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Original Research Paper

Ophthalomology

A CROSS SECTIONAL STUDY TO EVALUATE THE PREVALENCE OF OCCLUDABLE ANGLES IN PATIENTS ATTENDING TERTIARY CARE CENTRE IN WESTERN REGION OF UTTAR PRADESH.

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ABSTRACT

Aim: To assess the prevalence of occludable angles and identify key risk factors such as shallow anterior chamber, refractive error, gender, and age in patients attending a tertiary care center in western Uttar Pradesh. The study also aims to advocate for routine screening in high-risk groups to facilitate early detection and management of primary angle-closure glaucoma (PACG). **Materials and Methods:** A cross-sectional study was conducted on 100 patients aged 40 years and above at the VIMS Ophthalmology Outpatient Department between October 2024 and March 2025. Comprehensive ocular examinations included visual acuity, refraction, anterior chamber depth assessment, intraocular pressure (IOP) measurement, gonioscopy, and fundus evaluation. Occludable angles were defined based on gonioscopic visibility of the posterior trabecular meshwork in <90°. **Results:** Occludable angles were observed in 18% of patients. The majority of these cases were females (83%), hypermetropes (61.1%), and individuals aged between 60–80 years (50%). The mean IOP was 16.91 mmHg, with 73% of patients falling within the normal IOP range (10–20 mmHg). Statistically significant associations were found between occludable angles and female gender ($p < 0.01$), hypermetropia ($p = 0.03$), and age over 60 years ($p = 0.04$). **Conclusion:** This study emphasizes the importance of routine gonioscopic screening in high-risk groups, especially elderly hypermetropic females, to enable early detection of occludable angles. Integrating such screening in regular ophthalmic check-ups can significantly reduce the risk of irreversible vision loss due to PACG.

KEYWORDS : PACG, Shallow Anterior chamber, Occludable angles, Gonioscopy.

INTRODUCTION

Primary angle-closure glaucoma (PACG) is a significant cause of irreversible blindness worldwide, second only to primary open-angle glaucoma. According to the World Health Organization, glaucoma is the second leading cause of blindness globally, and PACG contributes to a disproportionately high burden of visual impairment in Asian populations [1]. Anatomical predispositions, such as shallow anterior chamber depth (ACD) and narrow angles, make early detection essential, especially in high-risk populations.

Studies have suggested that women, hypermetropes, and the elderly are particularly vulnerable to developing angle closure due to their anatomical configuration [2][3]. Gonioscopy remains the gold standard for evaluating the angle of the anterior chamber, but its usage is often limited in general practice due to time constraints and lack of expertise [4]. There is a need to conduct focused screening in tertiary care settings to identify individuals at risk of PACG.

This study aims to evaluate the incidence of occludable angles in high-risk groups, determine the risk factors associated with shallow anterior chambers, and underscore the importance of routine screening among patients attending outpatient departments.

MATERIALS & METHODS

A hospital based cross sectional study was conducted in the department of ophthalmology at Venkateshwara Institute of Medical Sciences (VIMS) Rajabpur, western UP. The study was conducted from October 2024 to march 2025. A sample size of 100 patients who attended ophthalmology OPD at VIMS hospital were included.

Inclusion Criteria:

- Patients aged 40 years and above
- Patients attending the OPD irrespective of presenting complaint
- Patients with shallow anterior chamber (van Herick's grade 1, 2,3)

Exclusion Criteria:

- Patients with corneal opacities obstructing gonioscopic view
- Diagnosed cases of primary open-angle glaucoma, angle closure glaucoma or any other known chronic ocular disease.

Detailed histories concerning various risk factors and the associated symptoms which may lead to angle closure were established. Informed consent was obtained from each participants.

Each participant underwent the following examinations:

1. Visual acuity assessment using Snellen chart
2. Refraction testing
3. Intraocular Pressure (IOP) measurement with Goldmann applanation tonometry
4. Slit-lamp biomicroscopy to evaluate Anterior Chamber Depth (Van Herick's method)
5. Gonioscopy with a 4-mirror goniolens
6. Fundus examination with a +90D lens

Statistical Analysis

Data was analyzed using SPSS version 25. Descriptive statistics were used to summarize demographic and clinical variables. Chi-square tests were applied to assess the association between occludable angles and risk factors such as age, gender, refractive status, and IOP. A p-value < 0.05 was considered statistically significant.

