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EVALUATION OF NARROW ANGLE GLAUCOMA CASES ATTENDING A TERTIARY CARE CENTER OF CENTRAL INDIA

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ABSTRACT: AIMS: To evaluate Glaucomatous Optic Neuropathy (GON) and blindness in narrow angle glaucoma patients. **MATERIALS AND METHODS:** This is a hospital based retrospective analysis primary angle closure glaucoma patients attending eye OPD between June 2013 to May 2014.The demographic data related to age, sex, IOP and type of glaucoma was analyzed. Primary angle closure glaucoma (PACG) was diagnosed and categorized into symptomatic and asymptomatic groups according to the history and clinical presentation. Disc damage likelihood scale (DDLS) was used to evaluate glaucomatous optic neuropathy. **RESULTS AND CONCLUSION:** Out of 96 cases of all primary glaucoma cases, narrow angle glaucoma was present in 54 patients. Out of 54 cases, 36(67%) were asymptomatic and 18(33%) were symptomatic. Moderate to severe glaucomatous optic neuropathy was found in 64% in asymptomatic group. There were 45% cases with unilateral blindness in asymptomatic group as compared to 19% in symptomatic narrow angle glaucoma group. **CONCLUSION:** Asymptomatic narrow angle glaucoma was more commonly found. Increasing age, female gender and high IOP were significantly associated with it. Blindness due to asymptomatic narrow angle glaucoma was double as compared to acutely presenting narrow angle glaucoma.

KEYWORDS: Primary angle closure glaucoma, Glaucomatous optic neuropathy, Blindness, Primary open angle glaucoma.

INTRODUCTION: Glaucoma is the second leading cause of world blindness after cataract and accounts for 15% of global blindness.[1] Asian represent 47% of those with glaucoma and 87% of those with Angle Closure Glaucoma (ACG). Primary Angle Closure Glaucoma (PACG) has been reported to be more prevalent in South East Asia Countries than rest of the world.[2] The regional burden of blindness (RBB) is highest for India (23.5% of global blindness) with at least 5.8 million blind due to glaucoma.[3] India accounts for a minimum of 12.9% of primary open angle glaucoma (POAG) blindness and 12.7% of Primary Angle Closure Glaucoma (PACG) blindness in the world.[4] Glaucoma is the heterogeneous group of disorders marked by damage to the optic nerve. Primary open angle glaucoma, which is usually detected via elevated intraocular pressure (IOP), is the most common diagnosis, while angle closure glaucoma can cause the most sudden and devastating vision loss. Early diagnosis is the key to successful management of glaucoma.

The condition is visually destructive and accounts for most of the glaucoma blindness in southern India.[5] The acute symptomatic phase is dramatic and occurs in minority whereas chronic asymptomatic form of PACG predominates as shown by population based surveys in African and Asian settings.[6] Eye with asymptomatic PACG presents with severe to end stage visual field loss on first presentation to the hospital.[7]

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The aim of this study was to investigate the severity of vision loss in subjects presenting with PACG and to compare subjects with a previous acute symptomatic episode with chronic asymptomatic subjects of PACG.

MATERIALS AND METHODS: This is a retrospective study of 54 patients of primary angle closure glaucoma (PACG) who presented between June 2013 to May 2014 at a rural based hospital of Central India. The records of all subjects were retrieved after approval by the institutional review board. Cases of secondary angle closure, such as neovasculrisation of the iris, uveitis, trauma, lens intumescence or subluxation were excluded. Demographic characteristic and ophthalmic data were recorded for every patient. This included age, sex, ocular history, pre-existing medical condition, type of glaucoma, visual acuity using Snellen's distance acuity chart, anterior segment examination, applanation intraocular pressure (IOP), stereoscopic assessment of the disc by slit lamp indirect ophthalmoscopy, gonioscopy and visual field examination using a Humphrey Field Analyzer whenever possible. The following criteria were used to define cases of PACG: The presence of glaucomatous optic neuropathy and a closed angle on indentation gonioscopy. A closed angle was defined as the presence of at least 180 degree of angle in which the trabecular meshwork was not visible on gonioscopy, and with evidence of peripheral anterior synechiae in any part of the angle.

