Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Ophthalmology

Glaucoma Patterns among Patients at a Tertiary Eye Hospital

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DOI: https://doi.org/10.36347/sjams.2025.v13i02.027 | **Received:** 03.01.2025 | **Accepted:** 08.02.2025 | **Published:** 19.02.2025

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Abstract **Original Research Article**

Background: Glaucoma is a major cause of irreversible blindness worldwide, with a variety of subtypes such as primary open-angle glaucoma (POAG), primary angle-closure glaucoma (PACG), and secondary glaucomas, each with distinct pathophysiological mechanisms and treatment challenges. The prevalence and patterns of glaucoma vary geographically, with PACG being more common in Asian populations. Early detection and management are crucial in preventing blindness, particularly in resource-limited settings where delayed diagnosis is common. ***Objective:*** This study aims to analyze the patterns of glaucoma among patients at a tertiary eye hospital in southern Bangladesh, focusing on the distribution of different glaucoma subtypes, demographic trends, and clinical characteristics. ***Methodology:*** A prospective observational study was conducted at the outpatient department of Sheikh Fazilatunnessa Mujib Eye Hospital & Training Institute (SFMEHTI), Gopalganj, Bangladesh, from January to December 2019. All patients presenting with glaucoma or suspected glaucoma were included. Data were collected on age, clinical diagnoses, symptoms, ocular examination findings, intraocular pressure (IOP), gonioscopic findings, and visual field tests. The glaucoma subtypes were classified based on the clinical presentation and diagnostic results. ***Results:*** The most common types of glaucoma were PACG (45%), POAG (32%), and lens-induced glaucoma (LIG) (12%). Other types included normal tension glaucoma (NTG) (6%), juvenile glaucoma (2%), congenital glaucoma (1%), neovascular glaucoma (NVG) (1%), and aphakic and others glaucoma (1%). At the time of presentation, 47% of patients had normal vision, 30% had visual impairment, 14% were severely visually impaired, and 5% were blind. The mean IOP was 26.29 mmHg in the right eye and 26.37 mmHg in the left eye. Gonioscopy revealed that the majority of patients had narrow angles, with a smaller percentage showing open or closed angles. ***Conclusion:*** Primary angle-closure glaucoma (PACG) was the most prevalent form of glaucoma observed in the outpatient department of this tertiary eye hospital. A significant proportion of patients presented with advanced stages of the disease, highlighting the need for earlier detection and intervention strategies. Lens-induced glaucoma was identified as the most common form of secondary glaucoma. This study offers valuable insights into the glaucoma profile of patients from remote regions of southern Bangladesh and underscores the importance of targeted screening and public health strategies to combat glaucoma-related blindness.

Keywords: Glaucoma, Primary Angle-Closure Glaucoma, Primary Open-Angle Glaucoma, Lens-Induced Glaucoma, Intraocular Pressure, Gonioscopy.

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INTRODUCTION

Glaucoma is a leading cause of irreversible blindness worldwide, affecting millions of individuals across diverse populations. Characterized by progressive optic neuropathy and associated visual field loss, glaucoma often remains asymptomatic until significant damage has occurred. The disease encompasses several subtypes, including primary open-angle glaucoma (POAG), primary angle-closure glaucoma (PACG), and secondary glaucomas, each with distinct pathophysiological mechanisms and risk factors. Given its silent progression and the potential for severe visual impairment, early detection and effective management are crucial in preventing blindness [1-4].

The prevalence and patterns of glaucoma vary significantly based on demographic, genetic, and environmental factors. Studies indicate that POAG is more common in Western populations, while PACG is more frequently observed in Asian populations [4-6]. Additionally, factors such as advancing age, elevated intraocular pressure (IOP), family history, and systemic conditions like diabetes and hypertension have been implicated in glaucoma development. Understanding the distribution and risk factors of different glaucoma types is essential for devising region-specific screening and treatment strategies [7-9].

