

Delay in Presentation of Glaucoma Patients: Reasons and Risk Factors

AIMAL KHAN¹, IFTIKHAR UL HAQ TAREEN¹, MOHAMMAD AFZAL KHAN¹, MAHTAB MENGAL², MUHAMMAD AMIN³, MANZOOR AHMED KHAN²

¹Assistant Professor Ophthalmology, Helpers Eye Hospital / Bolan Medical College, Quetta

²Senior Registrar Ophthalmology, Helpers Eye Hospital, Quetta

³Assistant Professor Ophthalmology, Teaching Hospital, Loralai

Correspondence to: Iftikhar Ul Haq Tareen, Email: iftikhart966@gmail.com

ABSTRACT

Background: Glaucoma is a chronic optic neuropathy and a leading cause of irreversible blindness worldwide. In developing countries, patients often present at advanced stages due to lack of awareness and limited access to eye care services. Identifying the factors contributing to delayed presentation is essential for early detection and prevention of vision loss.

Objective: To determine the reasons and risk factors associated with delayed presentation among glaucoma patients attending a tertiary care hospital in Quetta, Pakistan.

Methods: A cross-sectional study was conducted at the department of Ophthalmology, Bolan Medical College / Helpers Eye Hospital Quetta, over six months, from June, 2020 to November, 2020, involving 250 newly diagnosed glaucoma patients. Data were collected using a structured questionnaire covering demographic, socioeconomic, and clinical variables. Delay in presentation was defined as diagnosis at an advanced stage or symptom duration exceeding six months before consultation. Data were analyzed using SPSS version 25.0, applying descriptive statistics and Chi-square tests to assess associations, with a significance level of $p < 0.05$.

Results: The mean age of participants was 56.8 ± 12.4 years; 58% were male and 64.8% resided in rural areas. Over half of the patients were illiterate (54%) and from low socioeconomic backgrounds (56.8%). Advanced-stage glaucoma at presentation was observed in 51.2% of cases. Significant associations with delayed presentation were found for rural residence ($p = 0.001$), low education level ($p = 0.003$), and low socioeconomic status ($p = 0.002$). The most common reasons for delay were lack of awareness (44.8%) and financial constraints (29.2%).

Conclusion: Delayed presentation of glaucoma remains common and is strongly linked to socioeconomic and educational disparities. Enhancing public awareness, strengthening primary eye care, and improving accessibility to ophthalmic services are critical for reducing glaucoma-related blindness.

Keywords: Glaucoma, delayed presentation, risk factors, awareness, socioeconomic status

INTRODUCTION

The loss of retinal ganglion cells and associated visual field abnormalities are hallmarks of glaucoma, a chronic, progressive optic neuropathy that, if untreated, can result in irreversible blindness¹. Glaucoma is one of the most common causes of visual impairment in the world, second only to cataracts, but unlike cataracts, glaucoma causes permanent vision loss². Glaucoma is frequently diagnosed late due to its asymptomatic nature in its early stages, especially in settings with limited resources where routine eye screening is not common.

By 2040, glaucoma is predicted to affect 80–111 million people worldwide, with Africa and Asia bearing the greatest burden³. A significant percentage of patients arrive at advanced stages of the illness, despite improvements in diagnostic tools and therapeutic approaches. The risk of visual impairment is greatly increased by this delayed presentation, which also places a heavy socioeconomic strain on patients and healthcare systems⁴.

Glaucoma can be slowed down by early detection and promptness in treatment and functional vision can be maintained⁵. Nonetheless, its diagnosis is greatly dependent on patient awareness, accessibility of the eye care services and frequent ophthalmic examinations. Some patients do not seek the evaluation until vision loss is observed, and by that time much damage has already been inflicted on the optic nerve.

Various factors may contribute to delay in presentation of glaucoma patients and these factors may include, lack of awareness of the disease, financial constraints, poor health-seeking behavior, cultural beliefs, misdiagnosis at primary healthcare levels, and poor referral system⁶. Delayed presentation and diagnosis has also been attributed to other determinants including the distance to tertiary eyecare centre, gender, level of education and socioeconomic status.