PACG subject were further categorized into 2 groups: Symptomatic group (SG) consisted of those who presented with acute symptomatic angle closure, and Asymptomatic group (AG) consisted of those who were asymptomatic. Patients with history or ocular examination findings showing acute angle closure episode were included in the symptomatic group (SG). Characteristics of the acute angle-closure episode were obtained from the charts retrospectively. For this study, acute angle closure was defined as follows.

1. Presence of at least 2 of the following symptoms: ocular or periocular pain, nausea and/or vomiting and an antecedent history of intermittent blurring of vision with halos; and,
2. IOP of >28 mmHg (as measured by Goldmann applanation tonometry) and the presence of at least 3 of the following signs: conjunctival injection, corneal epithelial edema, mild-dilated unreactive pupil, shallow anterior chamber, glaucomffecken, and iris atrophy.

If one eye had an acute angle closure, the other eye was included in the same group considering the patient to be in symptomatic group whereas if no history or characteristics of angle closure were found, patient was included in asymptomatic group and both eyes were included in same group.

The optic disc was evaluated with Volk 90 Dioptre lens using Haag-strait slit lamp. Disc Damage Likelihood Scale (DDLS) was used in all cases of PACG to categorize all eyes based on appearance of neuro-retinal rim (NRR) of optic disc corrected for disc diameter. The glaucomatous optic neuropathy(GON) was scored using DDLS (0 to 7). The eyes were grouped into mild to moderate and moderate to severe glaucomatous optic neuropathy in symptomatic and asymptomatic group of narrow angle patients.[8]

Blindness was defined as as a best corrected visual acuity ≤3/60 or constriction of visual fields <10 degrees from fixation in a better eye as per WHO definition of blindness. Similarly, blind eye was defined as a best corrected visual acuity ≤3/60 in the affected eye.
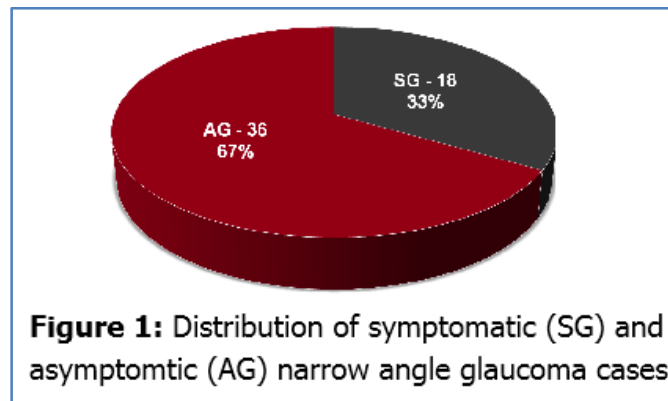
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The summery statistics for the baseline characteristics of the patients were obtained and compared using the appropriate tests. The association of glaucomatous optic neuropathy and blindness with type of PACG was evaluated using a Chi-squared test.

RESULTS: In this observational study carried out over a period of 12 months, there were 96 patients of primary glaucoma, out of which 54 (56%) were PACG. The demographic profile of all primary glaucoma cases is shown in Table 1.

|	POAG (n=42)	PACG (n=54)
Age (Years)	**58.03±10.22**	**55.14±10.12**
Sex		
Male	28	22
Female	14	32
Mean IOP (mmHg)	17.52±5.03	25.79±11.46
POAG: Primary open angle glaucoma; PACG: Primary angle closure glaucoma		
Table 1: Characteristics of patients with Primary Glaucoma		

Out of 54 PACG cases, 36(67%) were asymptomatic as against 18(33%) symptomatic cases as shown in Figure 1.

Figure 1: Distribution of symptomatic (SG) and asymptomtic (AG) narrow angle glaucoma cases

Asymptomatic narrow angle glaucoma was more common than symptomatic narrow angle glaucoma after 5th decade as shown in Fig. 2.

