

# Prevalence of Eye with Spectrum of Angle Closure in a Population Attending the Outpatient Department of a Tertiary Eye Care Center in Kolkata

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## Abstract

**Objective:** The objective of this study was to determine the prevalence of eye with angle closure disease in a population attending the outpatient department of a tertiary eye care center in Kolkata.

**Materials and Methods:** The study was hospital-based cross-sectional study. Total of 150 patients visiting the outpatient department of a tertiary care eye center in Kolkata and satisfying the inclusion criteria were randomly selected. The patients were divided into groups according to their age, and each group underwent complete ocular examination. The total study was for 16 months (January 1, 2019–April 30, 2020). Subjects underwent detailed ophthalmic examination including slit lamp examination, intraocular pressure measurement, gonioscopy, stereoscopic fundus examination, automated visual field testing, and Heidelberg Spectralis Oct fast retinal nerve fiber layer scan.

**Results:** Results were analyzed using Chi-square test and multiple logistic regressions using SPSS 25(IBM). Mean age was  $46.1 \pm 6.05$  years. The prevalence was more in females (65%) than males (35%). Out of which, 78 patients had primary angle closure suspect (PACS) (52%; CI 95%, 44.1–59.8%), 52 patients had primary angle closure (PAC) (34.6%; CI 95%, 27.5–42.5%), and 20 patients had PAC glaucoma (PACG) (13.3%; CI 95%, 8.8–19.6%). One hundred and twelve were chronic (74.6%), while 38 patients were acute (25.3%) patients of PAC disease (PACD). Ninety-two patients were asymptomatic (61.3%) and 58 were symptomatic (36.6%) on presentation.

**Conclusion:** As per this study, it was concluded that higher age and females were most affected. PACS was the most common subtype. Most of the patients were found to be chronic asymptomatic.

**Key words:** Prevalence, Primary angle closure disease, Primary angle closure glaucoma, Primary angle closure suspect, Primary angle closure

## INTRODUCTION

Acute angle closure glaucoma is an ocular emergency and receives distinction due to its acute variation, need for immediate treatment, and well-established anatomic pathology.<sup>[1]</sup> Rapid diagnosis and immediate intervention and referral can have profound effect on a patient's

outcome and morbidity. There is a wide variation in the prevalence of the primary angle closure glaucoma (PACG) within India.

Angle closure disease is the leading cause of irreversible blindness and is an important Public Health issue. Population-based studies are important for assessment of disease burden, health care policy planning, and appropriate resource allocation. Asians represent 47% of those with glaucoma<sup>[2]</sup> and 7% of those with angle closure disease. The prevalence of PACG in southern India ranges from 0.5% to 4.30%,<sup>[3]</sup> where as in Eastern India, it was only 0.23%.<sup>[4]</sup>

The aim of this study was to determine the prevalence of eye with spectrum of angle closure in a population

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attending the outpatient department of a tertiary eye care center in Kolkata.

## MATERIALS AND METHODS

Population-based studies are important for assessment of disease burden, health care policy planning, and appropriate resource allocation. This is a hospital-based cross-sectional study which was conducted in patients visiting the outpatient department of a tertiary eye care center in Kolkata. One hundred and fifty patients attending the outpatient department were randomly selected. The study commenced on January 2019 and concluded on June 2020. The Institutional Ethics Review Board approved the study that adhered to the tenets of the Declaration of Helsinki.<sup>[5]</sup>

The patients who came to the outpatient department were randomly selected and were divided into groups according to their age, and each group underwent complete ocular examination. On arrival at the examination center, the subjects were requested to sign an informed consent. In the case of illiterate subjects, the consent form was read out to them in their vernacular language in the presence of either a relative or a community volunteer. The left thumb impression was used as a signature for illiterate patients.

