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ORIGINAL RESEARCH ARTICLE

SCREENING AND AWARENESS OF GLAUCOMA IN FIRST DEGREE RELATIVES IN GLAUCOMA PATIENTS ATTENDING DEPARTMENT OF OPHTHALMOLOGY OF A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Glaucoma is the most common cause of irreversible blindness worldwide. Family history of Glaucoma is one of the major risk factors for glaucoma predisposition. Presence of family history of glaucoma is an important indication for screening of glaucoma. The main objective of this study was to determine the prevalence of glaucoma in first degree relatives and also to assess the level of awareness among them.

Methods: It was the hospital based cross-sectional study designed to screen, examine and diagnose glaucoma patient's first-degree relatives attending the outpatient department of Chitwan medical college from 30th March 2023 to 29th march 2024. All first-degree family members of glaucoma patients; who accompanied them to the glaucoma clinic, underwent a full ocular examination. Along with the general ophthalmological examination, the optic disc evaluation was done with slit lamp using 90D volk lens and intraocular pressure was measured with Goldmann applanation tonometry. Diagnosis was then defined as per ISGEO classification.

Results: Among 115 participants 22 (19.1%) were POAG suspect, 8 (7.0%) were primary open angle glaucoma, 24 (20.9%) were PACG suspect, 2 (1.7%) were chronic angle closure glaucoma and 59 (51.3%) had no any signs of glaucoma.

Conclusions: Ocular examination of the first-degree relatives accompanying glaucoma patients helps to screen a remarkable number of people with glaucoma and it can be an easy way to screen glaucoma cases in hospital settings.

INTRODUCTION

Glaucoma is one of the most common causes of blindness worldwide, and the second leading cause of irreversible blindness.[1] In Nepal, glaucoma is responsible for 1.7% to 5.9% of the total blindness.[2-5] The overall prevalence of glaucoma in Nepal is 1.9%.[6] First-degree relatives of POAG patients have 4–16% risk of developing POAG.[7] History of glaucoma in first degree relatives is considered a major risk factor for the development of glaucoma, which confirms a genetic predisposition of the disease.[7] First-degree relatives of the patients with glaucoma have a 10 times greater risk of developing glaucoma than those with no family history.[8] Majority of glaucoma patients are asymptomatic at the time of diagnosis but are found to have suffered an irreversible visual field loss.[9] Besides, Family history of POAG is also a major risk factor for the prevalence of angle closure glaucoma. Angle closure was more prevalent in both PACS siblings by 35.0% and PAC/PACG siblings by 36.7% as compared with OA siblings.[10] Siblings of Chinese patients with PAC or PACG have almost a 50% probability of having narrower angles than the general population.[11] Relatives of glaucoma patients are often unaware of the risk of glaucoma, sometimes even decades after treatment are initiated in their family.[12] The awareness of glaucoma is 2.4 % in the general population and is significantly lower in females as compared to males.[3]

Glaucoma is the preventable irreversible blinding disease. Early detection and treatment are the only way to limit the damage of the disease. This hospital-based screening is the easiest and earliest way of detecting the glaucoma. Chitwan Medical College is a tertiary level hospital providing treatment to millions of Nepalese and foreign nationals. As most of the glaucoma patients are asymptomatic, they are completely unaware of their disease condition. This type of study has been already conducted in Western and central part of Nepal but not in our part, so this study is expected to provide prevalence, demographics of patients, clinical findings and features, investigative findings in first degree relatives of glaucoma patients.

METHODS

This was the hospital based prospective cross-sectional study conducted at Chitwan Medical college from 30th March 2023 to 29th March 2024. The ethical clearance for the study was obtained from CMC-IRC (Ref: CMC-IRC/078/079-104)

$n= (Z^2 \times P \times Q) / e^2$
$= (1.96^2 \times 0.019 \times 0.981) / 0.025^2$
$=115$
Where n= required sample size
Z= 1.96 at 95% confident interval
P= prevalence of glaucoma reported by similar study
Q=1-p
E= Margin of error 2.5%

