

# GLAUCOMA IN COMMUNITY: AN OPPORTUNISTIC SCREENING IN CATARACT SCREENING PROGRAMS

Rajbanshi L<sup>1</sup>, Paudyal I<sup>2</sup>, Thapa S<sup>3</sup>

## Affiliation

1. Ophthalmologist, Vitreo-retina specialist, Vitreo-retina department
2. Assistant Professor, Glaucoma Specialist, NAMS, Tilganga Institute of Ophthalmology, Nepal
3. Glaucoma specialist, HOD Glaucoma department. Professor of NAMS, PHD Tilganga Institute of Ophthalmology, Nepal

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### \* Corresponding Author

Dr Lily Rajbanshi

Ophthalmologist, Vitreo-retina specialist,

Vitreo-retina department, Biratnagar eye hospital, Nepal

Email ID: [lrajbanshi@yahoo.com](mailto:lrajbanshi@yahoo.com)

ORCID ID: <https://orcid.org/0000-0003-0186-8592>

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## ABSTRACT

### Introduction

Glaucoma is an optic neuropathy for which elevated intraocular pressure is considered as major risk factor. Glaucoma is the second most common cause of blindness after cataract. Since visual loss in glaucoma is irreversible, management strategies must be focused upon early detection and prevention of disease progression through strict control of intraocular pressure.

### Objectives

To estimate the ocular morbidity of glaucoma in community screening camps and to estimate the types of glaucoma.

### Methodology

It is a Community based opportunistic screening program. Study was carried out at community screening camps for cataract from August 2009 to August 2010. Five hundred five patients equal and above 50 years were examined in five screening camps conducted in Kathmandu valley. Glaucoma suspects were identified on the basis of shallow anterior chamber, intraocular pressure > 20 mm of Hg, abnormal frequency doubling perimetry (FDP), cup to disc ratio (CDR) >0.7:1, asymmetric CDR > 0.2:1, unhealthy NRR and the other disc findings suggestive of glaucoma. Glaucoma suspects were re-examined in tertiary eye hospital (TIO) in order to make a final diagnosis and provide treatment.

### Result

Out of 505, 67 glaucoma suspects were re-examined in Tilganga Institute of Ophthalmology. Number of patient diagnosed glaucoma was 17 (3.37%). Of them 9 patients (1.78%) had POAG, 4 (0.79 %) had secondary glaucoma, 3 (0.59%) had normal tension glaucoma and 1 (0.20 %) had ocular hypertension.

### Conclusion

Morbidity of glaucoma is very high in community and more screenings in larger scales are needed in order to decrease the burden of blindness due to glaucoma.

## KEYWORDS

cup to disc ratio, frequency doubling perimetry glaucoma suspect



## INTRODUCTION

Glaucoma is a group of ophthalmic diseases that have in common features of optic neuropathy with associated visual field loss for which elevated intraocular pressure is one of the primary risk factor.<sup>1-4</sup> It is the second most common cause of blindness after cataract.<sup>1</sup> The term "Glaucoma" originally derived from Greek meant clouded.<sup>2</sup> The World Health Organization (WHO) estimates that 3.4% of people aged 50 years and older are blind in a South-East Asian sub-region that includes Nepal. In this sub-region, WHO estimates that approximately 9% of blindness in all age groups is due to glaucoma.<sup>1</sup> These estimates are very crude, given the paucity of visual epidemiology work conducted in Nepal