They then proceeded through various ophthalmic examinations and diagnostic procedures in the following order:<sup>[6,7]</sup>

- a. Ocular and medical history
- b. Lensometry was performed where necessary
- c. Refraction and recording of best-corrected visual acuity
- d. Pupillary evaluation
- e. Corneal pachymetry: The central corneal thickness was measured using the ultrasound pachymeter
- f. Slit lamp bio-microscopy, including van Herrick grading of the angle of the anterior chamber angle, was performed
- g. Applanation tonometry: Intraocular pressure (IOP) recording with the Goldmann applanation tonometer was done. Calibration was done by trained senior glaucoma surgeons on a weekly basis
- h. Gonioscopy: A Goldmann's 3-mirror hand-held gonioscope was used, and the angle was graded according to the Shaffer system. Gonioscopy was performed in dim ambient illumination with a shortened slit that did not fall on the pupil. An angle was considered occludable if the pigmented trabecular meshwork was not visible in  $>270^\circ$  of the angle in dim illumination. All subjects with occludable angles in one or both the eyes were deemed to have primary angle closure disease (PACD). If the angle was occludable,

indentation gonioscopy was performed, and the presence or absence of peripheral anterior synechia was recorded. Laser iridotomy was performed in subjects with occludable angles after obtaining their consent. The rest of the examination was deferred to another convenient date following laser iridotomy.

- i. Grading of lens opacities (Lens Opacities Classification System II)
- j. Fundus examination using +90 D lens
- k. Optic disk evaluation was done using +78D lens. The vertical cup-disk ratio was recorded, and a special note was made of peripapillary atrophy and optic disc/peripapillary hemorrhage, bayoneting sign, barring of circumferential vessels, and laminar dot sign
- l. Automated visual field testing was done in all subjects using Humphrey field analyzer using central 24-2 SITA standard test
- m. Heidelberg spectralis Oct fast retinal nerve fiber layer (RNFL) scan was employed to determine RNFL analysis.

The following definitions based on INTERNATIONAL SOCIETY GEOGRAPHICAL AND EPIDEMIOLOGICAL OPHTHALMOLOGY guidelines<sup>[8-10]</sup> were used for the current work.

### Primary Angle Closure Suspect (PACS)

Gonioscopy shows posterior meshwork iridotrabecular contact (ITC) in three or more quadrants but no Peripheral Anterior synechiae (pas). Many patients with less ITC have evidence of intermittent angle closure, and a lower threshold for diagnosis, such as, two quadrants of ITC, pigment smudging or even a very narrow angle approach,  $20^\circ$  or less, maybe justified.

1. Normal IOP, optic disk, and visual field
2. No peripheral anterior synechiae
3. The risk of PACG at 5 years maybe around 30%.

### Primary Angle Closure (PAC)

1. Gonioscopy shows three or more quadrants of ITC with raised IOP and/or PAS, or excessive pigment smudging on trabecular mesh work
2. Normal optic disk and visual field.

### PACG

1. ITC in three or more quadrants, with glaucomatous optic neuropathy
2. Optic nerve damage from an episode of severe IOP elevation, such as acute angle closure, may not appear as typical glaucomatous cupping.

### Inclusion Criteria

The following criteria were included in this study:

1. Adult age group of more than 18 years and  $<55$  years
2. Patients with PACD or PACS or PAC or PACG

3. Patients with acute or chronic onset of symptoms
4. Patients having either symptomatic or asymptomatic presentation.

**Exclusion Criteria**

Patients with secondary glaucomas and open angle glaucoma were excluded from the study.

**Statistical Analysis**

Data were collected on a standardized pro forma from all the subjects who were willing to participate in the study after taking informed written consent. Data were entered in Microsoft Excel sheet and analyzed by SPSS 25 IBM version. Quantitative data were expressed in mean ± S.D or median ± interquartile range. Qualitative data were expressed in proportions and percentages and associations, were calculated using Chi-square or Fischer exact test.  $P < 0.05$  was considered as statistically significant.

**RESULTS**

A total of 150 patients were enumerated who visited the outpatient department from January 2019 to June 2020. Data from all the 150 subjects were analyzed. Table 1 shows that the average age was  $46.1 \pm 6.05$ . 0.6% was in age 18–25 years, 4.6% were in 26–35 years, 36% were in 36–45 years, and 58.6% were in 46–55 years. The prevalence of glaucoma was found to be increasing in higher age groups. Out of 150 patients, 65% were female and 35% were male [Figure 1]. Hence, females are affected more as compared to males. In our study, 78 patients had PACS (52%; CI 95%, 44.1–59.8%), 52 patients had PAC (34.6% CI 95%, 27.5–42.5%), and 20 patients had PACG (13.3% CI 95%, 8.8–19.6%). Hence, higher prevalence was for PACS, while least prevalence was for PACG. Our study, Table 2 shows that higher age group has higher prevalence of PACS followed by PAC and PACG [Table 2].

