PROFILE OF GLAUCOMA PATIENTS AT A TERTIARY CARE CENTRE IN GOKARNESHWOR, KATHMANDU, NEPAL

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ABSTRACT

Glaucoma is a progressive optic neuropathy characterized by irreversible optic nerve damage and progressive visual field loss. It is the second leading cause of global irreversible blindness. The objective of this study was to find the prevalence, clinical profile and distribution of various types of glaucoma in patients attending a tertiary care center of Kathmandu. This was a retrospective, descriptive hospital based study conducted at glaucoma clinic at tertiary care center from March 2022 to February 2024 (24 months). Patients' demographic profile along with comprehensive eye examination findings were reviewed from the records. Data analysis was done with SPSS version 18 and chi-square test was used for analysis. P value <0.05 was considered as statistically significant. Two hundred and four patients were diagnosed with glaucoma during 2 years period. The Mean age among glaucoma patients was 55.12 ± 16.7 years. Female was common 109 (53.4%) than male 95 (46.6%). Open angle was 185 (90.7%) and close angle was 19 (9.3%) on gonioscopy. Prevalence of glaucoma seen in this study was 0.72% of total outpatients (27,970). Among the glaucoma patients, primary open angle glaucoma (POAG) was more common 84 (41.2%) followed by glaucoma suspect 46 (22.5%), normal tension glaucoma (NTG) 26 (12.7%), primary angle closure disease 19 (9.4%), ocular hypertension (OHT) 12 (5.9%), secondary glaucoma 9 (4.4%) and juvenile open angle glaucoma (JOAG) 8 (3.9%). In primary angle closure disease, primary angle closure glaucoma (PACG) was 10 (4.9%), angle closure attack 5 (2.5%) and primary angle closure suspect (PACS) 4 (2%). The most common secondary glaucoma was pigmentary glaucoma 3 (1.5%) followed by steroid induced glaucoma 2 (1%), neovascular glaucoma 2 (1%) and inflammatory glaucoma 2 (1%). The most common type of glaucoma seen in a tertiary care center of Nepal was POAG. Glaucoma was more prevalent in female patients after forty years. The prevalence of glaucoma increases with increasing age. So, the patients above the age of 40 should be screened for glaucoma for early detection and prompt treatment. Awareness of glaucoma is needed as it is one of the leading causes of blindness.

KEYWORDS

Glaucoma, prevalence, open angle glaucoma, angle closure glaucoma

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INTRODUCTION

Glaucoma is the second leading cause of world blindness and accounts for 15% of global blindness.[1] Glaucoma is characterized by progressive optic neuropathy resulting in a characteristic appearance of the optic disc and a specific pattern of irreversible visual field defects and raised intraocular pressure is one of important risk factors. The two most common types are POAG and PACG with different patterns of disease occurrence.[2] POAG is asymptomatic and tends to progress slowly whereas PACG can often present acutely with pain, corneal edema, blurring of vision, vomiting and the patient seek early medical attention. Loss of vision initially is in the form of loss of peripheral field but finally blindness may result due to no or inadequate treatment.[3] It has been estimated that 64.3 million people were affected by glaucoma globally, increasing to 76.0 million in 2020 and 111.8 million in 2040.[4] An estimated 3.2 % of the total blindness in this country was reportedly due to glaucoma in Nepal Blindness Survey done in 1981.[5] Since open angle glaucoma is asymptomatic, screening for this type of glaucoma becomes essential for early diagnosis and treatment.

The purpose of this study was to find the prevalence, demographic profile, various types of glaucoma, severity of glaucoma at presentation in patients attending glaucoma clinic at tertiary care center of Nepal.

MATERIALS AND METHODS

This was a descriptive, retrospective hospital based study among glaucoma patients attending Nepal Medical College Teaching Hospital (NMCTH) from March 2022 to February 2024 (24 months). Patients' demographic profile along with comprehensive eye examination findings were reviewed from the records. Total 204 glaucoma patients were analyzed for the study. All the patients had undergone comprehensive eye examination. Visual acuity was determined with a Snellen vision chart. Vertical cup-disc ratio (CDR) was evaluated with the +90D Goldman lens. Intraocular pressure (IOP) was measured with Goldman applanation tonometer. Gonioscopy was performed using the Sussman 4-mirror goniolens and angle was graded according to Shaffer system. Central corneal thickness (CCT) was measured by ultrasonic Nidek pachymeter. Visual field examination was done with Zeiss Humphrey Field Analyzer.

The various subtypes of glaucoma were diagnosed by following standard definition:

POAG: It is characterized by 360° open angles and IOP (>21 mmHg) associated with either glaucomatous disc damage or visual field changes suggestive of glaucoma.