Tertiary eye hospitals play a pivotal role in diagnosing and managing glaucoma, often catering to a high volume of complex cases. Patients presenting at such centers frequently have advanced disease due to late detection or inadequate access to primary eye care services. Evaluating the patterns of glaucoma among patients attending a tertiary hospital provides valuable insights into the burden of the disease, its progression at the time of diagnosis, and the effectiveness of current treatment approaches.

In resource-limited settings, where awareness about glaucoma is often low, delayed diagnosis remains a significant challenge. Many patients seek medical attention only after experiencing noticeable visual impairment, by which time substantial optic nerve damage has already occurred. Identifying the most affected groups and common clinical presentations can help design targeted screening programs and public health initiatives to promote early intervention.

Objective

This study aims to analyze the patterns of glaucoma among patients at a tertiary eye hospital, focusing on the distribution of different glaucoma subtypes, demographic trends, and clinical characteristics.

METHODOLOGY

A prospective observational study was done in outpatient department (OPD) of Sheikh Fazilatunnessa Mujib Eye Hospital & Training Institute (SFMEHTI), Gopalganj, Bangladesh; from January 2019 to December 2019. All glaucoma or glaucoma suspect patients who were presented to this hospital were included. Patients in age of 1 day to 100 years were included in this study. Patients were grouped into three age groups (0-25 years, 26-50 years and >50 years) and grouped in terms of clinical diagnoses. History was taken in regard to chief complaints, any history of pain, redness, watering, decrease in vision, frequent change of glasses, colored haloes, photophobia, any history of previous eye surgery, trauma, any laser treatment of the eye, use of topical steroids, any family history of glaucoma, any history of systemic disease like diabetes mellitus, hypertension and asthma. Ocular examination included visual acuity and the best corrected visual acuity. Visual acuity (VA) was obtained with illuminated Snellen chart. Refraction was done where it was indicated. External eye examination, papillary light reaction and overview of anterior segment were performed with torch light in a screening mode. Slit Lamp Examination was the backbone of the study and the detailed ocular examination for glaucoma was done with a slit Lamp biomicroscope. Careful examination of cornea, anterior chamber, iris, pupil, and lens was done. Pseudo-exfoliation (PEX) deposits on the corneal endothelium, iris and iris margin were examined using 16-20 times magnification before dilating the pupil. The anterior lens surface was also screened for any PEX material. PEX syndrome was diagnosed by the typical white deposits on the iris and/or anterior lens surface, anterior vitreous face, posterior capsule and even on the intraocular lens. Stereoscopic examination of the optic disc and parapapillary area was performed at the slit lamp using a +90-dioptre lens. Vertical cup:disc ratio (vCDR) was measured and recorded in units of 0.5. Asymmetry of discs, notching, bayoneting, disc haemorrhages, peripapillary atrophy and tilted discs were noted and recorded. The width and locations of the thinnest neuroretinal rim was also noted. The posterior pole was examined with red free light to note early changes of retinal nerve fiber layer in the arcade. Gonioscopy was attempted in all participants with a Goldmann three mirror gonioscope and the angles were graded according to RPC classification.8-10 If the posterior pigmented trabecular meshwork was not visible in the three quarters or more of the angle circumference in the primary position without manipulation in the presence of low illumination, the angle was considered occludable, otherwise it was open (i.e. grade 3 or less). If the patient was not cooperative with gonioscopy, the Van Herrick technique was used to grade peripheral anterior chamber depth. When peripheral chamber was equal to or less than ¼ th of corneal thickness, the angle was considered occludable. All participants with open angles determined on gonioscopy had their eyes dilated using tropicamide 1%. Participants who had dilatation deferred because of occludable/narrow angles had dilated examination performed after laser iridotomy either on the same day or on a subsequent day. Gonioscopy was done by Goldmann three mirror gonioscope in all the cases. This helped in classifying the glaucoma into the various subtypes and to record changes like peripheral anterior synechia, pigmentation of trabeculum strampollis line, angle configuration, any neovascularization, PEX material, angle recession etc. Intra ocular Islam MA, *et al.,* Eastern Medical College Journal EMCJ. July 2022; 7 (2) 18 pressure (IOP) was recorded with either the Goldman or Perkins applanation tonometer or this was used throughout the study. Visual fields were tested with the Humphrey Field Analyzer using the threshold 24-2 or 30-2 test strategy. SITA programme was used in selected patients who had good vision and were cooperative and analyses of data was performed. P value of < 0.05 was considered significant. Visual field tests were judged to be reliable if fixation losses <33%, false positives <40%, and false negatives <33%. Reliable tests showing defects >5 dB in depth in an area 12˚x12˚ were considered probably glaucomatous, while those consistent with definite glaucoma were >10 dB in depth and 18˚x12˚. It was required that the cluster of points in these areas be confined to one horizontal hemi field. The four points along the superior margin of the field were disregarded in grading, as were the nine points surrounding the blind spot. Medical files of all patients were retrieved and evaluated through standardized international guidelines. The specific type of glaucoma was determined based on the clinical presentation, optic nerve-head findings, gonioscopic

