Original Article

Screening Of Moderate to High Myopic Patients For Primary Open Angle Glaucoma.

Afroz Khan, Snober Yousuf, Sammar Gani, Farhat Akhtar, Afnan Showkat

Abstract

Background:

Glaucoma is a major cause of irreversible blindness globally, with an estimated 76 million individuals affected in 2020. Projections suggest this number may rise to 112 million by 2040. Primary open-angle glaucoma (POAG) often progresses asymptomatically, and diagnosis typically occurs after the disease has already advanced beyond the stage where treatment can be fully effective. Routine screening in populations at elevated risk supports earlier detection and intervention, potentially slowing the progression of optic nerve damage. Moderate to high myopia (-3.00D) is identified as a significant risk factor for POAG; individuals with low myopia have a 1.65-fold increased risk, while those with moderate to high myopia have an odds ratio of 2.46.

The purpose of this study was to estimate prevalence of primary open angle glaucoma (POAG) in patients with moderate to high myopia.

Materials and Methods: This cross-sectional study included 150 patients with moderate or high myopia. Each underwent a detailed clinical history, subjective refraction, applanation tonometry, optic disc evaluation, visual field analysis, and retinal nerve fibre layer analysis. Data were analysed in SPSS Version 26.0, with categorical variables assessed using Fisher's exact test.

Results: This study identified a statistically significant correlation between the degree of myopia and the presence of primary open angle glaucoma (POAG), evidenced by a p-value of 0.006. Among individuals diagnosed with POAG, a greater proportion exhibited high myopia (69.60%) compared to those with moderate myopia (30.40%). Among those without POAG, 62.20% had moderate myopia and 37.80% had high myopia. This indicates that high myopia is a significant risk factor for developing POAG compared to moderate myopia.

Conclusion: This study found a significant correlation between myopia severity and primary open angle glaucoma, with high myopia linked to a greater likelihood of POAG than moderate myopia. These findings indicate that high myopia may be a significant risk factor for primary open-angle glaucoma (POAG) and emphasize the importance of regular glaucoma screening in individuals with severe myopia to facilitate early detection and appropriate management.

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Introduction

Glaucoma is a leading cause of irreversible blindness worldwide, affecting approximately 76 million in 2020, with projections estimating an increase to 112 million by 2040[1].The global prevalence of glaucoma in individuals aged 40-80 years is approximately 3.54 %, with primary open angle glaucoma (POAG) being the most common subtype[2]. POAG tends to have a long asymptomatic course and by the time it is diagnosed the disease process has already started and progressed to the point where it is not amenable to treatment[1]. Therefore, screening for POAG is crucial to halt and prevent disease progression.

Routine screening in high-risk populations helps in the early detection and timely intervention, which can delay the progression of optic nerve damage[3]. The integration of structural and functional assessments significantly improves diagnostic accuracy[4].Early diagnosis is particularly associated with better visual outcomes. Multimodal screening strategies also reduce healthcare burden and societal cost[5].

Correlation between myopia and POAG

Myopia is a major cause of visual impairment and is increasingly common, particularly among young people[6]. Moderate to high myopia (-3.00D) is a significant risk factor for POAG3. Individuals with low myopia have a 1.65 times higher risk, while those with moderate to high myopia have an odds ratio of 2.46[7].

Author Affiliations

Afroz Khan, Professor; **Snober Yousuf**, Assistant Professor; **Sammar Gani**, Junior Resident; **Farhat Akhtar**, **Afnan Showkat**, Senior Residents:

Post graduate Department of Ophthalmology, Government Medical College, Srinagar

Correspondence

Dr. Snober Yousuf,
Post graduate Department of Ophthalmology, Government Medical College, Srinagar, J&K, India, 190010
Email: snoberyousuf@gmail.com
(m): 9997365855

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Keywords

Primary open angle Glaucoma, Intraocular Pressure, Visual Field, Myopia

Axial elongation and optic nerve head stretching in myopic eyes can lead to biomechanical stress on the optic nerve head. Additionally, the thinner lamina cribrosa in such eyes may increase susceptibility to IOP-induced neuropathy[8]. A genetic link between myopia and POAG has been identified at loci on chromosome 14 near the SIX6 gene[9].