Glaucoma is often detected incidentally when a patient visits an ophthalmologist for some other ocular problems. At the time of diagnosis most of the glaucoma patients are in advanced stage with significant loss of vision. This is due to asymptomatic nature of the disease and also due to lack of awareness of the disease in the population.<sup>4</sup> A glaucoma suspect is defined as an adult who has one of the following finding in at least one eye; an optic nerve or nerve fiber layer defect suggestive of glaucoma (enlarged cup disc ratio >0.5:1, asymmetric cup disc ratio, notching or narrowing of neuroretinal rim, a disc hemorrhage or diffuse or local abnormalities in the nerve fiber layer), visual field abnormalities consistent with glaucoma, an elevated IOP consistently greater than 21 mm of Hg.<sup>4</sup> The importance of identifying glaucoma suspect is to detect the earliest sign of optic nerve damage and by intervening at that point to prevent any visually significant damage that can occur in the person's lifetime. As the visual loss in glaucoma is irreversible, management goals must be focused upon early detection and prevention of disease progression through strict control of IOP. However, these goals of screening plans are difficult to achieve in the country like Nepal because of the cost effectiveness.<sup>5-7</sup> This is a community based, prospective, opportunistic screening method adopted in cataract screening programs to detect glaucoma suspects so that they could be further investigated for final diagnosis and treatment.

## METHODOLOGY

This is a community based opportunistic screening. The study was carried out at community screening camps for cataract from August 2009 to August 2010 inside Kathmandu valley. Screening camps were held in Nagarkot mulicipality, Bhaktapur; Lubu, Lalitpur; Chapagaun Monestry, Lalitpur; Bhaktapur community eye hospital, Bhaktapur. Five hundred five patients were examined in five screening camps conducted by Tilganga Institute of Ophthalmology. Patients equal and above 50 yrs were included for the study. Consents were obtained from the patients enrolled in the study. Personal and demographic details of the patients were noted. Visual acuity was recorded by using E chart. For intraocular pressure

measurement average of 10 readings was obtained with the help of tonopen (Tonopen Avia- Reichert). Detail personal and medical history of the patients was obtained. Anterior segment examination was done by using portable slit lamp. Anterior chamber depth was calculated according to Van Herrick method and mentioned only as normal or shallow. Pupils were dilated by mydriatic drop (tropicamide 1%) and the fundus was examined by direct ophthalmoscope (Heine 200S) to the patients who had normal anterior chamber. In case of shallow anterior chamber, fundus examination was done by direct ophthalmoscope without dilating the pupils. Size of the disc (1.5 mm, <1.5mm, >1.5 mm), cup disc ratio (<0.7:1, >0.7:1), neuroretinal rim (whether it is healthy or unhealthy) were noted subjectively. Peripapillary atrophy, splinter hemorrhage, or any other abnormalities of the disc mentioned. Frequency doubling preimery (FDP) was obtained by using Welch Allyn FDP machine. Patients having intraocular pressure >20 mm of HG, shallow anterior chamber, abnormal FDP test, cup disc ratio >0.7 or asymmetric cup disc ratio >0.2, thinning of neuroretinal rim and other disc findings suggestive of glaucoma were considered as glaucoma suspects and were referred to outpatient department of Tilganga Institute of Ophthalmology for further investigations and management.

In Tilganga Institute of Ophthalmology, glaucoma suspects underwent a complete ocular examination. Refraction was done using a streak retinoscope (Beta 200 Heine, Germany) and best corrected visual acuity was recorded. FDP was repeated and IOP was measured by applanation tonometry (Goldmann tonometer AT 020). Gonioscopy by shaffer's grading (Zeiss four mirror) was performed. Anterior segment was examined by slit lamp biomicroscopy (Haag Streit BQ 900). Posterior segment examination was done by slit lamp biomicroscopy with the help of 90 diopter lens. Patients having normal FDP, normal IOP and normal disc findings in TIO were excluded from glaucoma suspects. Further investigations were carried out in those patients who had abnormal FDP, IOP more than 20 mm of Hg and/or abnormal disc findings. Disc photos were taken. Centre corneal thickness was measured by Pachimetry (Alcon lab. INC, USA). Visual field defect was measured by automated visual field test using SITA Standard 24-2 program (model 750, Humphrey Instrument, CA, USA). In few patients, who were unable to cooperate for visual field tests, nerve fiber layer optical coherence tomography (STRATUS oct, model 3000, USA) was also obtained. After carrying out detail examination and investigation, final diagnosis was made as no glaucoma, angle closure glaucoma, open angle glaucoma, normal tension glaucoma, ocular hypertension and secondary glaucoma. Diagnosed glaucoma patients were then treated accordingly.

