeted health education initiatives, especially for rural and less-educated populations. Incorporating routine glaucoma screening into standard ophthalmic evaluations for high-risk individuals, along with strengthening patient counseling by healthcare providers, could improve early detection. Public health strategies should also leverage mass media and community outreach programs to enhance awareness. Addressing these gaps is essential to reduce the burden of avoidable blindness due to glaucoma.

DECLARATIONS

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Conflict of Interest:None declared.

Consent:Written informed consent was obtained from all participants.

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