Little data has been done to investigate the reasons as to why patients with glaucoma show up late when it comes to diagnosis and treatment thus in many developing countries such as ours. The majority of the current studies are dedicated to prevalence and clinical patterns being researched instead of the social and behavioral determinants of the health-seeking behavior.

The awareness of these barriers is important in developing the public health interventions that will encourage the earlier diagnosis and prevent avoidable blindness due to glaucoma.

Determining the causes and risk factors related to late presentation will enable clinicians and policymakers to come up with specific educational and screening interventions. It will also help in enhancing referral process and sensitizing the population on the necessity to have eye checks frequently especially the high-risk group, which includes the elderly and family history of glaucoma^{7,8}.

Thus, the proposed study will establish the causes and risk factors that may have led to the delay in presentation of patients with glaucoma attending a tertiary eye care facility. It is theorized that the findings will formulate plans of earlier detection and prevention of glaucoma-related visual disability.

MATERIAL AND METHODS

This cross-sectional study was conducted at the department of Ophthalmology, Bolan Medical College / Helpers Eye Hospital Quetta, Pakistan, over a period of six months, from June, 2020 to November, 2020. The study aimed to identify the reasons and risk factors associated with delay in presentation among patients diagnosed with glaucoma. Ethical approval was obtained from the institutional review board prior to commencement of the study, and written informed consent was taken from all participants in accordance with the Declaration of Helsinki.

The sample size was calculated using the World Health Organization (WHO) formula for estimating a single population proportion: $n = Z^2 \times p \times (1-p) / d^2$

Taking the value of 1.96 to represent a 95% confidence interval ($Z = 1.96$), a hypothetical proportion (p) of 3.4% based on other work in the region on a latent diagnosis of glaucoma, and a margin (d) of 2.25, the minimum sample size was 249 (250). The technique employed in the recruitment of eligible patients was a non-probability consecutive sampling method until the required sample size was reached.

The inclusion criteria were all patients that reported to the outpatient department with a diagnosis of any form of glaucoma

during the study period. Clinical assessment was undertaken to make a diagnosis, also intraocular pressure was measured on a Goldmann applanation tonometry, optic disc observation was done using a slit-lamp biomicroscopy with 90D lens and visual field testing where necessary. Patients who had been diagnosed and followed up or under regular treatment in the past with glaucoma were excluded and those who were not willing to participate or could not give reliable pieces of information were excluded because of cognitive and communication challenges.

Data was collected by using a pre-established, structured questionnaire as a face-to-face interview with trained ophthalmology residents. The variables contained in the questionnaire were demographic (age, gender, education level, occupation, and place of residence (urban or rural)) and clinical (type and stage of glaucoma at presentation). Data on the causes of delay in presentation was collected through requesting the respondents about awareness of the disease, past eye checkups, access to medical sites, financial limitation and referral history.

Delay in presentation was determined as the diagnosis of glaucoma at the stage where the optic nerve damage and subsequent visual field loss were already present, or when the patients indicated that they had been experiencing visual symptoms since a period of over six months before visiting a doctor. Optic disc cupping and visual field criteria were used to determine the staging of glaucoma as per the conventional clinical guidelines.

The Statistical Package of the social Sciences (SPSS) version 25.0 was used to enter and analyze the data. Descriptive statistics were used to profile demographic and clinical features. Frequencies and percentages were used to represent the categorical variables and the mean's standard deviation was used to represent the continual variables like age. The Chi-square or Fisher exact test was used as needed to analyze associations of delayed presentation with the possible risk factor. The p-value of below 0.05 was taken to be statistically significant.

All patient data remained confidential and all the participation was voluntary. The findings were only used as part of the research with the aim of establishing modifiable aspects that lead to the delayed presentation of glaucoma among this population in the region.

RESULTS

There were 250 patients with glaucoma, who participated in the study. Age of the participants was between 25 and 80 years with a mean age of 56.8 and a standard deviation of 12.4 years. Most of them were men and the greater majority were those that were in the lower socioeconomic bracket. The tables presented below provide the summary of the demographic, clinical, and behavioral characteristics of the studied population, the relation between different factors and delay in presentation.

The demographic participants of the participants are listed below. Majority of the patients included in the age bracket of 51-60 years and 58% of the patients were men. Almost two out of three of the patients were rural, and over half were uneducated.

