


Clinico-epidemiological Study of Patients with Glaucoma in a Tertiary Eye Center, Nepal

Nirsara Shrestha¹ , Sangeeta Shrestha¹, Deepak Khadka¹, Arjun Shrestha¹,
Barsha Suwal¹, Samata Sharma¹, Rajan Shrestha¹

¹B. P. Eye Foundation, Hospital for Children, Eye, ENT and Rehabilitation Services (CHEERS), Bhaktapur, Nepal

ABSTRACT

Introduction: Major cause of irreversible blindness is glaucoma which is increasing as a significant global health problem. Knowledge of glaucoma burden and its clinical characteristics in this region is essential.

Materials and methods: This was a cross-sectional hospital -based study conducted at Glaucoma unit in CHEERS Hospital, Bhaktapur from August 2015 to July 2019. Patients' demographic profile, along with comprehensive eye examination findings were reviewed from the records. Data analysis was done with IBM SPSS version 24 and was presented in mean (\pm SD), frequency and proportions and a chi- square test was applied. P value < 0.05 was considered statistically significant.

Results: Total of 310 glaucoma cases were included in this study. The mean age presentation was 61.89 ± 14.4 years, and the majority of patients (52.9%) were in the age group 60-79 years. Most patients had primary open angle glaucoma (171, 55.2%) followed by primary angle closure glaucoma (92, 29.7%).

Conclusion: Primary open angle glaucoma is the most common form of glaucoma. The proportion of glaucoma increased with increasing age (> 40 years). Provision of screening programs targeting persons with risk factors and opportunistic eye examinations would be beneficial in detection of glaucoma.

Key words: Glaucoma, Primary angle closure glaucoma, Primary open angle glaucoma.

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Corresponding Author

Dr. Nirsara Shrestha
Department of Ophthalmology,
Hospital for Children, Eye, ENT and Rehabilitation Services
(CHEERS),
Bhaktapur, Nepal
E-mail: nirsara.shrestha@gmail.com



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INTRODUCTION

The burden of glaucoma is significantly increasing as a global health problem. The prevalence of glaucoma worldwide is 3.54% (Tham et al, 2014). It was predicted that glaucoma will affect 79.6 million people in 2020 and 111.8 million people in 2040 worldwide (Quigley et al, 2006; Tham et al, 2014). The prevalence of glaucoma ranges from 0.94% to 1.9 % in Nepal (Sah et al 2007; Thapa et al, 2012). Early detection and timely management of glaucoma may decrease the burden of blindness.

Primary open angle glaucoma (POAG) constituted 74% of all glaucoma cases (Quigley et al, 2006). The prevalence of glaucoma and subtypes vary with sex, age, geographical location, and race (Tielsch et al, 1991). Studies have shown that primary-angle closure glaucoma (PACG) was more common in Asian population in comparison to Africans and Europeans. Whereas, persons with African descent were found to be at a higher risk of glaucoma as compared to white Caucasians in the United States (Tielsch et al, 1991; He et al, 2006).

This study targeted the people of Bhaktapur with the aim to describe clinical characteristics and epidemiology of glaucoma patients attending CHEERS Hospital, Bhaktapur. This study was expected to provide the burden of glaucoma and its associated risk factors, which in turn would be beneficial to plan screening programs and management protocol.

MATERIALS AND METHODS

This was a descriptive cross sectional study conducted among glaucoma patients attending Glaucoma Unit at B.P. Eye Foundation, Hospital for Children, Eye, ENT and Rehabilitation Services (CHEERS) between August 2015 and July 2019. Ethical approval was obtained from Nepal Health Research Council (NHRC Reg' no. 620/207-9) prior to the study. All glaucoma patients aged 20 years and above who presented in the Glaucoma Unit during the study period were included in the study. Those patients with incomplete records were excluded. Data collection was done through the hospital record review.

Data was collected in predesigned proforma which included the patient's demographic profile, duration of illness, family history of glaucoma, history of prolonged steroid medication as well as a history of any prior ocular trauma or ocular surgery were included. History of any systemic illness, hypertension and diabetes mellitus were noted. All the patients had undergone comprehensive eye examination. Visual acuity was determined with a Snellen chart. Intraocular pressure (IOP) was measured with the Goldman applanation tonometer. Vertical cup-disc ratio was evaluated with the 90D Goldman lens. Gonioscopy was performed using the Zeiss 4-mirror lens. Visual field was tested with the Humphrey Field Analyzer (Carl Zeiss Meditech, Inc. Dublin, CA). A digital photograph of the optic nerve head was taken. Central corneal thickness (CCT) was measured.



Disc optical coherence tomography (OCT) was done where necessary (TOPCON 3D ver.8.20).