All of the accompanying person who were first degree relatives were included in the study after obtaining their informed consent. They were asked detail ocular history and underwent a comprehensive eye examination. History was obtained from the participants who accompanied the glaucoma patients. They were asked if they had heard about glaucoma? Is glaucoma and cataract the same disease? Does glaucoma run in family? If they have had glaucoma and had any treatment? A comprehensive ocular examination included visual acuity examination using Snellen chart, subjective refraction, Slit lamp bio-microscopy (Haag Streit BM 900 model), Intraocular pressure (IOP) measurement using Goldmann applanation tonometer, gonioscopy in needed cases using Zeiss 4 mirror gonio lens) where the angle was graded according to the Shafer grading system, and dilated fundus examination was done using Slit lamp bio-microscope with 90D lens and the vertical cup/ disk ratio, neural rim thinning, notching of optic nerve head, splinter hemorrhages, and retinal nerve fiber layer abnormalities were noted. Visual field testing was carried out on Humphrey Field analyzer, when the visual field showed glaucomatous defects, a second field was repeated at the same time to confirm the presence of the defects. Glaucomatous disc changes included, increase in vertical C:D ratio, focal notching, NRR thinning, disc hemorrhage, loss of nerve fiber layer, and cup asymmetry between the two eyes of > 0.2 when disc size was the same for both eyes.

Those patients with an IOP of less than 21 mmHg, without optic disc changes were considered to be normal. Those patients with an IOP of greater than or equal to 21 mmHg in either eye or with suspicious optic disc changes for glaucoma were termed primary open angle glaucoma suspects. The term primary angle- closure suspect (PACS) is defined by the presence of a narrow angle with ≥180° of appositional iridotrabecular contact, without overt signs of PAC (IOP elevation or PAS) or glaucomatous optic nerve damage. POAG was defined as those with open angles on gonioscopy, glaucomatous optic disc changes and visual field defects. PACG was defined as those with closed angles on gonioscopy more than 270 degrees, glaucomatous optic disc changes and visual field defects. Diagnosis was defined as per ISGEO classification.

All collected data were entered into SPSS 26 and analyzed.

RESULTS

A total of 115 participants, attending Chitwan Medical College from 30th March 2023 to 29th March 2024 were enrolled in the study. Among the 115 participants, 18 (15.7%) were below 40 years, 56 (48.7%) were 40-60 years and 41 (35.7%) were more than 60 years. 53 (46.1%) were male and 62 (53.9%) were female.

32 (27.8%) were Brahmin, 27 (23.5%) were Chhetri, 42 (36.5%) were Mongols and 12 (12.2%) others. Most of the patients were from urban area 95 (82.6%) and 20 (17.7%) were from rural areas. Most of the patient 82 (71.3%) were Hindus and 33 (28.7%) were Buddhist (Table 1).

Table 1: Socio-demographic data of the first-degree relatives accompanying glaucoma patients

Variable	n (%)
Age (In Years)	
<40	18 (15.7)
40-60	56 (48.7)
>60	41 (35.7)
Gender	
Male	53 (46.1)
Female	62 (53.9)
Religion	
Hindu	82 (71.3)
Buddhist	33 (28.7)
Area of Residence	
Urban	95 (82.6)
Rural	20 (17.4)
Ethnicity	
Brahmin	32 (27.8)
Chettri	27 (23.5)
Mongolian	42 (36.5)
Others	12 (12.2)

Table 2: Prevalence Glaucoma in first degree relatives

Presence of Glaucoma	n (%)
Offspring	3 (2.6%)
Siblings	5 (4.3%)
Cousins	2 (1.7)
Parents	0 (0%)
Screening Results of the participants	
No any signs of Glaucoma	59 (51.3)
POAG Suspects	22 (19.1)
Primary open angle Glaucoma	8 (7.0)
PACG Suspects	24 (20.9)
Chronic Angle Closure Glaucoma	2 (1.7)
Treatment received after screening and diagnosis	
Medical	8 (7.0)
Laser	17 (14.8)
Surgery	1 (0.9)

Though, 76 (66.1%) of the participants were educated, 48 (41.7%) of the participants only had heard about glaucoma.