## Statistical analysis

An Excel spreadsheet (Microsoft Corp.) was used for data entry and analysis was done using SPSS software (version 16.1, SPSS, Inc.)



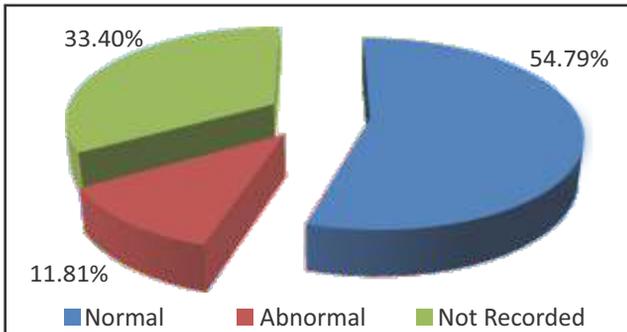
## RESULT

Total number of five hundred and five patients was examined in five different screening programs (Table 1). Female predominance was seen in the study (59.8%). A number of patients who were diagnosed to have glaucoma suspects was 67. Glaucoma suspects were identified on the basis of shallow AC, IOP > 20 mm of Hg, abnormal FDP, CDR > 0.7:1, asymmetric CDR > 0.2:1, unhealthy NRR and other disc findings suggestive of glaucoma (Figure 1, Table 2). Out of 67 glaucoma suspects, 60 patients came for re-examination in TIO and among them, 17 patients (3.37%) were diagnosed to have glaucoma. Seven patients did not appear in TIO (Figure 2).

**Table 1: Glaucoma suspects**

**Total number of patients examined in each screening camps and number of glaucoma suspects**

Serial no	Total no of patients attending each screening camps (N=505)	No. of Glaucoma suspect cases (n=67)	Percentage
1.	110	15	13.63
2.	120	17	14.16
3.	75	10	13.33
4.	89	13	17.97
5.	111	12	10.81

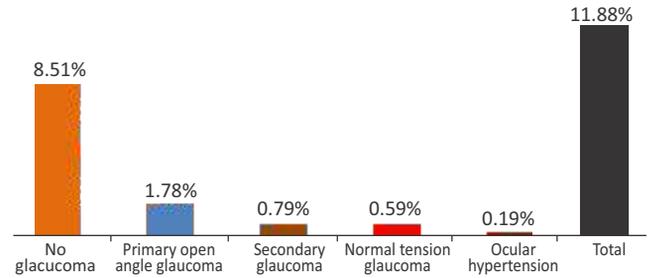


**Figure 1:** Frequency doubling perimetry finding

**Table 1: Glaucoma suspects**

**Total number of patients examined in each screening camps and number of glaucoma suspects**

Measurement	Value	RE	LE
Range of IOP [N=505] (mm of hg)	10- 20	473	477
	>20	27	27
	NA	5	1
Size of Optic Disc [N=505] (mm)	<1.5	28	29
	1.5	422	416
	>1.5	44	46
Pattern of CDR [N=505]	NA	11	14
	<0.7:1	475	478
	>0.7:1	19	13
Pattern of NRR [N=505]	NA	11	14
	Healthy	480	477
	Unhealthy	14	14
Range of CCT in Glaucoma Suspects [N=34]	NA	11	14
	<500μ	15	12
	500-550μ	16	20
	550-600μ	3	2