A description of clinical patterns and types of glaucoma among the participants of the study is given below. The most common diagnosis was primary open-angle glaucoma (POAG) and secondly was primary angle-closure glaucoma (PACG). High percentage of patients were diagnosed with an advanced form of the disease.

The primary causes of delayed presentation as reported by the patients are as discussed below. The most common causes that were cited were lack of awareness on glaucoma and finances, next came misdiagnosis at the primary care centers and proximity to the tertiary eye centers.

The summaries of associations between different sociodemographic and clinical factors and delay in presentation are presented below. Delay was largely linked to rural living, low level of education and low level of socioeconomic status. Delayed

presentation was also significantly related to advanced stage at diagnosis ($p < 0.05$).

Table 1: Demographic characteristics of glaucoma patients (n = 250)

Variable	Category	Frequency (n)	Percentage (%)
Age group (years)	25–40	38	15.2
	41–50	52	20.8
	51–60	88	35.2
	>60	72	28.8
Gender	Male	145	58.0
	Female	105	42.0
Residence	Urban	88	35.2
	Rural	162	64.8
Education level	Illiterate	135	54.0
	Primary	58	23.2
	Secondary or above	57	22.8
Socioeconomic status	Low	142	56.8
	Middle	81	32.4
	High	27	10.8

Table 2: Clinical characteristics of glaucoma patients

Variable	Category	Frequency (n)	Percentage (%)
Type of glaucoma	Primary open-angle glaucoma (POAG)	128	51.2
	Primary angle-closure glaucoma (PACG)	76	30.4
	Secondary glaucoma	46	18.4
Stage at presentation	Early	49	19.6
	Moderate	73	29.2
	Advanced	128	51.2
Laterality	Unilateral	87	34.8
	Bilateral	163	65.2
Intraocular pressure (mmHg)	<21	42	16.8
	21–30	109	43.6
	>30	99	39.6

Table 3: Reported reasons for delay in presentation

Reason for delay	Frequency (n)	Percentage (%)
Lack of awareness about glaucoma	112	44.8
Financial constraints	73	29.2
Misdiagnosis or inappropriate treatment at primary level	29	11.6
Long distance or transportation difficulties	21	8.4
Fear of diagnosis or surgery	8	3.2
Other reasons	7	2.8

Table 4: Association between selected factors and delayed presentation of glaucoma

Variable	Category	Delayed presentation n (%)	Timely presentation n (%)	p-value
Gender	Male	102 (70.3)	43 (29.7)	0.182
Residence	Rural	129 (79.6)	33 (20.4)	0.001
Education level	Illiterate	112 (82.9)	23 (17.1)	0.003
Socioeconomic status	Low	118 (83.1)	24 (16.9)	0.002
Type of glaucoma	POAG	87 (68.0)	41 (32.0)	0.274
Stage at presentation	Advanced	119 (93.0)	9 (7.0)	<0.001

DISCUSSION

The current paper has examined the cause and risk factors involved in the late presentation of patients with glaucoma in a tertiary care hospital in Quetta, Pakistan. The results showed that most of the patients were detected at an advanced stage of the disease, which was in line with international and local data that glaucoma is usually rarely detected until it is too late and

permanent vision damage is caused⁹. This pattern of late detection seems to be chiefly mediated by the asymptomatic character of early glaucoma and lack of awareness about the need to take periodic eye check-ups.

The average age of the study participants was 56.8 years and the majority of the patients were over 50 years of age indicating the epidemiological pattern of the disease glaucoma being a disease of the elderly¹⁰. Old age is known as one of the risk factors not only in the development but also in the progression of glaucoma and old people are also less prone to preventive care to the eye unless there are signs that vision is declining. The same age distribution pattern has also been observed in other hospital-based research findings in developing areas, which has supported the need to focus the screening programs on the middle-aged and older populations¹¹.

Male participants were mostly seen, but the difference between the genders in the presentation delay was not found to be significant. In other environments, more males can access healthcare services because of sociocultural and economic forces, but women usually encounter either barrier related to mobility, dependence, and health-seeking behavior¹². The absence of a significant gender difference in the present study can relate to the growing awareness and avenue to eye care among women but the disparities continue to exist in the rural and low-income population.