The specific type of glaucoma was determined based on the clinical presentation, optic nerve-head findings, visual-field changes, intraocular pressure (IOP), and gonioscopy findings. Patients were categorized into subgroups- primary openangle glaucoma (POAG), primary angle-closure glaucoma (PACG) and secondary glaucoma (SG) as per following diagnostic criteria (Sah et al 2007).

1. Primary Open Angle Glaucoma was defined as IOP ≥ 21 mmHg associated with either glaucomatous optic disc abnormalities or glaucomatous visual field abnormalities or with both. The chamber angle had to be open and normal appearing by gonioscopy.
2. Normal tension Angle was defined as IOP ≤ 21 mmHg associated with either glaucomatous optic disc abnormalities or glaucomatous visual field abnormalities or with both. The chamber angle had to be open and normal appearing by gonioscopy.
3. Primary Angle Closure Glaucoma was defined as IOP ≥ 21 mmHg associated with either glaucomatous optic disc abnormalities or glaucomatous visual field abnormalities or with both, associated with one or more of the following criteria
 - a. Anterior chamber angle is partially or totally closed, a very narrow angle clearly prone to occlusion

b. Synechiae in angle

c. Absence of signs of secondary angle closure

4. Secondary Glaucoma: IOP ≥ 21 mmHg associated with either glaucomatous optic disc abnormalities or glaucomatous visual field abnormalities or with both, associated with evidence secondary to other eye disorders, medical or surgical treatment or trauma.

IBM SPSS version 24 was used for data analysis. The data was presented in mean (\pm SD), frequency, proportion and chi-square test was applied. P value < 0.05 was considered statistically significant.

RESULTS

Among 331 glaucoma patients presented during the study period, records of 21 patients were incomplete and excluded from the analysis. 310 glaucoma patients' records were reviewed and included in the final analysis. The mean age of patients was 61.89 ± 14.4 years (range 20-96 years). The majority of patients (164, 52.6%) were in the age group 60-79 years (Table 1). Glaucoma was mostly observed after the age of 40 years and above which was statistically significant (Table 1). There was slight female predominance (163, 52.9%) among the participants. The mean IOP for all types of glaucoma was 16.78 ± 8.4 mm Hg and CCT was 528.6 ± 35.4 μ m.

Table 1: Demographic distribution, gender and family history with glaucoma diagnosis.

Parameters		Frequency (%) (n=310)	P-value (χ^2 test)
Age Category (years)	20-39	26 (8.4%)	< 0.001
	40-59	91 (29.4%)	
	60-79	164 (52.9%)	
	80-99	29 (9.4%)	
Gender	Male	147 (47.4%)	0.36
	Female	163 (52.6%)	
Ethnicity	Janajati	262 (84.5%)	< 0.001
	Brahmin/ Chhetri	36 (11.6%)	
	Thakuri/ Sanyasi	6 (1.9%)	
	Madhesi	5 (1.6%)	
	Muslim	1 (0.3%)	
Family history of glaucoma	Present	12 (3.9%)	< 0.001
	Absent	298 (96.1%)	

Twelve (3.9%) patients had a family history of glaucoma. Majority of patients were POAG (171, 55.2%) followed by PACG (92, 29.7%) and SG (47, 15.1%). NTG was observed in

65 (59.6%) among patients with POAG. The proportion of male gender was higher among POAG , whereas female gender was higher in PACG (Figure 1).

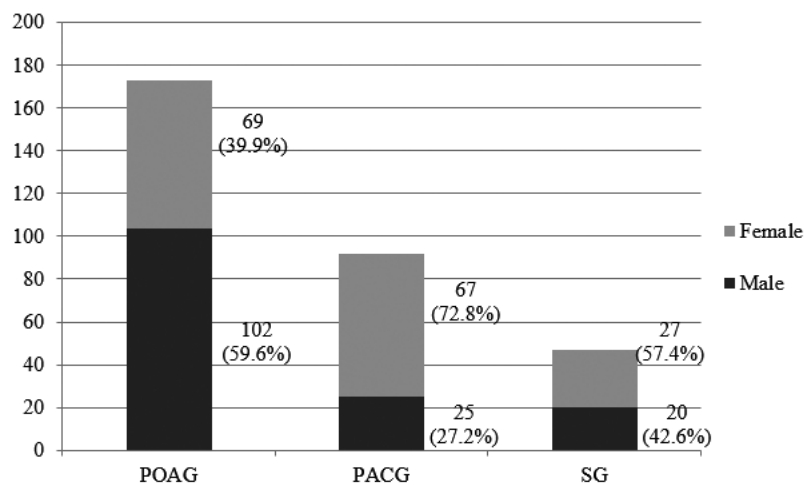


Figure 1: Gender and type of glaucoma.