Among those accompanies 5 (4.3%) of them were siblings, 2 (1.7%) cousins and 3 (2.6%) offspring. No parents were present as accompanies. Among 115 participants 22 (19.1%) were POAG suspects, 8 (7.0%) had primary open angle glaucoma, 24 (20.9%) were PACG suspect, 2 (1.7%) had chronic angle closure glaucoma and 59 (51.3%) had no any signs of glaucoma. In our study 26 (22.6%) underwent treatment of which 8 (7.0%) had medical, 17 (14.8%) had laser and 1 (0.9%) had surgical treatment (Table 2).

Awareness was assessed by asking questions like is glaucoma and cataract same disease? 76 (66%) had "yes" and 39 (33.9%) had "no" answer which gave ideas about it. Similarly, Does the glaucoma run in the family members? 46 (40.0%) had "No" answer and 69 (60.0%) had yes answer. Participants got information about glaucoma from different sources like, 21 (18.3%) heard from family and friends, 15 (13%) from attending accompany in hospital, 10 (8.7%) from social media and 2 (1.9%) through other sources (Table 3).

Table 3: Awareness regarding glaucoma

Knowledge regarding Glaucoma	n (%)
Is Glaucoma and Cataract the same disease?	
Yes	76 (66)
No	39 (33.9)
Does Glaucoma run in the family?	
Yes	46 (40.0)
No	69 (60.0)
Source of information regarding glaucoma	
Friends and family	21 (18.3)
Hospital Accompany	15 (13.0)
Social media	10 (8.7)
Others	2(1.9)

Most of the participants where asymptomatic 72 (62.6.1%), very few numbers of patient had redness 11 (9.6%), ocular pain10 (8.7%), decrease vision 10 (8.7%), headache 11 (9.6%) and color halos 1 (0.9%) (Table 4).

Table 4: Ocular symptoms among the participants

Symptoms among participants	n (%)
Asymptomatic	72 (62.6)
Redness	11 (9.6)
Ocular Pain	10 (8.7)
Decrease Visual Acuity	10 (8.7)
Headache	11 (9.6)
Colored Halo	1 (0.9)

Systemic illness was present in 100 (87%) participants, among which 5 (4.3%) had active tuberculosis, 48 (41.7%) had hypertension, 42 (36.5% had diabetes mellitus, 28 (24.3%) had thyroid disorder and 41 (35.7%) had obesity (Table 5).

Majority of the participants, right eye (58.3%) and left eye 84 (73%) had visual acuity between 6/6-6/18. On Gonioscopy 89 (77.4%) had open angle and 26 (22.6%) had angle closure. Humphrey field analyzer in both eyes was outside normal limit in 10 (8.7%). Nerve fiber layer defect was present in 16 (13.9%) in both eyes, and 5 (4.3%) in one eye. Peripapillary atrophy was present in both eyes in 12 (10.4%) and in one eye in 7 (6.1%). Splinter hemorrhage was present in 10 (8.7%). Thinning of Neuroretinal rim was present in 16 (13.9%) in both eyes, 5(4.3%) in one eye. Rubeosis iridis was present in 4 (3.5%) in both eyes and 2 (1.7%) in one eye. Intraocular pressure was high in 15 (13.0%) in both eyes and in one 4(3.5%). Cup disc ratio was more than 0.5:1 in 26 (22.6%) in both eyes and 6 (5.2%) in only one eye. The prevalence of glaucoma 10 (8.7%) and glaucoma suspect was 46 (40%) in first degree relatives of glaucoma patients (Table 6).

Table 5: Prevalence of Systemic diseases among the participants

Systemic illness among participants	n (%)
Diabetes Mellitus	42 (36.5)
Tuberculosis	5 (4.3)
Hypertension	48 (41.7)
Thyroid disorder	28 (24.3)
Obesity	41(35.7)

Table 6: Clinical findings among the participants

Clinical Parameters	Bilateral n (%)	Unilateral n (%)
Decreased vision	114	1
Gonioscopy (Open angle)	89	-
Gonioscopy (Angle closure)	26	-
Humphrey's field analyzer	10 (8.7)	-
Nerve fiber layer defect	16 (13.9)	5 (4.3)
Peripapillary atrophy	12 (10.4)	7 (6.1)
Splinter hemorrhage	10 (8.7)	-
Thinning of NRR	16 (13.9)	5 (4.3)
Rubeosis Iridis	4 (3.5)	2(1.7)
High IOP	15 (13.0)	4 (3.5)
C:D ratio ≥0.5	26 (22.6)	6 (5.2)

