

ORIGINAL RESEARCH

Prevalence of primary open angle glaucoma in patients above 40 years of age with myopia more than 4 Dioptres

¹Dr. Gopi Krishna Chetti, ²Dr. Venumadhav Mothukuri, ³Dr. Rakesh Singh, ⁴Shanti Kumar Goparaju

¹Assistant Professor, ²Associate Professor, Department of Ophthalmology, Govt. Medical College, Ramagundam, Telangana, India

³Civil Assistant Specialist, C.H.C. Gajwel, India

⁴Professor, Department of General Surgery, Govt. Medical College, Mulugu, Telangana, India

Corresponding author

Dr. Gopi Krishna Chetti

Assistant Professor, Department of Ophthalmology, Govt. Medical College, Ramagundam, Telangana, India

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ABSTRACT

Background: Glaucoma is one among the leading causes of global irreversible blindness. Until the advanced stage, it is asymptomatic. Glaucoma is an irreversible condition hence early detection and treatment is essential in delaying or halting the progression of the disease for the control of blindness due to glaucoma. Various risk factors are known to be associated with the occurrence of glaucoma such as age, gender, race, refractive error, hereditary and systemic diseases may play role in pathogenesis. POAG is often diagnosed on routine ocular examination and in many instances in the late stage. It manifests mainly as peripheral visual field loss with central vision being preserved almost till the end stage. By the time the patient is symptomatic the visual loss is irreversible. Therefore, early diagnosis is essential so that treatment to halt progression can be instituted. **Materials and Methods:** This is a hospital-based cross-sectional observational case study conducted between February 2019 and August 2020 in the Department of Ophthalmology, Regional Eye Hospital, Warangal, Telangana State, India. During the above mentioned period, the Study population consisted of 50 patients presenting in OPD with myopia greater than 4 Diopters above 40 years of age were included in the study. **Results:** In the present Prospective observational case study with a sample size of 50 patients, the age groups of the patients included in the study ranged from 41 to 65 years. Among the 50 patients included in the study, the majority were in the age group of 51–55 years (28%), the least belonged to 61–65 years (8%), a male-to-female ratio of 1.38:1. There are 18 % High Myopics (more than 6 diopters) and 82 % Moderate Myopics (4 to 6 diopters). Among the study group 28 % are Diabetics and 72 % are Non-Diabetics. 32 % patients with Hypertension and 68 % without Hypertension. 58 % of the study patients had moderate visual acuity and 42 % had good visual acuity in Right Eye. 58 % of the Study patients have Moderate visual acuity and 42 % have Good visual acuity in Left Eye. 8 % of the patients with myopia have primary open angle glaucoma. **Conclusion:** In present study, High myopia presented as significant risk factor for have primary open angle glaucoma (POAG). Hence it is important to screen high myopic patients for glaucoma at closer intervals. Cup Disc ratio and visual field changes had good correlation with POAG. Hence Disc evaluation with 90D is mandatory in all patients above 40 years with high myopia for early diagnosis and treatment

Key words: Intra ocular pressure, Optic Disc, Visual acuity

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INTRODUCTION

Glaucoma is one among the leading causes of global irreversible blindness. Glaucoma is considered the “silent killer of sight”. Until the advanced stage, it is asymptomatic. Glaucoma is an irreversible condition hence early detection and treatment is essential in delaying or halting the progression of the disease for the control of blindness due to glaucoma.

The global prevalence of glaucoma is estimated to be 80 million in 2020. The etiology of POAG remains unclear despite a number of epidemiological studies

that have investigated various potential risk factors for the disease. Various risk factors are known to be associated with the occurrence of glaucoma such as age, gender, race, refractive error, hereditary and systemic diseases may play role in pathogenesis.

Recognition of all risk factors for POAG is important for early diagnosis and intervention. POAG is often diagnosed on routine ocular examination and in many instances in the late stage. It manifests mainly as peripheral visual field loss with central vision being preserved almost till the end stage. By the time the

patient is symptomatic the visual loss is irreversible. Therefore, early diagnosis is essential so that treatment to halt progression can be instituted.

AIMS AND OBJECTIVES OF THIS STUDY

To study the Prevalence of Primary Open angle glaucoma in patients aged 40 and above with myopia of more than 4 Diopters attending Ophthalmology outpatient department in Mahathma Gandhi Memorial Hospital, Warangal to enable early detection of this silent vision killer.