One hundred and twelve were chronic (74.6%), while 38 patients were acute (25.3%) patients of PACD. Ninety-two patients were asymptomatic (61.3%) and 58 were symptomatic (36.6%) on presentation.

**DISCUSSION**

The estimated global prevalence of glaucoma was found to be 3.54% in a systematic meta-analysis in 2014,<sup>[11]</sup> with the highest prevalence in Africa. The prevalence of POAG is highest in Africa, while the prevalence of PACG is highest in Asia.

Several studies have shown that the prevalence of glaucoma increases with age. Our study also showed

**Table 1: Mean age with standard error and standard deviation among the study subjects**

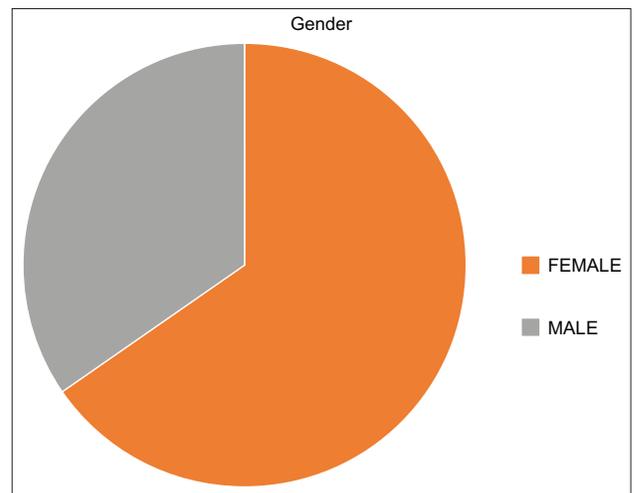
Mean	46.17
SEM	0.495
Median	47.00
SD	6.057
Variance	36.690
Range	31
Minimum	24
Maximum	55
Percentiles	
25	42.75
50	47.00
75	51.00

SD: Standard deviation, SEM: Standard error of mean

**Table 2: Age-wise distribution of different types of the primary angle closure disease**

Age group	Subtype		
	PACS	PAC	PACG
19–25	0	1	0
26–35	4	3	0
36–45	27	16	11
46–55	47	32	9
Total	78	52	20

PACS: Primary angle closure suspect, PACS: Primary angle closure, PACG: Primary angle closure glaucoma



**Figure 1: Gender distribution of the subjects**

higher prevalence of glaucoma to be in the age group of 46–55 years, 58.6% of the total population were in this age group which is significantly higher. The Andhra Pradesh eye disease study also found that prevalence is 2.21% in 40 years and above patients and 1.41% in 30 years of age and older glaucoma patients.<sup>[11,12]</sup>

Our study shows a higher prevalence of glaucoma in female than male. The Aravind Comprehensive Eye Survey,<sup>[12]</sup> Barbados Eye Study,<sup>[13]</sup> Rotterdam Study,<sup>[14]</sup> and Framingham Eye Study<sup>[15]</sup> also showed a higher prevalence

of glaucoma in men, whereas the Beaver Dam Eye Study<sup>[16]</sup> showed no gender difference in glaucoma prevalence. The Blue Mountains Eye Study<sup>[16]</sup> Reported a higher prevalence of glaucoma in women.

The strength of this study was that it was conducted in a tertiary care hospital with all the standardized protocols and calibrated instruments among the patients in a randomized manner. However, the main limitation of this study was its less sample size and lack of routine follow-up due to various reasons.

## CONCLUSION

This study determined the prevalence of angle closure glaucoma among the patients attending our hospital and found that PACS is the most common subtype of glaucoma, whereas PACG was found to be the least common. Females are generally more affected as compared to males.

Most of the patients that attended the outpatient department were asymptomatic with a chronic presentation.

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