RESULTS

Of the 100 patients studied, 76% were female and 24% were male. Refractive error distribution showed that 73% of participants were hypermetropes, 7% were myopes, and 20% were emmetropic.

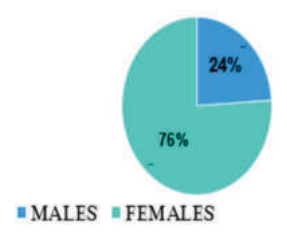

Fig 1

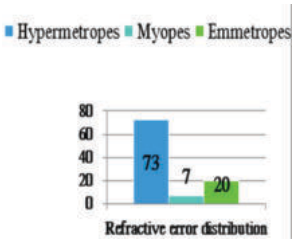

Fig 2

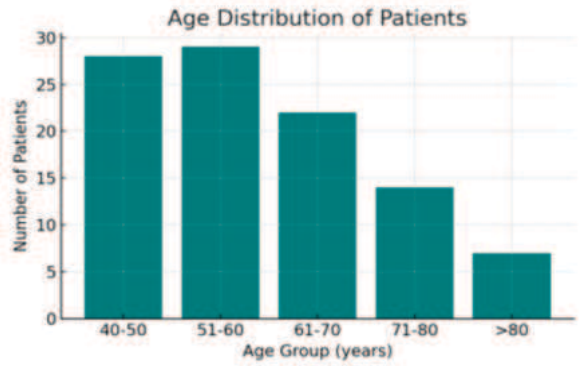

Fig 3

Distribution according to Van Herick's grading:		
(LACD) as compared to CT	Van Herick's grading	Percentage distribution
>1/4 to 1/2 of corneal thickness	Grade-III	48%
1/4 of corneal thickness	Grade-II	34%
<1/4 of corneal thickness	Grade-I	15%
No to minimal space observed	Slit angle	3%

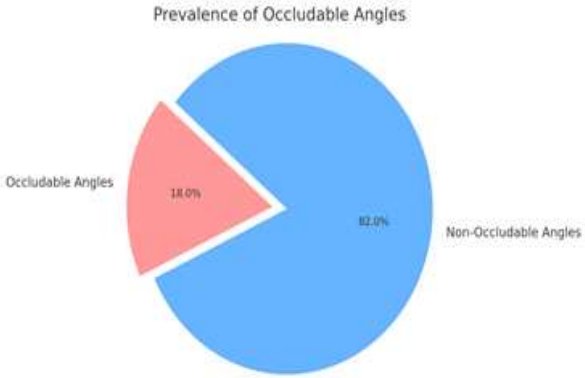

Fig 4

Occludable angles were detected in 18 participants (18%). Among them:

- 83% (15/18) were females
- 61.1% (11/18) had hypermetropia,
- 50% (9/18) were from the age group 60-80 years
- 66.7% (12/18) had immature senile cataract in both eyes. 33.3% (6/18) had both eyes pseudophakic