Population based studies indicate that risk of glaucoma increases with increasing degree of myopia. Many studies have suggested that moderate to high myopia is associated with increased risk of POAG. Hence there is a need to evaluate the patients with myopia for Glaucoma.

METHODOLOGY

INCLUSION CRITERIA

- Patients aged 40 years and above
- Both males and females
- Myopia with more than 4 diopters

EXCLUSION CRITERIA

- Patients below 40 years of age
- Myopia less than 4 diopters
- Defective vision due to lenticular sclerosis
- Patients not willing for study

PATIENTS AND METHODS

- Prospective Observational Study
- Study Duration : 18 Months
- Sample size : 50
- Set Up: Mahathma Gandhi Memorial Hospital, Warangal.

STUDY DESIGN

The Study population consisted of 50 patients presenting in OPD with myopia greater than 4 Diopters above 40 years of age.

A written informed consent was obtained from the patients above 40 years and with more than 4 Diopters of myopia for the detailed eye examination

Detailed history of the patient was taken including complaints, family history, ocular history, drug history and systemic history.

Patients were then examined in detail under following headings.

1. Visual acuity using Snellen's chart or E chart
2. Anterior Segment evaluation Using Slit Lamp.
3. Refraction by auto refractometer and subjective correction

DESCRIPTIVE STATISTICS

TABLE 1: Details of MEAN values of AGE ,IOP ,CCT AND CDR AMONG STUDY GROUP

	AGE	IOP(RE)	IOP(LE)	CCT(RE)	CCT(LE)	CDR(RE)	CDR(LE)
Mean	52.120	16.720	16.160	529.920	531.680	0.354	0.350
SD	6.0899	1.7961	2.0540	8.3393	6.7414	0.1129	0.1165

4. Intraocular measurement with Goldmann applanation tonometer
5. Central Corneal Thickness measured using pachymetry
6. Optic Disc evaluation with 90D using slit lamp
7. Gonioscopy using Ziess 4 mirror gonioscopes
8. Humphrey Visual field analysis

OBSERVATION AND RESULTS

In the present Prospective observational case study with a sample size of 50 patients, the following results were obtained.

Age and sex distribution

The age groups of the patients included in the study ranged from 41 to 65 years.

Among the 50 patients included in the study, the majority were in the age group of 51–55 years (28%), the least belonged to 61–65 years (8%), 18% belonged to 41–45 years, 20% belonged to 46–50 years and 26% belonged to 56–60 years of age groups. In this study, males represented 58% and females represented 42% of the sample with a male-to-female ratio of 1.38:1.

Details of degree of myopia

There are 18 % High Myopics (more than 6 diopters) and 82 % Moderate Myopics (4 to 6 diopters) among study patients

Details of diabetic patients among the study group

Among the study group 28 % are Diabetics and 72 % are Non –Diabetics.

Details of hypertensive patients among study group

Among the study group 32 % patients with Hypertension and 68 % without Hypertension.

Details of study patients with best corrected visual acuity in right eye

Among the study group 58 % of the study patients had moderate visual acuity and 42 % had good visual acuity in Right Eye.

Details of study patients with best corrected visual acuity in left eye

Among the study group 58 % of the Study patients have Moderate visual acuity and 42 % have Good visual acuity in Left Eye.

Details of study patients with primary open angle glaucoma

Among the study group 8 % of the patients with myopia have POAG

Minimum	41.0	14.0	14.0	512.0	518.0	0.3	0.3
Maximum	63.0	20.0	20.0	542.0	546.0	0.8	0.9

The above Table shows Mean values of Study population with respect to Age, Mean Intra Ocular Pressure of Right and Left Eye, Mean Central Corneal Thickness of Right and Left eye and Mean Cup Disc Ratio of Right and Left eye respectively.

TABLE 2: DETAILS OF MEAN IOP IN RIGHT EYE OF MODERATE AND HIGH MYOPIC PATIENTS

RIGHT EYE	MYOPIA	MEAN	SD	P
	MODERATE	16.585	1.6275	
	HIGH	17.333	2.4495	

Chi Square Test P= 0.262 (NS)

TABLE 3: DETAILS OF MEAN IOP IN LEFT EYE OF MODERATE AND HIGH MYOPIC PATIENTS

LEFT EYE	MYOPIA	MEAN	SD	P
	MODERATE	15.90	1.9976	
	HIGH	17.33	2.0000	

Chi Square test P=0.058 (NS)

The Mean IOP in the Right Eye was 16.58 in moderate myopic patients and 17.33 in high myopic patients. Using Chi square test, it was found that there was no statistical significance (p = 0.262) between Mean IOP of moderate and high myopic patients.