findings, slit lamp, IOP and visual-field changes. The eye with the worse visual acuity and/or visual-field defect was included in the analyses.

RESULTS

PACG (45%), POAG (32%), LIG (12%), NTG (6%), Juvenile glaucoma (2%), Congenital glaucoma (1%), NVG (1%) and Aphakic & others glaucoma (1%).

Table-1: Distribution of different glaucoma type by prevalence

Glaucoma Type	Prevalence (%)
Primary Angle Closure Glaucoma (PACG)	45%
Primary Open Angle Glaucoma (POAG)	32%
Secondary Glaucoma (LIG)	14%
Normal Tension Glaucoma (NTG)	6%
Juvenile Glaucoma	2%
Congenital Glaucoma	1%
Neovascular Glaucoma (NVG)	1%
Aphakic & Others Glaucoma	1%

Normal, visually impaired (VI), severely visually impaired (SVI) and blind. Most of the patients (47%) were with normal vision and 5% were blind.

Table-2: Visual status at the time of presentation

Visual Status	Percentage (%)
Blind	5%
Severely Visually Impaired (SVI)	14%
Normal Vision	47%
Visual Impairment (VI)	30%

Table-3 presents the intraocular pressure (IOP) distribution in the studied subjects. For the right eye, 25.65% of patients had an IOP less than 20 mmHg, 39.8% had an IOP between 21-35 mmHg, and 32.47% had an IOP greater than 35 mmHg. A small percentage (1.04%) had phthisical eyes with an IOP below 6 mmHg, and 1.04% had their IOP not measured. The mean IOP for the right eye was 26.29 mmHg. Similarly, for the left eye, 27.55% of patients had an IOP less than 20 mmHg, 40.8% had an IOP between 21-35 mmHg, and 30.11% had an IOP greater than 35 mmHg. Phthisical eyes accounted for 1.04%, and 0.5% had their IOP not measured. The mean IOP for the left eye was 26.37 mmHg.

Table-3: Intraocular pressure (IOP) observed in studied subject

IOP (mmHg)	Right Eye (%)	Left Eye (%)
<20	25.65	27.55
21-35	39.8	40.8
>35	32.47	30.11
Phthisical (<6)	1.04	1.04
Not measured	1.04	0.5
Mean IOP	26.29	26.37

The gonioscopic findings in the studied subjects revealed that the majority of eyes had narrow angles, with 56.15% in the right eye and 53.88% in the left eye. A smaller proportion of eyes showed open angles, with 34.75% in the right eye and 35.24% in the left eye. Closed angles were observed in 9.1% of the right eyes and 10.88% of the left eyes, indicating a significant presence of narrow and closed angles in the studied population.