This study aimed to estimate the prevalence of primary open glaucoma in patients with moderate to high myopia

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This study aimed to estimate the prevalence of primary open glaucoma in patients with moderate to high myopia.

Methods

This observational cross-sectional study was conducted at the Post Graduate Department of Ophthalmology, Government Medical College, Srinagar, over a period of one and half years after obtaining ethical clearance from the Institutional Ethical Committee. Each patient provided informed consent and underwent a comprehensive ophthalmic examination, including subjective refraction, Goldmann applanation tonometry, central corneal thickness measurement, gonioscopy, and slit lamp biomicroscopy for optic disc evaluation. Additionally, each patient had a Humphrey Visual field analysis with the 24-2 threshold program to detect early glaucoma and optical coherence tomography for retinal nerve fibre layer analysis.

The data was analysed using SPSS version 26.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean ± Standard Deviation (SD), while categorical variables were summarized using frequencies and percentages. Descriptive analysis involved calculating the Mean, Standard Deviation, Frequency, and Percentage. Fisher's exact test was used to analyse categorical variables. A p-value of <0.05 was considered statistically significant.

Results

Demographics

A total of 150 subjects were enrolled in this study. The majority of participants were young adults aged between 20 and 30 years, accounting for 42.67% of the sample. This was followed by 34.67% of subjects in the 31-40 years age group. The mean age of participants was 33.96 years, indicating a relatively young cohort (Figure 1). The gender distribution showed a male predominance at 56.67% (Figure 2). The intraocular pressure (IOP) assessment revealed that 83.3% of the participants had IOP within the normal range (<21 mmHg), whereas 16.67% exhibited elevated IOP >21 mmHg (Figure 3). This shows fewer participants had elevated IOP, a risk factor for glaucoma. More participants had moderate myopia (-3.0 D to -6.0 D) at.