OHT: Raised IOP >21 mmHg in the absence of disc and field changes. (24 hour IOP estimation was performed).

NTG: Similar to POAG but IOP <21 mmHg on more than one occasion.

Juvenile open angle glaucoma: Onset of POAG at a young age (between 16 and 40 years) was termed JOAG.

Primary angle closure disease: It includes Primary angle closure suspects (PACS), primary angle closure (PAC) and primary angle closure glaucoma (PACG).

PACS: Closed angles, normal IOP, normal optic disc

PAC: Closed angles, high IOP, normal optic disc

PACG: Closed angles, high IOP, glaucomatous cupping

Secondary glaucoma: glaucoma with an identifiable secondary cause of raised IOP with glaucomatous cupping.

Glaucoma suspect: Eyes that do not have glaucoma but have optic disc or RNFL features that are highly suspicious of glaucoma.

Records were analyzed according to age, gender, ethnicity, CDR, IOP, gonioscopic findings and type of glaucoma. Data analysis was done with SPSS version 18 and chi-square test was used for analysis. P value <0.05 was considered as statistically significant.

RESULTS

A total of 27,970 patients attended Ophthalmology OPD at NMCTH from March 2022 to February 2024 (24 months). A total of 204 patients were found to have glaucoma giving a prevalence rate 0.72% in this hospital based population. In our study, the prevalence of POAG was 0.3%, glaucoma suspect 0.16%, NTG 0.09%, primary angle closure disease 0.06%, OHT 0.04% and secondary glaucoma 0.03%.

The mean age of patients was 55.12years ± 16.7 (range 20 to 89 years) at presentation. Patients above 40 years of age were 77.5%. The majority of patients (21.1%) were in age group 61-70 years. As the age increases glaucoma was more prevalent (p= <0.001) (Table 1).

Age	POAG	Glaucoma suspect	NTG	OHT	PACG	Angle closure attack	PACS	Secondary glaucoma	Juvenile glaucoma	n (%)	P value
20-30	0	12	0	5	0	0	0	1	3	21 (10.3)	
31-40	5	10	2	1	1	0	0	1	5	25 (12.3)	
41-50	19	8	3	3	0	0	1	0	0	34 (16.7)	
51-60	17	9	6	1	2	0	0	3	0	38 (18.6)	<0.001
61-70	20	2	9	1	5	4	1	1	0	43 (21.1)	
71-80	16	5	5	0	1	1	2	2	0	32 (15.7)	
81-90	7	0	1	1	1	0	0	1	0	11 (5.4)	
Total	84	46	26	12	10	5	4	9	8	204	

Table 1: Distribution of glaucoma with age

Table 2: Distribution of patients according to gender:

Characteristics	n	%	P value
Gender			
Female	109	53.4%	0.44
Male	95	46.6%	
Total	**204**	**100%**	

significant association between ethnicity and glaucoma (p=.002) (Table 3).

The mean vertical cup disc ratio was 0.65 ± 0.16, ranging from 0.2:1 to 0.95:1. According to cup disc ratio, mild glaucoma (CDR ≤0.65) was seen in 90 (44.1%), moderate glaucoma (CDR 0.7 to 0.85) was seen in 96 (47.1%) and severe glaucoma (CDR ≥ 0.9) was seen in 18 (8.8%) at

Table 3: Association between ethnicity and type of glaucoma

Ethnicity	POAG	Glaucoma Suspect	NTG	Ocular HTN	PACG	Angle Closure attack	PACS	Secondary glaucoma	JOAG	Total	P value
Indoaryan	31	14	6	3	9	1	3	6	1	74	.002
Tibetomongolian	53	32	20	9	1	4	1	3	7	130	
Total	84	46	26	12	10	5	4	9	8	204	

Table 4: Distribution of severity of glaucoma

Cup disc ratio	n	%	P value
≤ 0.65 (Mild)	90	44.1	
0.7-0.85 (Moderate)	96	47.1	**<0.001**
≥0.9 (Severe)	18	8.8	
Total	**204**	**100.0**	