The Mean IOP of Left eye in moderate and high myopic patients was 15.90 and 17.33 respectively. Using Chi Square Test, it was found that there was no statistical significance (p = 0.058) between Mean IOP of moderate and high myopic patients.

TABLE 4: DETAILS OF MEAN CCT IN RIGHT EYE OF MODERATE AND HIGH MYOPIC PATIENTS

RIGHT EYE	MYOPIA	MEAN	SD	P
	MODERATE	529.512	8.1336	
	HIGH	531.778	9.5102	

Chi Square Test P=0.466 (NS)

TABLE 5: DETAILS OF MEAN CCT IN LEFT EYE OF MODERATE AND HIGH MYOPIC PATIENTS

LEFT EYE	MYOPIA	MEAN	SD	P
	MODERATE	531.171	6.7376	
	HIGH	534.000	6.6332	

Chi Square Test P=0.258 (NS)

The Mean CCT of Right eye in moderate and high myopic patients was 529.51 and 531.77 respectively. Using Chi Square Test, it was found that there was no statistical significance (p = 0.466) between Mean CCT of moderate and high myopic patients.

The Mean CCT of Left eye in moderate and high myopic patients was 531.17 and 534.00 respectively. Using Chi Square Test , it was found that there was no statistical significance (p = 0.258) between Mean CCT of moderate and high myopic patients.

TABLE 6: DETAILS OF MEAN CDR IN RIGHT EYE OF MODERATE AND HIGH MYOPIC PATIENTS

RIGHT EYE	MYOPIA	MEAN	SD	P
	MODERATE	0.332	0.722	
	HIGH	0.456	0.1944	

Chi Square Test P=0.002 (S)

TABLE 7: DETAILS OF MEAN CDR IN LEFT EYE OF MODERATE AND HIGH MYOPIC PATIENTS

LEFT EYE	MYOPIA	MEAN	SD	P
	MODERATE	0.324	0.0582	
	HIGH	0.467	0.2179	

Chi Square Test $P=0.001$ (S)

The above graph shows CDR of Right and Left eyes of moderate and high myopic patients.

The Mean CDR of Right eye in moderate and high myopic patients was 0.332 and 0.456 respectively. Using Chi Square Test, it was found that there was statistical significance ($p = 0.002$) between the Mean CDR of moderate and high myopic patients.

The Mean CDR of Left eye in moderate and high myopic patients was 0.324 and 0.467 respectively. Using Chi Square Test, it was found that there was statistical significance ($p = 0.001$) between the Mean CDR of moderate and high myopic patients.

TABLE 8: DETAILS OF DEGREE OF MYOPIA AND OPEN ANGLE GLAUCOMA

			DEGREE OF MYOPIA		Total
			HIGH	MODERATE	
DIAGNOSIS	NO GLAUCOMA	Count	6	40	46
		%	66.7%	97.6%	92.0%
	POAG	Count	3	1	4
		%	33.3%	2.4%	8.0%
Total		Count	9	41	50
		%	100.0%	100.0%	100.0%

Chi Square = 9.571, P Value = 0.002 (S)

The above table shows 33.3 % of patients who had high myopia also had open angle glaucoma. Using CHI SQUARE TEST, it was found that there was statistical significance between the degree of myopia and open angle glaucoma.

DISCUSSION

In present study, among 50 patients with myopia of more than 4 Diopters, 58% were male and 44% were female. The mean age group of study was 52.12 ranging from 41 to 63 years. The maximum number of subjects were in the age group 51-55 (28%) and 56-60 (26%). High prevalence in males was comparable to other studies [1]

Prevalence of POAG in urban population is 2.56% and 1.6% in rural population by APEDS. Increase in prevalence of POAG with age was seen both in APEDS and CGS. In present study, 3 patients with POAG are in the age group of 51- 55. Prevalence is low above 60 years as we excluded patients with defective vision due to nuclear sclerosis [2]

Parikshit et al showed that defective vision was the most common presenting complaint in myopic. In our study 18 % of the study patients were high myopic with more than 6 Diopters of myopia and 82 % were moderate myopic with myopia between 4 to 6 Diopters.