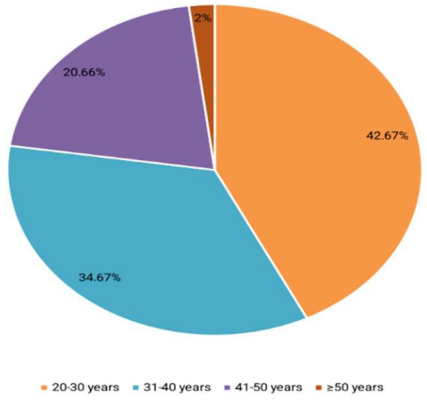


Figure 1. Sample distribution on basis of age groups

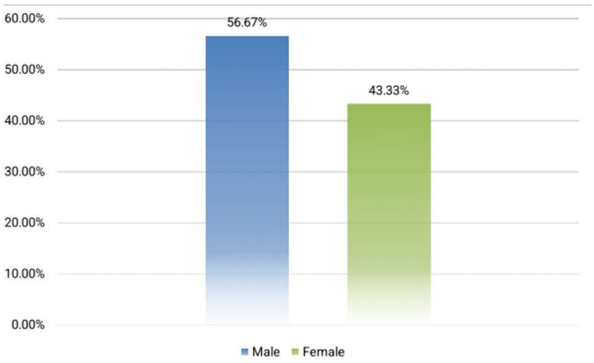


Figure 2. Gender distribution of study participants

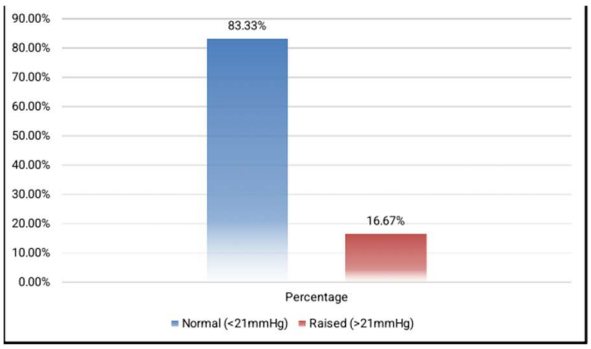


Figure 3. Status of IOP of study participants

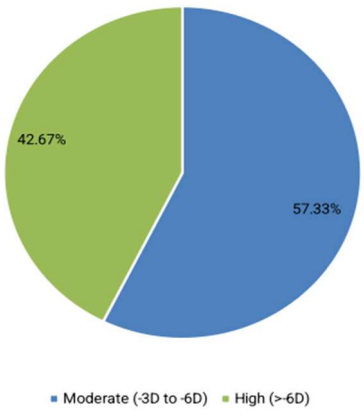


Figure 4. Status of Myopia among study population

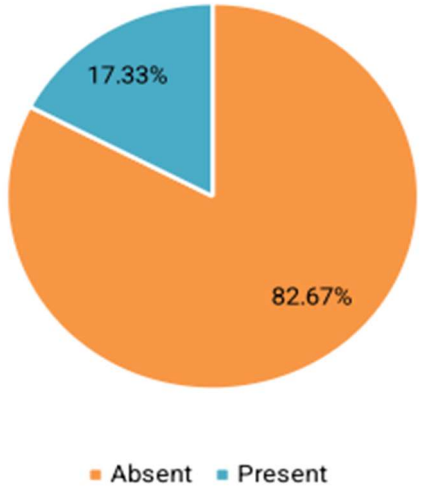


Figure 5. Status of Glaucomatous optic disc changes

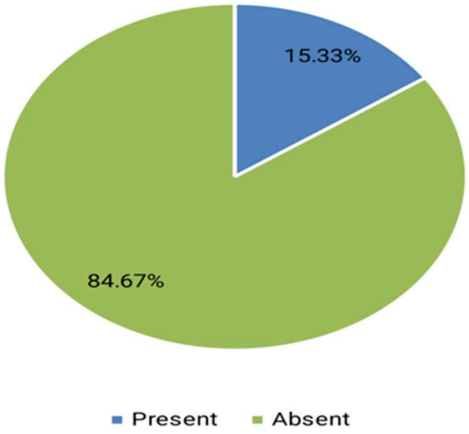
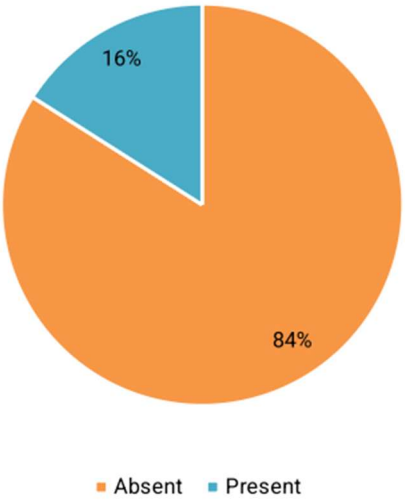


Figure 8. Status of POAG among study participants



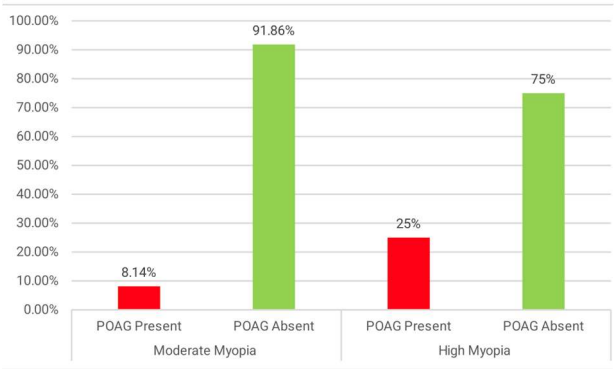
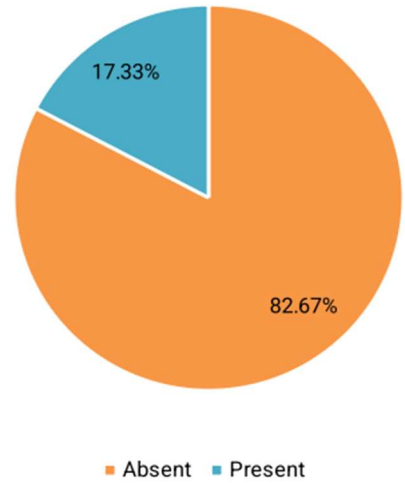