**Figure 2:** Different types of glaucoma among the glaucoma suspects (N=60)

## DISCUSSION

In this study, we found the majority of patients having POAG which is similar to other studies conducted in Nepal and other south Asian countries.<sup>8-13</sup> The study by Dr. Sah R. P. et al was a community based cross sectional study done in 1600 patients above 40 years in Sunsari district of Nepal<sup>10</sup>. Prevalence of glaucoma in that study was 0.938 % which was lower than our study (3.37%). We found number of patients with POAG was the highest among other entities and most of the secondary glaucoma was lens induced, which was similar to their study.<sup>10</sup> In Bhaktapur study conducted by Suman S Thapa et al reported POAG (1.245 %) being the highest among types of glaucoma which is similar to ours having 1.78%<sup>12</sup> However we didn't find any cases of PACG in our study. In another study by Suman S Thapa et al showed that approximately 2 to 4% of patients 50 years or older were newly diagnosed with POAG<sup>13</sup>. Early detection and treatment is necessary for reduction of blindness due to glaucoma. In a country like Nepal, where most of the population is either unaware or unprivileged for the treatment facilities, screening programs can play important role. IOP >20 was found in 54 eyes. IOP was one of the major risk factors for the development of glaucoma though the difference of IOP in diseased and non diseased group is not statistically significant. Measurement of IOP and careful examination of Optic nerve head seems to be most important tools for screening. Although FDP is easy and sensitive method for visual field measurement<sup>14</sup>, it seems difficult to conduct properly in our population due to many technical problems. Similar problems regarding FDP for screening has been mentioned in a study by Mansberger et al.<sup>15</sup> In our study, though the sensitivity of FDP was 100 %, specificity was very low. Size of optic disc and CCT didn't show significant correlation with the disease. Similarly central corneal thickness (CCT) also played vital role in diagnosing glaucoma, however it was not performed in all glaucoma suspects (Table 2). Patients who had features of glaucoma in examinations but normal IOP were sent for CCT in order to know the influence of corneal thickness on influence of corneal thickness on actual IOP which has important role on making diagnosis of Normal tension glaucoma and Ocular hypertension.

In our study, we also encountered difficulties in screening glaucoma due to media opacity like cataract in significant cases, vitreous hemorrhage in some cases. Besides that explaining about the disease and convincing patient for

coming to the hospital for further investigation was sometimes challenging. Regardless of all the challenges, we managed to examine good number of patients, diagnose and treat.

## CONCLUSION

This study shows the prevalence of glaucoma is quite significant in the population of Nepal (3.37%), POAG being the highest (1.78 %) among other entities. Increased IOP seems to be the major risk factor in developing glaucoma. Although FDP is an easy and sensitive visual field test for detecting early optic nerve fiber damage in glaucoma, it doesn't seem to be promising in large numbers of patients in short duration of times in camps. Thus IOP measurement and careful disc evaluation are the best tools for detection of glaucoma. In order to address the real burden of blindness due to glaucoma and to get rid of it, such screening programs should be incorporated in large scales.

## RECOMMENDATION

Glaucoma is a major cause of blindness in Nepal. Despite the advancement in glaucoma management throughout the world, Nepal however falls short in many ways. The nature of the disease, the cost of screening and treatment and lack of awareness among the population are some of the factors that are responsible for blindness caused by glaucoma. Most of the patients who come to the hospital already have advanced glaucoma.

Since glaucoma causes irreversible vision loss, early detection and treatment is mandatory. In country like Nepal,

where socioeconomic condition is very low and access to health facilities are way too insufficient, large scaled programs regarding screening and awareness about the seriousness of the disease are highly recommended. Besides that, cost effectiveness of the treatment should be addressed well.

## LIMITATION

Although glaucoma is more common in older age, it can affect any age group. In this study, patients only equal and above 50 yrs were included thus, unable to address the real morbidity of the disease in whole community. Besides that, patients who refused for examination, who lost for follow up and patients with media opacities were excluded from the study, might also have the disease and missed in this study.

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## CONFLICT OF INTEREST

None

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