Maximum numbers of glaucoma patients were observed in Janajati (262, 84.5%) followed by Brahmin/Chhetri (36, 11.6%), Thakuri/Sanyasi (6, 1.9%), Madhesi (5, 1.6%) and Muslim (1, 0.3%). Most of the patients (236, 76.1%) were newly diagnosed glaucoma and 74 patients (23.9%) were known cases of glaucoma, who were already diagnosed at other centers.

DISCUSSION

Increasing age is considered as an important risk factor for glaucoma (McMonnies CW, 2017). The mean age presentation was 61.89 ± 14.4 years in our study. This result was in concordance with other studies (Thapa et al, 2012; Paudyal et al, 2011; Baskaran et al, 2015; Jackson et al, 2014). Proportion of glaucoma increased with increasing age beyond 40 years, which was also observed in other studies from Nepal (Sah et al 2007, Rijal et al, 2005), India (Mehta et al, 2017) and Nigeria (Kyari et al, 2015). Prevalence of glaucoma was shown to increase with advancing age in a population based Nigerian study; 1.5% in 40-49 years, 3.69% in 50-59 years, 8.85% in 60-69 years and 16.85% in 70-79 years. However, the prevalence decreased to 12.32% in 80-89 years (Kyari et al, 2015).

There was no significant difference in gender. This finding was inconsistent with other studies (Thapa et al, 2012; Paudyal et al, 2011; Baskaran et al, 2015; Jackson et al, 2014). In some studies male predominance was seen (Paudyal et al, 2011; Leibowitz et al, 1980), on contrary some studies showed female predominant (Mehta et

al, 2017; Al et al, 2011) this difference in gender distribution may be influenced by different criteria, regional and ethnic diversity in various study groups.

The mean IOP (\pm SD) was 16.78 ± 8.4 mmHg which was comparable to other studies (Baskaran et al, 2015; Ashaye et al, 2013; Khawaja et al, 2016).

Previous population-based studies have demonstrated ethnic and racial variations in the prevalence of glaucoma (Murakami et al, 2011). This study showed a significant association of glaucoma with Janajati ethnicity. However, as this was a single center, hospital-based study in central Nepal, the definite relationship of ethnicity with glaucoma is difficult to establish with this study. This is because of the presence of a discernible pattern to geographical spread of different ethnic groups in Nepal (Pradhan et al, 2005).

Proportions of common types of glaucoma were compared with previous studies in Nepal (Table 2). The results of this study were comparable to Bhaktapur Glaucoma Study (Thapa et al, 2012) and Podyal I et al (Paudyal et al, 2011), whereas studies by Sah RP et al (Sah et al 2007) and Rijal AP et al (Rijal et al, 2005) showed POAG as the commonest, followed by SG and PACG. The proportion of NTG among patients with POAG in Asian population ranged 52%-92% (Cho et al, 2014). The percentage of NTG among patients with POAG was 59.6% which was similar to 52% in an Indian study (Ramakrishnan et al, 2003) and 56% in a Nigerian study (Kyari et al, 2015).

Table 2: Comparison of glaucoma diagnosis with previous Nepalese studies.

Name of study	Study type	Sample size	POAG (%)	PACG (%)	SG (%)
Rijal AP (2005) (7)	Hospital based	Glaucoma patients 827	57.3	19.9	20.8
Sah RP, et al (2007) (3)	Population based	1600 screened Glaucoma patients 15	60	13.3	26.7
Podyal I, et al (2011) (8)	Hospital based	Glaucoma patients 447	38.2	32	19.4
Bhaktapur Glaucoma study (2012) (4)	Population based	3991 screened Glaucoma patients 75	68	22.7	9.3
Present study 2020	Hospital based	Glaucoma patients 310	55.2	29.7	15.1

POAG is observed as the most common type of glaucoma in most population-based Asian studies (Cho et al, 2014). The Tajimi Study showed that the prevalence of POAG was the highest (Iwase et al, 2004). However, studies from Myanmar (Casson et al, 2007), Mongolia (Foster et al, 1996) and Harbin, China (Qu et al, 2011) showed the prevalence of PACG higher than that of POAG. The prevalence of POAG and PACG remain disputed among different Asian populations. Such differences could be because of dissimilar different criteria to define glaucoma, geographic or genetic factors (Baskaran et al, 2015).

Identification of glaucoma patients in the early stage and institution of treatment before the onset of visual impairment is the major goal of glaucoma screening. Screening for glaucoma in persons aged 40 years and above, and/or family members of glaucoma patients as shown in this study would help in early identification of glaucoma.

Retrospective hospital-based study was the major limitation of this study. In our study, certain race groups showed a very small sample. Future studies with a larger population and broader geographical area will help to address this issue.

CONCLUSION

POAG was the predominant glaucoma and the proportion of glaucoma increased significantly with advancing age. Opportunistic eye examinations and screening programs targeting people aged more than 40 years and above, and/or those with family history of glaucoma will be beneficial in detecting glaucoma at an early stage and thus salvaging the vision.



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