DISCUSSION

In our study, majority of patients 56 (48.7%) presented between 40-60 years which is similar to the study done by Shrestha et. all KUMJ 2022[13]. Majority of the cases were Mongolian 42 (36.5%) followed by 32 (27.8%) Brahmin, 27 (23.5%) were Chettri and remaining others. Mongolian had glaucoma due to anatomical configuration and is similar to study by Poudyal et all.[14] Among 115 patients 53 (46.1%) were male and 62 (53.9%) were female in our study. In our study 5 (4.3%) of siblings, 3 (2.6%) of offspring and 2 (1.7%) of cousins had glaucoma Systemic illness was present in 100 (87.0%) of patients, among which 48 (41.7%), 42 (36.5%), 41 (35.7%), 28 (24.3%) and 5 (4.3%) had HTN, DM, Obesity, Thyroid and tuberculosis respectively which is not shown by any other study. Diabetes had been deemed as a risk factor for POAG by some reports, however, epidemiologic studies of the relationship between diabetes and POAG are still controversial.

Several epidemiological studies have reported that an increase in systemic blood pressure (BP) is associated with a slight increase in IOP.[15] This is because the increase in BP increases episcleral venous pressure so that the aqueous clearance (excretion of aqueous humor) will decrease, which will cause an increase in IOP.[16] However, until recently, the relationship between BP and the incidence of glaucoma is still being debated. there is a lack of consistent epidemiologic evidence on associations between hypothyroidism and glaucoma. Several past studies have found significant associations between open-angle glaucoma and thyroid disorders.[17-20] A common thyroid condition, hypothyroidism, may lead to the deposition of mucopolysaccharides in the trabecular meshwork, which increases IOP as well as aqueous outflow resistance.[21,22] As our study center is the multidisciplinary hospital, so we had majority of patients with different systemic diseases.

Majority of the patients had best corrected visual acuity between 6/6-6/18 on RE 74 (64.3%) and LE 94 (81.7%). The prevalence of glaucoma 10 (8.7%) and glaucoma suspect was 46 (40%) in first degree relatives of glaucoma patients which is less than the study done by Bhandari RD et all[23] and high than study done by Poudyal et all.[14] This may be due to the inclusion of accompanies who also had other systemic illness. However, high prevalence rate was also reported in some other studies like, 38.6% Mc Naught AI et al,[12] and 64.8% Wu J et all.[24] In our study 8 (7.0%) of patients were diagnosed with POAG. PACG suspect had more prevalence 24 (20.9%) in our study than POAG suspects 22 (19.1%), which was similar to the study done by Bhandari RD et all.[23] This may be due to small sample size and that of angle closure patients attended hospital more frequently due to symptomatic nature. This higher number of suspects suggest future risk of developing glaucoma in these participants. It was an indirect way of screening the glaucoma cases and it gave the limelight that these participants could be knocking door to the disease. Even though literate patients were 76 (66.1%) in our study, 66 (57.4%) had no idea about the glaucoma 48 (41.7%) had some idea that glaucoma is not disease like cataract in our study. Despite accompanying a glaucoma patient to the glaucoma clinic only, 46 (40.0%) had no answer to the question that glaucoma runs in the family members and 69 (60.0%) had yes answer. Accompanying glaucoma patient did not have much information about glaucoma could be even in first degree relatives which is similar to other studies done in Nepal.[3,13,14,23] Studies done by Livingston et all[26] and another study of Celebi R et all[27] showed higher awareness in relatives of glaucoma patients 79% and 82% in general population which is much higher level of glaucoma awareness in developed countries. This suggest that the family members of the glaucoma patients still lack awareness regarding glaucoma and the importance of glaucoma evaluation among them.

CONCLUSION

Ocular examination of the first-degree relatives accompanying POAG patients helped to identify a significant percentage of individuals with glaucoma and thus might be used as an effective and viable tool for screening glaucoma in a hospital setting. Awareness regarding glaucoma is very low even among the first-degree relatives of glaucoma patients.

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