Fig. 1: Distribution of different types of glaucoma

Majority of patients were female 109 (53.4%) than male 95 (46.6%). Female were more with POAG, PACG, NTG, OHT, secondary and JOAG whereas male were commonly seen in glaucoma suspect and angle closure attack. There was no significant association between gender and glaucoma (p=0.44) (Table 2). Regarding the ethnicity, Tibetomongolian were 130 (63.7%) and Indoaryan were 74 (36.3%). There was a
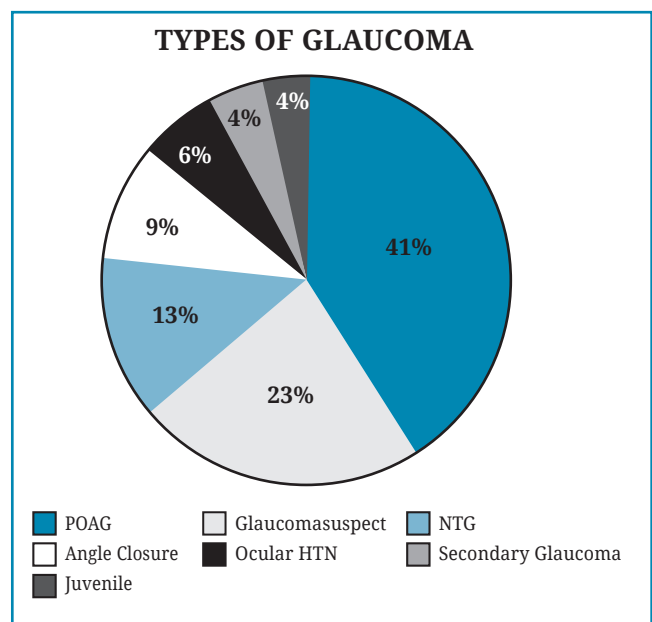
IOP	POAG	Glaucoma suspect	NTG	Ocular HTN	PACG	Angle Closure attack	PACS	Secondary glaucoma	Juvenile glaucoma	Total	P value
10-20	57	46	26	2	5	0	4	2	5	147	
21-30	27	0	0	10	5	1	0	4	3	50	
31-40	0	0	0	0	0	1	0	3	0	4	<0.001
41-50	0	0	0	0	0	2	0	0	0	2	
51-60	0	0	0	0	0	1	0	0	0	1	
Total	**84**	**46**	**26**	**12**	**10**	**5**	**4**	**9**	**8**	**204**	

Table 5: Association between intraocular pressure and type of glaucoma

Table 6: Association between gonioscopic angle and glaucoma

Angle	n	%	P value
Open	185	90.7%	<0.001
Close	19	9.3%	
Total	**204**	**100%**	

Table 7: Comparison of prevalence of glaucoma with previous Nepalese studies

Name of study	Study type	Prevalence
National blindness survey[5]	Population based	3.2%
Sah RP[6]	Population based	0.94%
Thapa SS[7]	Population based	1.9%
Rijal AP[8]	Hospital based	0.74%
Present study	Hospital based	0.72%

the time of diagnosis. There was a significant association between severity and type of glaucoma (p=<0.001) (Table 4). The mean IOP for all type of glaucoma was 18.4± 6.1 mmHg (range 10 to 54 mm Hg) and CCT was 532.32 ± 36.54 μm (range 425 to 622 μm). There was a significant association between IOP and type of glaucoma (p=<0.001) (Table 5). On gonioscopic findings, open angle was seen in 185 (90.7%) and angle closure in 19 (9.3%). There was a significant association between gonioscopic angle and type of glaucoma (p=<0.001) (Table 6).

Among the glaucoma patients POAG was more common 84 (41.2%) followed by glaucoma suspect 46 (22.5%), NTG 26 (12.7%), primary angle closure disease 19 (9.4%), Ocular HTN 12 (5.9%), secondary glaucoma 9 (4.4%) and JOAG 8 (3.9%). In primary angle closure disease, PACG was 10 (4.9%), angle closure attack 5 (2.5%) and PACS 4 (2%). The most common secondary glaucoma was pigmentary glaucoma 3 (1.5%) followed by steroid induced glaucoma 2 (1%), neovascular glaucoma 2 (1%) and inflammatory glaucoma 2 (1%) (Fig. 1).

DISCUSSION

Glaucoma is one of the most common causes of irreversible blindness in the world, majority of which remains undetected. This was a descriptive, retrospective hospital based study to evaluate the prevalence, demographic profile, different types of glaucoma and the severity of disease at the time of presentation of patients attending glaucoma clinic during 2 years of tertiary eye care center of Nepal. A total of 204 patients were found to have glaucoma giving a prevalence rate 0.72% in this hospital based population. The global prevalence of glaucoma for population is 3.54%.[4] However the prevalence was more in population based study done in Nepal by National blindness survey (3.2%),[5] Sah et al (0.94%)[6] and Thapa et al[7] study (1.9%) than our study. Similar to our study, prevalence of glaucoma was 0.74% in hospital based study done by Rijal AP[8] (Table 7). In our study, the prevalence of POAG was 0.3%, glaucoma suspect 0.16%, NTG 0.09% and primary angle closure disease 0.06%. The prevalence of POAG, PACG, secondary glaucoma and ocular hypertension were 0.562%, 0.125%, 0.250% and 0.500% respectively.[6] The prevalence of glaucoma was 2.6% and POAG was 1.7% and PACG 0.5% in rural population of Southern India study done by Ramakrishnan

et al.[9] Since this was hospital based study, prevalence was lower in compare to other population based study. These differences in prevalence could vary based on number of patients visited our center.