Table-4: Gonioscopic findings in studied subject

Gonioscopic Findings	Right Eye (%)	Left Eye (%)
Open	34.75	35.24
Narrow	56.15	53.88
Closed	9.1	10.88

DISCUSSION

The most common types of glaucoma observed in a tertiary government hospital were PACG, POAG, and lens-induced glaucoma8. Many patients presented late in the course of the disease, with a high percentage of those having no light perception (NLP), particularly in

cases of PACG and secondary glaucoma. Higher intraocular pressure (IOP) was also noted in these groups, along with poorer vision, reflecting the severity of glaucomatous optic neuropathy (GON) [9]. PACG leads to significant destruction of the eye, characterized by advanced GON, loss of central vision, and uncontrolled IOP due to drainage angle closure, either acutely or chronically, which eventually becomes unresponsive to medical or laser treatment [10]. Conversely, POAG is typically associated with a gradual rise in IOP, which is generally responsive to medical therapy, and vision loss tends to occur later if left untreated [11]. Lens-induced glaucoma, specifically the phacomorphic type, involves a rapid IOP increase due to angle closure caused by a pupillary block resulting from increased contact between the lens and the iris [12]. If untreated, this condition can lead to total vision loss and permanent angle closure [13]. The delay in treating the enlarged cataractous lens in phacomorphic glaucoma resulted in complications such as glaucoma, underscoring that patients at government referral hospitals tend to seek medical care late, often presenting with more advanced disease and complications [14]. Among the glaucomas studied, PACG was found to be the most common subtype (45%), which aligns closely with findings from a center-based study in North India (36.6%) [15]. Another study from North India supports this, confirming that chronic PACG is the most prevalent subtype of PACG9. While many Western studies report POAG as more common than PACG globally [16], population-based studies from Asia and the Far East, particularly in countries with large populations like China and India, show that closed-angle glaucoma is more prevalent than open-angle glaucoma [17]. A survey conducted 40 years ago at the University of the Philippines-Philippine General Hospital (UP-PGH) found PACG and POAG to be the most common types of glaucoma, comprising 35% and 31% of total cases, respectively [11]. In both surveys, PACG was more prevalent than POAG. However, it is important to exercise caution when drawing conclusions about PACG being the predominant type of glaucoma in the Philippines, as the patients attending UP-PGH tend to seek care late (83.2% after >6 weeks), often only when symptoms such as acute pain (14.5%) or blurred vision (67.5%) appear. These symptoms were the most common reasons for consultation (82%), suggesting that the study population was biased toward more severe disease. Similar to other studies [12-14], this study showed that PACG patients were typically older, female, had higher IOP, poorer visual acuity, and a larger percentage with NLP. POAG, on the other hand, was more common among males and responded well to medical therapy (70%), whereas most PACG patients required either surgical (37.5%) or laser treatment (20.5%). In conclusion, PACG and POAG are the two most prevalent types of glaucoma seen in patients seeking treatment at a government tertiary eye hospital. However, due to the selective nature of the patient population at this institution, any conclusions about the relative prevalence of the two types of glaucoma in the country would be premature. A population-based study is necessary to accurately determine the incidence and prevalence of glaucoma in Bangladesh.

CONCLUSION

The most prevalent form of glaucoma seen in the outpatient department of a large eye-care center in the southern region of Bangladesh is primary angle-closure glaucoma. At the time of presentation, 5% of glaucoma patients were blind, and 14% were severely visually impaired. For more than one-quarter of the patients, trabeculectomy was recommended as the preferred treatment. This study aims to define the profile of glaucoma patients from remote areas of southern Bangladesh. Although it is a single-center study, it offers insights into the severity of glaucoma, the characteristics of its various subtypes, and potential interventions in this region. It may also serve as valuable background information for planning population-based glaucoma studies and developing strategies to combat glaucoma-related blindness in the area. Additionally, lens-induced glaucoma was found to be the most common form of secondary open and closed-angle glaucoma.

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