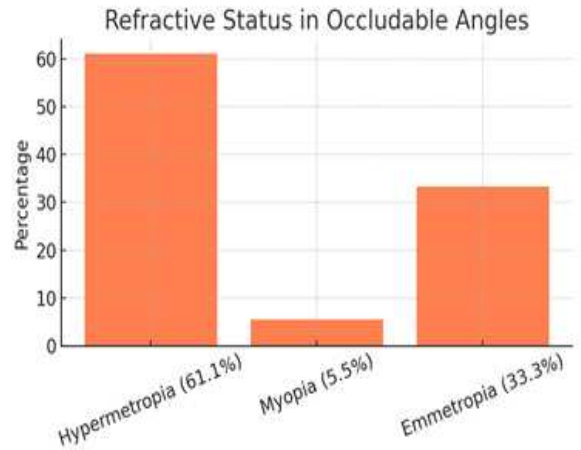

Fig 5

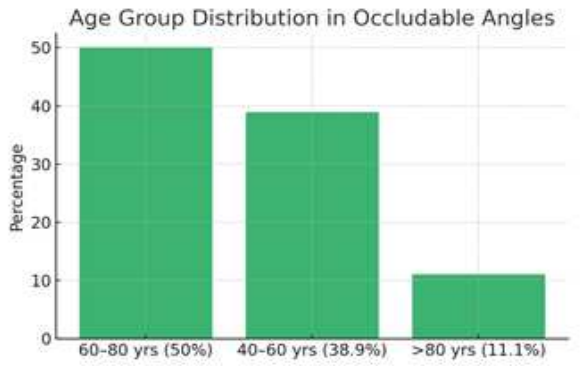

Fig 6

Gonioscopic findings (shaffer's grading)			
Grade	Degree	Angle status	Percentage distribution
Grade-IV	35-45	Wide open	48%
Grade-III	25-35	Open	21%
Grade-II	20	Narrow	13%
Grade- I	10	Eventually possible closure	18%

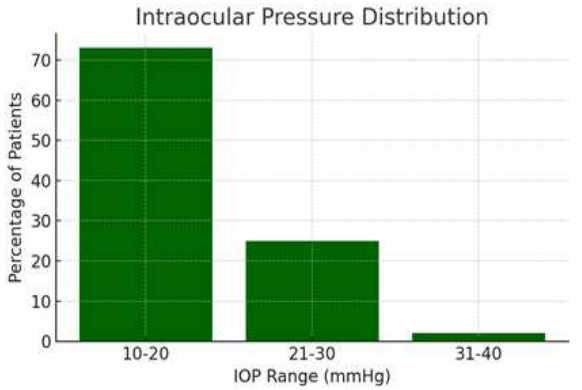

Fig 7

Only those patients were included in the category of occludable angles where the gonioscopic findings had posterior trabecular meshwork visible for <90 degree.

Considering Intraocular pressure normal range between 10-21 mmhg:

- 73% had IOP in in the range of 10-20 mmHg
- 25% had IOP between 21-30 mmHg
- 2% had IOP between 31-40 mmHg
- Mean IOP was 16.91 mmHg.

Statistical analysis revealed significant associations between occludable angles and the following risk factors:

- Female gender ($p < 0.01$)
- Hypermetropia ($p = 0.03$)
- Age above 60 years ($p = 0.04$)

DISCUSSION

The present study confirms a higher prevalence of occludable angles among females and hypermetropes, aligning with previous studies by Foster et al. [5] and Alsbirk [6]. Women are more susceptible due to anatomical factors such as shallower anterior chambers and shorter axial lengths [7]. In our study, 83.3% of patients were female, which is consistent with these anatomical predispositions. Furthermore, 61.1% of patients were hypermetropic—a refractive state marked by shorter axial lengths that inherently increases the risk of angle closure due to reduced anterior chamber depth [8].

Age-related anatomical changes also played a significant role. Half of the patients (50%) were in the 60–80-year age

group, reflecting the influence of advancing age in increasing lens thickness and anterior displacement, both of which contribute to narrowing of the anterior chamber angle. Lens status further revealed a strong correlation with angle closure risk: 66.7% of patients had immature senile cataracts in both eyes. The enlarged, aging crystalline lens in these individuals likely led to forward displacement of the iris-lens diaphragm, exacerbating angle crowding. On the other hand, 33.3% of patients were pseudophakic, suggesting that cataract extraction could help relieve angle narrowing and reduce intraocular pressure (IOP). This supports emerging perspectives on early lens extraction as a preventative strategy in managing primary angle-closure disease.

Notably, only a small proportion of patients in this study exhibited elevated IOP (>21 mmHg), which highlights the limitation of relying solely on IOP measurements in glaucoma screening. This finding underlines the importance of comprehensive anterior chamber angle assessment through gonioscopy, as advocated by the American Academy of Ophthalmology [9].

In light of these observations, routine gonioscopic screening for high-risk groups—particularly elderly, hypermetropic females—becomes essential. Early detection can facilitate timely laser or surgical interventions such as peripheral iridotomy or lens extraction, thereby preventing irreversible optic nerve damage and vision loss [10].

CONCLUSION

This cross-sectional study highlights a significant incidence of occludable angles among patients attending a tertiary care center, particularly among elderly hypermetropic females. Routine gonioscopy and anterior chamber depth evaluation should be considered as part of regular ophthalmic check-ups in such high-risk populations. Early identification and treatment of angle-closure suspects can help mitigate the burden of blindness due to PACG in India.

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