Figure 9. Prevalence of POAG in moderate to high myopia



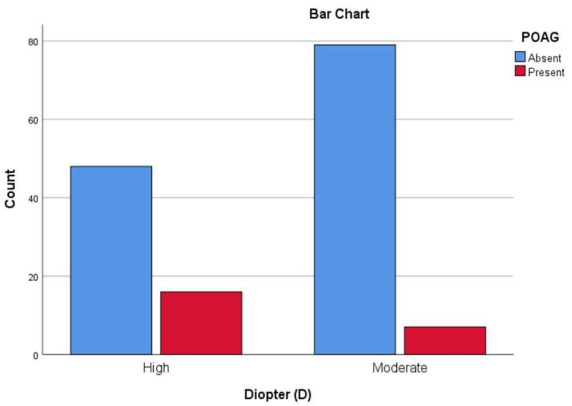


Figure 6 & 7. Status of visual field defects and RNFL changes among study participants

Figure 10. Status of high and moderate myopia among study participants on the basis of POAG

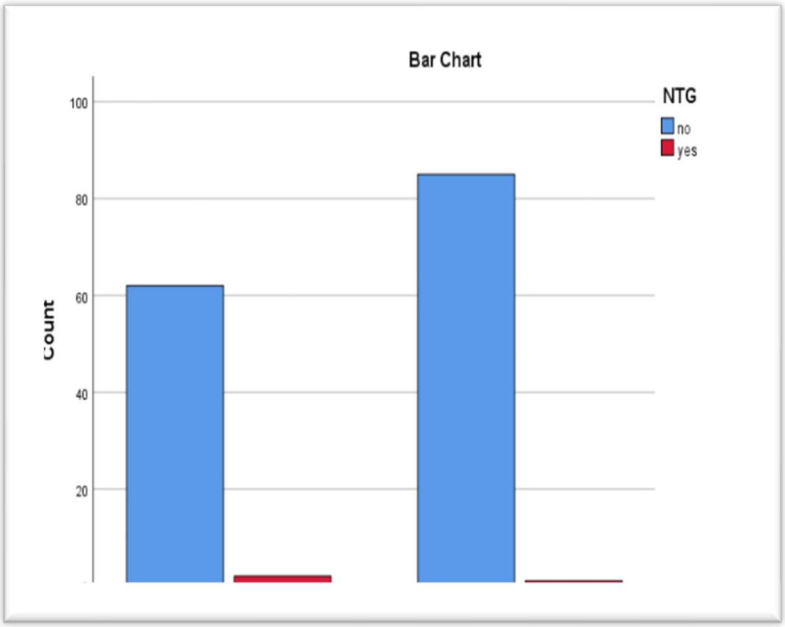


Figure 11. Study of high and moderate myopic patients on the basis of NTG among study participants

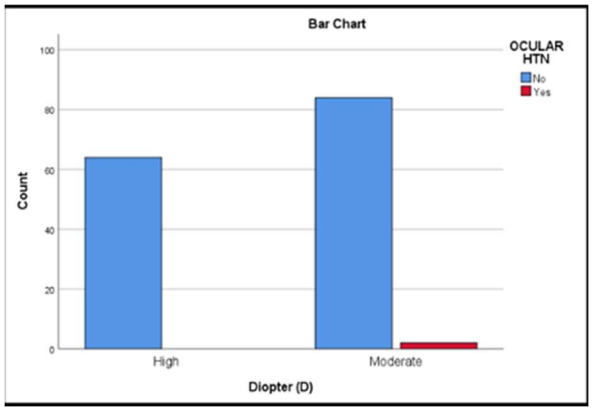


Figure 12. Status of high and moderate myopia on the basis of ocular HTN

57.33% than high myopia (-6.0 D) at 42.67% (Figure 4). The results indicated that while both levels of myopia were prevalent within the study population, moderate myopia was slightly more predominant.

Prevalence of POAG

During glaucoma screening, 17.3% of participants showed signs of glaucomatous disc changes, suggesting that over one-sixth need further evaluation despite most having healthy optic discs (Figure 5). 16% of participants had visual field defects on perimetry, suggesting glaucomatous optic nerve damage (Figure 6).17.3% showed RNFL thinning on OCT, indicating early signs of glaucomatous optic neuropathy (Figure 7).