Several studies have shown that the prevalence of glaucoma increases with age.[9] The mean age of patients was 55.12±16.7 years in our study. The majority of patients (21.1%) were in age group 61-70 years which was similar to studies done by Thapa *et al,*[7] Sharma *et al,*[10] Shrestha *et al.*[11] Our study also showed the patients above 40 years were (77.5%) which was similar to studies from Sah *et al*[6], Rijal AP.[8] Similar to our study in Munteanu *et al*[12], the mean age of glaucoma patients was 60.81 ± 12.14 years with high frequencies in the 55-69 age groups. As the age increases, the drainage system cannot function properly resulting in an increase in IOP.[13] Our study stated that as the age increases glaucoma was more prevalent (p= <0.001) which was stastistically significant.

In our study there was a slight female predominance (109, 53.4%) than male (95, 46.6%) among the glaucoma patients which was similar to study by Sah *et al*[6] where female (811, 50.7%) participants was higher than that of the male (789, 49.3%). Female were more with POAG, PACG, NTG, OHT, secondary and JOAG whereas male were commonly seen in glaucoma suspect and angle closure attack. Unlike our study, male preponderance has been seen in POAG, NTG, JOAG and secondary glaucoma whereas female were more in OHT, PACG and developmental glaucoma.[14] There was no difference among genders seen in studies by Thapa et al,[7] Rijal AP,[8] Sharma *et al,*[10] Shrestha *et al.*[11]

Unlike our study, in study by Shrivastava VK,[15] male (65.62%) were more prevalent than female (34.37%). In another study also 3,735 (61%) male and 2,385 (39%) female patients were present in Seth *et al.*[16] There was no significant association between gender and type of glaucoma (p=0.4) in our study.

Regarding the ethnicity, 130 (63.7%) were Tibetomongolian and 74 (36.3%) were Indoaryan in this study. In Sharma *et al,*[10] Shrestha *et al*[11] studies, glaucoma was more prevalent in Janajati ethnicity which was similar to our study. There was a significant association between ethnicity and type of glaucoma (p=0.002).

The mean vertical CDR was 0.65±.16 in our study. Mild glaucoma (CDR ≤0.65) was seen in 90 (44.1%) eyes, moderate glaucoma (CDR 0.7 to 0.85) was seen in 96 (47.1%) and severe glaucoma (CDR ≥0.9) was seen in 18 (8.8%) at the time of diagnosis. There was a significant association between severity and type of glaucoma (p= <0.001). Unlike our study in Sah *et al*[6], 1303 (81.45%) had CDR of 0.3:1. Similar to our study, the mean CDR was 0.7 ± 0.003 in a study by Seth *et al.*[16]

The mean IOP for all type of glaucoma was 18.4±6.1 mm Hg which was almost similar to other studies like Shrestha *et al*[11], Seth *et al.*[15] The mean IOP was lower 13.3 mmHg in Thapa *et al*[7] in compare to our study. In our study mostly 147 (72%) had IOP between 10 to 20 mmHg, 50 (24.5%) had 21-30 mmHg and 4 (2%) had 31-40mmHg which was similar to study by Sah RP[6] where majority (98%) had IOP between 11 to 20 mmHg and 1.4% had more than 20 mm Hg. There was a significant association between IOP and type of glaucoma (p= <0.001).

POAG was more common 84 (41.2%) followed by glaucoma suspect 46 (22.5%), NTG 26 (12.7%), primary angle closure disease 19 (9.4%), Ocular HTN 12 (5.9%), secondary glaucoma 9 (4.4%) and JOAG 8 (3.9%). The results were similar to other studies done in Nepal where POAG was the most common among glaucoma.[6,7,8,10,11,17] whereas in study done by Sarkar *et al*[18] in South East Nepal, PACG (35.3%) was more common than POAG (22.6%).

In various studies done at different part of world, majority of cases were POAG than PACG among glaucoma patients.[15,16,19,20,22] but in some studies PACG was more common than POAG.[14,21,23,24] These differences may be because of dissimilar different criteria to define glaucoma, geographic or genetic factors.[25]

In our study POAG was the most common type of glaucoma. The prevalence of all type of glaucoma was found to be 0.72% of hospital attending population. Glaucoma was significantly associated with increase in age. There was a slight female predominance among the glaucoma patients. Comprehensive eye checkup to screen glaucoma in hospital attending patients is a good measure for early detection and prompt treatment to avoid blindness due to glaucoma.

ACKNOWLEDGMENTS

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