Most of the patients in this study were in rural locations and lower socioeconomic bases which were highly related with the delay in presentation. These results align with the existing literature that states that the people in the distant area and deprived of economic means are less prone to obtain specialized ophthalmic treatment in time¹³. The expensive nature of transport, the opportunity cost of earning daily salaries, and the absence of eye care facilities near them are all obstacles that lead to the delay of medical care. To solve these problems, more integration of glaucoma screening services will be required at the primary care level and subsidized referral facilities to the rural population¹⁴.

Another strong determinant of delayed presentation was educational status. Patients whose education level was low or not at all were greatly prone to present with a developed disease. Health literacy and awareness of ocular health are closely interconnected with education; people with low education levels can be unable to detect the early manifestations, or the necessity to visit an ophthalmologist regularly¹⁵. Educational interventions that highlight the silent facts about glaucoma and the importance of early diagnosis could be used in the community to close this gap, especially among the low-literacy populations.

In clinical cases, over fifty percent of the patients reported to have a case of glaucoma at an advanced stage and the most prevalent type of glaucoma was the primary open-angle glaucoma. This distribution is similar to other studies conducted in this region which indicated late-stage diagnosis as a long-term problem in glaucoma management¹⁶. The high-grade disease at the first presentation highlights the necessity of the rapid intervention of the population health strategies aimed at the early screening, particularly of those who have the risk factors like family history of glaucoma or the high level of intraocular pressure.

The results of the analysis of patient-reported causes of delay also yielded valuable information on the potentially changing barriers. The major cause was ignorance, which was followed by financial constraints, wrong diagnosis at primary healthcare centers, and the lack of access to the special services. Such results are congruent with the reports of other similar populations, in which the awareness of glaucoma is still low, and the use of eye care services is mostly pursued when the visual impairment has occurred¹⁷. The problem of misdiagnosis helps to emphasize that it is essential to train the primary care doctors and optometrists to identify early symptoms of glaucoma and send patients to specialists as quickly as possible¹⁸.

The socioeconomic status and rural living found to be associated with the presentation at an advanced stage also indicate the inequalities in the provision of healthcare at large. The

richer and more medically accessible individuals will be more inclined to a regular checkup and early treatment¹⁹. Consequently, the aim of interventions is not only to create awareness but affordability and access to diagnostic and treatment facilities such as community based screening camps and mobile eye units.

In general, the results of the given study indicate that the delay in presentation of glaucoma is caused by a complex of demographic, socioeconomic, and systemic factors. Enhancement of the level of public awareness, primary eye care network and access to affordable ophthalmic services can be instrumental in reducing the burden of late-stage glaucoma²⁰. The public health policies should focus more on preventive eye care and educate about the ocular health throughout life as a way to decrease cases of irreversible blindness due to this disease that is preventable and silent.

There are some limitations associated with this research. As a cross-sectional study, which is hospital based, the results might not be a complete representation of the general population as only those patients who addressed tertiary care were enrolled in the study. Non-probability consecutive sampling can lead to the selection bias and self-reported data about the causes of delay can be influenced by the recall bias and the social desirability bias. Longitudinal follow-up of the effect of delayed presentation on long-term visual outcomes was not a part of the study. Also, family history, comorbidities, and access to primary eye care services were not studied in detail, which could have given more information on the determinants of late presentation. Nevertheless, in spite of these shortcomings, the article presents a critical baseline data on the adaptable barriers and the risk factors relating to late detection of glaucoma in the area.

CONCLUSION

This paper concludes that a considerable percentage of glaucoma patients appear in their late stage of the disease, and late presentation of the disease is highly linked with rural living, low level of education as well as low socioeconomic status. The most prevalent causes reported by patients about late seeking care were lack of awareness about glaucoma and financial limitations. The findings can be used to illustrate the necessity of community-based awareness interventions, increased screening on the primary healthcare level, and methods to increase the accessibility and affordability of ophthalmic services. Early diagnosis and prompt treatment are the best steps to ensure that we avoid irreversible blindness and lessen the price of the glaucoma blindness on the population.

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