The prevalence of POAG among study participants was 15.33% while the remaining 84.67% did not exhibit any features of POAG (Figure 8).The findings demonstrate that primary open-angle glaucoma (POAG) constitutes a significant portion of glaucoma cases within the study population. This underscores the importance of early screening and detection, especially among high-risk groups. The prevalence of POAG was notably higher in participants with high myopia compared to those with moderate myopia (Figure 9)

A statistically significant correlation (p-value 0.006) was observed between the degree of myopia and primary open-angle glaucoma (POAG). In participants with POAG, 69.60% had high myopia and 30.40% had moderate myopia. Among those without POAG, 62.20% had moderate myopia, and 37.80% had high myopia (Figure 10).

A p-value less than 0.05 shows that individuals with high myopia have a significantly higher risk of POAG compared to those with moderate myopia, emphasizing high myopia as a critical risk factor.

Three participants in the study were diagnosed with normal-tension glaucoma (NTG). Among these participants, two (66.70%) had high myopia and one (33.3%) had moderate myopia (Figure 11). The association was not statistically significant (p=0.576), showing no meaningful link between myopia levels and NTG presence in this sample. Similarly , no significant correlation (p = 0.507) was found between the extent of myopia and ocular hypertension (Figure 12).

Discussion

This study focused on young adults (mean age 33.96 years; 42.67% aged 20–30), with slightly more males (56.67%). Consistent with prior research, younger individuals are more likely to seek vision correction due to educational or occupational needs. Only 2% of participants were over 50, possibly due to study design or healthcare-seeking patterns Dandona et al[10] . The small male majority aligns with trends showing men more frequently seek clinical eye care as reported by Holden et al [6].

The study showed that 83.33% of participants had normal intraocular pressure (IOP), while 16.67% had elevated IOP—a risk factor for primary open-angle glaucoma (POAG) [11]. However, glaucoma can also occur in those with normal IOP, known as normal-tension glaucoma, so assessments should go beyond just IOP measurement[12]. Glaucomatous optic disc changes were found in 17.33% of participants, highlighting the importance of thorough fundoscopic exams, especially in those with myopia or high IOP. Visual field defects, present in 16%, further emphasize the need for perimetry to detect functional loss after structural optic nerve changes and to monitor glaucoma progression [13]. Even minor field defects may be clinically relevant, especially when linked to optic disc or RNFL changes. Notably, 17.33% of participants

showed RNFL thinning—a key early marker of glaucoma that often appears before visual field loss (Medeiros et al) warranting close monitoring for early glaucoma or other optic neuropathies [14]. As RNFL defects can predict future visual field progression (Schuman et al), early detection and multimodal evaluation, including disc assessment and perimetry, are essential for comprehensive glaucoma diagnosis [15].

The study found moderate myopia (57.33%) to be more common than high myopia (42.67%), consistent with trends in young adults. While fewer cases of high myopia were observed, this group requires closer monitoring due to higher risk of posterior eye changes [16]. Understanding myopia severity is vital for effective glaucoma screening and management, as early detection of high-risk individuals can help prevent permanent vision loss.

POAG was found in 15.33% of participants, reflecting its significant prevalence in this group. This aligns with global findings that identify POAG as the leading type of glaucoma, especially in adults over 40, and often asymptomatic until late stages Tham et al [1].

The study found that Primary Open-Angle Glaucoma (POAG) was more common in individuals with high myopia (25%) than in those with moderate myopia (8.14%), indicating a significant association ($p = 0.006$) between myopia severity and glaucoma risk. High myopia can cause optic nerve changes, increasing susceptibility to POAG even at normal intraocular pressures. Among POAG cases, nearly 70% had high myopia, while most non-POAG participants had moderate myopia. Features like unusual optic disc cupping and peripapillary atrophy in high myopes may mask early glaucoma or heighten optic nerve damage risk [17].

This study found a significant rate of glaucoma indicators and POAG in young adults in India, with high myopia strongly linked to POAG regardless of intraocular pressure. The results stress the need for glaucoma screening and thorough eye exams, especially for those with myopia and younger patients. Attention to gender differences is also needed to ensure equal access to eye care.

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