In present study, best corrected visual acuity in Right eye was Good (V/A >6/12) in 42 % of the patients and Moderate (6/60 – 6/12) for 58 % . Similarly best corrected visual acuity in Left Eye was Good for 52 % of the patients and 48% had moderate visual acuity [1]

One of the POAG patient was already diagnosed to have glaucoma. He was using anti glaucoma medications. His IOP was below 21 mmHg and CDR and field progression were not noted.

3 patients with myopia were detected to have POAG during the study. Their main complaint was defective vision which was not improving with refraction. 1 patient was referred for glaucoma evaluation and other 2 patients came for second opinion.

75% of the persons with POAG were not aware of the disease before our study. This is similar to the

estimates found in the visual Impairment Project (60%), 51% in Barbados Eye studies and Blue Mountain Eye Study. In contrast to this, the rate of undiagnosed in APDES was 92.6%, ACES was 93% and CGS was 98.5% [3]

In CGS the mean IOP for rural population was 14.29 (± 3.32) and 16.17 (± 3.74) for urban population. Intraocular pressure was positively associated with the diagnosis of POAG. APEDS also concluded a positive association between IOP and POAG.

The mean IOP measured with Goldman Aplanation tonometer for Right eye for moderate myopic patients was 16.58 mm of Hg and high myopic was 17.33 mm of Hg ($p = 0.262$) and similarly 15.90 mm of Hg and 17.33 mm of Hg for moderate and high myopic patients for Left eye respectively ($p = 0.058$). There was no statistical significance between myopia and IOP in present study [4]

In present study, None of the patients had family history of glaucoma. Since only few of those with glaucoma are diagnosed and most of them are unaware about glaucoma, a family history of no glaucoma may be inaccurate. In Rotterdam study, the first degree relatives of the patients diagnosed to have POAG were examined and 22.4% of them were found to have POAG [5]

In present study 28% were diabetics and 32 % were hypertensives. Present study did not show any significant association with POAG. This is similar to CGS which also concluded no significance association between diabetes, systemic hypertension [6]

In VES, the percentage of POAG in diabetics was 4.1%. A hospital based study by Mohammed et al showed positive correlation between POAG and systemic hypertension [7]

The mean CDR was 0.56 among unselected population group in VES and 0.39 in CGS. In present study, the mean CDR in the right eye was 0.32 for moderate and 0.45 for high myopic patients($p=0.002$). The mean CDR in the left eye was 0.32 in moderate and 0.46 in high myopic patients.($p=0.001$) [8]

P value was statistically significant suggesting a strong association between the cup disc ratios with the degree of myopia. 33% of the patients with high myopia also had POAG. This is comparable with the Blue mountain eye study, the Singapore Malay eye study and Beijing eye study which concluded, myopia as a risk factor for POAG ¹.

In present study, 80% of primary open angle glaucoma patients had their visual field defect corresponding to the optic disc changes. There was a significant correlation between visual field defect and CDR [9]

In our study only 8%, of the patients were aware of glaucoma .Awareness was low as most of the patients were from rural background and of low educational status [10]

Study by Krishnaiah et al, concluded that awareness increased with literacy. Similar results were also seen in CGS. Hence there is a need to improve the educational status of the individuals which in turn benefits for early detection and treatment and changing the individual perception about glaucoma.

In present study, only 14 % patients had previous eye check up for glaucoma. Even though the previous eye examination was done by ophthalmologist subjective correction was given more importance than evaluating a myopic for glaucoma. CGS and ACES concluded that important risk factor for subsequent blindness is late diagnosis of glaucoma [11]

CONCLUSION

- In present study, High myopia presented as significant risk factor for POAG. Hence it is important to screen high myopic patients for glaucoma at closer intervals.
- Cup Disc ratio and visual field changes had good correlation with POAG. Hence Disc evaluation with 90D is mandatory in all patients above 40 years and with high myopia for early diagnosis and treatment.
- Diabetes and Hypertension did not show any significant etiological association with POAG.
- Glaucoma awareness was extremely low, and knowledge about glaucoma as a cause of irreversible blindness was also low.
- Family members of the glaucoma patients must be examined to rule out glaucoma.
- All eye care personnel should counsel the patients about the irreversible blindness caused by glaucoma.
- In accordance with Glaucoma society of India, public, patients and health care personnel should

be tuned in both creating awareness and diagnosing glaucoma.

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