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Figure 2: Age distribution in symptomatic (SG) and asymptomatic (AG) narrow angle glaucoma cases
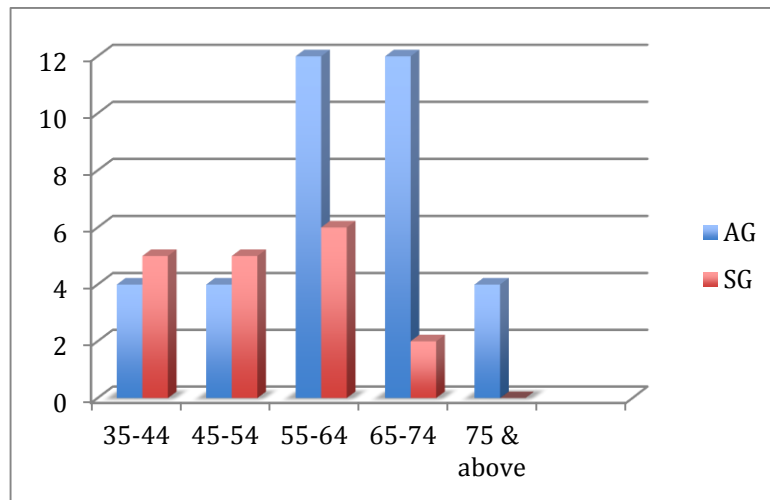
Total 107 eyes of 54 cases of PACG were included in the study. One eye of asymptomatic group had pthysis bulbi, hence excluded from the study. The proportion of eyes as per glaucomatous optic neuropathy and vision in two groups is shown in table 2.

Glaucomatous optic neuropathy (GON)	Overall (n=107)	AG (n=71)	SG (n=36)	P- value*
Mild-Moderate (DDLS 0-4)	46 (42.99%)	25 (35.21%)	21 (58.33%)	0.022
Mod. -Severe (DDLS 5-7)	61 (57.01%)	46 (64.79%)	15 (41.67%)	
Vision				
VA≤ 3/60 (Unilateral Blind)	39 (36.45%)	32 (45.07%)	7 (19.44%)	0.009
* Using Chi-square test				
DDLS: Disc Damage likelihood scale; AG: Asymptomatic Group; SG:Symptomatic Group				
Table 2: Distribution of eyes as per glaucomatous optic neuropathy (GON) and vision				

It is evident form the table that the proportion of moderate to severe glaucomatous optic neuropathy (64.79%, n=46 eyes) was higher in asymptomatic group as compared to symptomatic group (41.67%, n=15 eyes) which is statistically significant (p=0.022). The proportion of blind eyes in asymptomatic group (45.07%, n= 32 eyes) was also significantly higher than symptomatic group (19.44%, n=7 eyes)

DISCUSSION: The prevalence of glaucoma varies by region and race. About 60 million people are estimated to be affected by glaucoma out of which 11.2 million cases are estimated to be from the Indian subcontinent.[4,9] In all population-based studies from India reported in literature, the majority of glaucoma was undetected. According to a study done by Vijaya L et al. more than 90% of the glaucoma population is unaware of the disease.[10] Poor economical backgrounds, public unawareness and unavailability of resources to detect glaucoma are responsible factors for

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increasing glaucoma population in developing countries. People from rural setup have difficulty in seeking comprehensive eye examination and hence glaucoma behaves like a "Silent sight killer" and goes unnoticed. Awareness of glaucoma is very poor in urban as well as rural population of India as compared to western countries. [11]

There is necessity of actively looking at the disease because one in eight persons above the age of 40 years in India is either suffering from glaucoma or is at risk of the disease[12]. The main purpose of the study was to estimate blindness in symptomatic and asymptomatic primary angle closure glaucoma for which both eyes were included in the study for analysis.

In the present study, patients of angle closure glaucoma attending the ophthalmology unit of hospital during the period June 2013 to May 2014 were analyzed. A total of 4208 cases visited eye OPD during this period. Out of these, 54 cases were identified as having primary angle closure glaucoma thus; the hospital-based prevalence of PACG in our study was found to be 1.28%.

There have been many population based studies reported in India for prevalence and risk factors of glaucoma i.e Andhra Pradesh Eye Diseases Survey (APEDS)[5], Chennai Glaucoma Study (CGS),[10] Vellore Eye Survey (VES),[13] Aravind Comprehensive Eye Survey (ACES),[14] and West Bengal Glaucoma Study (WBGS).[15] There is a wide variation in the reported prevalence of PACG in India, which ranges from 0.5% to 4.3%.[10] The APED study done by Senthil S recently reported PACG prevalence of 0.94% in 40 years of age.[16]

Female gender has been reported to be an independent risk factor for narrow angle glaucoma. This is related to biometric differences between genders since women have shorter eyes and shallower anterior chamber depth than men.[17,18] Consistent with other studies reported on PACG, we reported 32 (59.25%) female patients out of 54 narrow angle patients suggesting more risk of PACG in female population. In a study done by Garudadri C et al female gender was the risk factor for primary angle-closure glaucoma (PACG).[19] In a cross-sectional population based survey in a Nepalese population, Thapa S S et al found similar co-relation of gender with PACG.[20]

Most angle closure diseases in India are asymptomatic and patients have the chronic form of disease, which does not present with significant visual symptoms. Dandona L et al reported 83.3% had chronic form of PACG without any symptoms of angle closure attacks.[5] In our study of narrow angle glaucoma cases, we also found chronic form of narrow angle glaucoma to be more common than the acute form with sudden loss of vision. The commonest symptom of presentation was gradual diminution of vision accounting for 36 cases (67%). Out of 54 cases of narrow category only 18(33%) cases presented with acute red eye and associated with acute loss of vision and pain. Gandhewar R et al reported that the patients who present with sudden onset of a painful, red eye with reduced visual acuity, should alert ophthalmologist for the possibility of acute narrow angle glaucoma.[21]

As per the WHO definition of blindness, there were four cases (7.4%) of bilateral blindness. PACG related bilateral blindness was reported to be 16.6% by APEDS,[5] and 5.9% by CGS (urban).[10] We found 32 (45.07%) unilateral blind eyes (vision <3/60) in asymptomatic group and 7 (19.44%) in symptomatic group. It shows that the prevalence of unilateral blindness is more in asymptomatic narrow angle glaucoma as compared to symptomatic group. Thus the association of visual outcome and diagnostic category was found statistically significant with p-

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value of 0.009 in our study population. Due to the acute glaucoma in one eye, the other eye is treated prophylactically with laser at the time of presentation and hence is prevented from getting blind. In our study, there were 64.79% cases with moderate to severe glaucoma in asymptomatic PACG.

Ang et al reported a study on visual field loss in asymptomatic and symptomatic narrow angle glaucoma. He found 52.8% of asymptomatic cases had end-stage visual field defects while mild to moderate visual field defects were seen in symptomatic narrow angle cases.[7]

Many times patients of developing countries like India cannot perform visual field testing accurately; hence it is very difficult to obtain reliable visual fields. Due to illiteracy, poverty and non-availability of glaucoma set-ups for rural population of developing countries, visual field testing is difficult for glaucoma cases. Therefore in this study we used DDLS classification[8] for evaluation of glaucomatous optic neuropathy and then compared severity of glaucoma in asymptomatic and symptomatic narrow angle cases.

There were certain limitations of our study like the retrospective study design and number of PACG cases. We recommend multicenter prospective study with large sample size to further verify our results. Although our study had limitations but it undoubtedly indicate that asymptomatic glaucoma is a proven "silent sight killer". Gonioscopic and fundus evaluation of all patients more than 40 years of age can detect glaucoma in early stages. As most of the narrow angle glaucoma is asymptomatic, patient awareness, high level of suspicion and screening can reduce the burden of glaucoma blindness found in Asian countries.

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