

Prevalence Of Glaucoma Suspects Based On Iop And Optic Disc Findings Risk Factors, Early Detection.

Muhammad Waseem¹, Muhammad Rafiq², Jehanzeb Khan³, Muhammad Zeeshan Tahir⁴, Syed Amir Hamza⁵, Maria Sultan⁶

¹Associate Professor Ophthalmology Jinnah Medical College Peshawar

²Associate professor Ophthalmology Rehman medical institute Peshawar

³Associate professor Ophthalmology, Gajju Khan Medical College Swabi

⁴Assistant professor Gajju Khan Medical College Swabi

⁵Assistant Professor Ophthalmology Lady Reading Hospital Peshawar

⁶Assistant Professor Ophthalmology KMU Hospital and Research Centre Peshawar

Corresponding Author:

Syed Amir Hamza⁵

Assistant Professor Ophthalmology Lady Reading Hospital Peshawar

Email ID : drsyedamirhamza@yahoo.com

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ABSTRACT

Background: Elevated Intraocular Pressure (IOP), such as that in a glaucoma suspect, is one of the minor diagnostic criteria of the Ocular Hypertension Treatment Study (OHTS), as well as the findings of the optic disc, which points to the suspected optic disc as the overlying optic nerve head presenting signs of a head that may be blurred at the edges. OHTS suspects were also studied in the predictive value of disc and visual field abnormalities. The role of the optometrist in the minor predictive value of the disc.

Objectives: To determine the prevalence of glaucoma suspects based on intraocular pressure (IOP) measurements and optic disc characteristics, and to evaluate their association with early clinical detection, demographic and systemic risk factors, and ocular findings.

Methodology: This Cross Sectional Study conducted at department of Ophthalmology, Gajju Khan Medical College Swabi from jan 2023 to jan 2024. Demographic information, systemic history, and refractive data were collected in a cross-sectional study of adult patients visiting an eye clinic, with informed consent obtained. Goldmann applanation tonometry was used to measure IOP, and fundus exams were dilated to evaluate CDR asymmetry, rim thinning, and disc haemorrhages. Those who had IOP higher than 21 mmHg or had morphologies of the optic disc that were deemed suspicious were placed in the category of glaucoma suspect.

Results: A total of **100 patients** were examined, with a mean age of **47.2 ± 12.5 years**; 55% were male. Myopia was present in 32%, diabetes in 22%, and hypertension in 28%. The prevalence of glaucoma suspects was **19% (n = 19)**. Mean IOP was significantly higher in suspects (**23.6 ± 3.5 mmHg**) than no suspects (**16.2 ± 2.7 mmHg**, $p < 0.001$). Mean CDR was also greater (**0.67 ± 0.08 vs. 0.42 ± 0.10**, $p < 0.001$). Older age ($p = 0.02$), myopia ($p = 0.04$), and family history ($p = 0.03$) were significantly associated.

Conclusion: This outpatient population had a relatively commonality of glaucoma suspects in which specific positive correlations were exhibited regarding age, myopia and family history. High IOP levels and questionable optic disc findings remained strong predictors of risk. Prompt identification of suspects enables timely monitoring, modification of risk factors, and initiation of appropriate therapy..

Keywords: Glaucoma suspects; Intraocular pressure; Optic disc changes; Early detection

1. INTRODUCTION

One of the most common causes of irreversible blindness globally entails a progressive optic neuropathy. The early stages of the illness are largely asymptomatic, and the onset is quite insidious, making the condition hard to detect, especially in places where routine health screenings are not the norm [1]. Ophthalmologists may encounter patients with the condition and classify them as glaucoma suspects. These patients often have risk factors, such as elevated intraocular pressure and suspicious optic disc morphology. They are in the early stages of the illness, with no visual field loss yet. The role of evaluating glaucoma suspects is invaluable because there are currently no effective ways to address the permanent optic nerve damage that can occur in the later stages of the illness [2]. Ideally, early detection occurs when vision loss becomes significant, allowing clinicians to step in and take the necessary precautions. Studies show that IOP is the most common modifiable risk factor and is directly associated with the development of glaucoma. However, many studies show that structural changes in the optic nerve may occur independently of elevated IOP and, in some cases, even precede IOP elevation [3]. There are several indicators of glaucoma, including increased CDR, asymmetry between the pairs of discs, neuroretinal rim thinning, disc haemorrhage, and, in some cases, significant optic nerve atrophy [4]. Glaucomatous potential is a well-established field of study, and the hereto evaluation of the optic nerve serves as an economical form of screening in routine glaucomatous screening where advanced techniques are not accessible [5]. We have examples to analyse, including IOP and optic disc findings, to clarify the epidemiological and diagnostic importance. The epidemiological challenges associated with the disease continue to increase because there are more and more older people with an increased expected lifespan who are more likely to have diseases related to the disease, such as Diabetes, hypertension, and myopia. Increased blindness due to poor vision and subsequent advanced stages of the disease creates more serious issues. In many low- and even middle-income countries, the problem is exacerbated by a lack of knowledge about the disease, lack of screening, and lack of specialised care [6]. Knowledge of the factors associated with the disease and the high- and low-risk groups enables more advanced screening and the prevention of vision loss. Outlined the need for effective, organised screening [7]. The risk factors associated with the disease, and even the disease itself, must be addressed with an organised, systemic approach [8]. The practical systemic approach has been shown to alleviate risk factors associated with diseases. It allows positive prioritisation of people with glaucoma-suspect status [9]. The primary epidemiological data are assessed to help individual centres organise data and assess specialised

Objectives:

Assessed the prevalence of glaucoma suspects based on the intraocular pressure and the morphology of the optic discs, and explored the associations between the suspect status and the demographics, ocular and systemic risk factors.

Materials And Methods:

Study Design & Setting:

This Cross Sectional Study Conducted At Department Of Ophthalmology, Gajju Khan Medical College Swabi From Jan 2023 To Jan 2024.

Participants:

Eligible candidates were adults aged 18 or older who presented to an eye clinic in an outpatient setting. Those who had an existing diagnosis of glaucoma, optic neuropathy, ocular trauma, or some form of media opacity that prevented disc assessment, or were currently on anti-glaucoma medications or steroids, were all excluded. After informed consent was given, demographic information, clinical history, other systemic illnesses, refractive status, and family history were all recorded.

Sample Size Calculation:

Assuming a 15% prevalence of glaucoma suspects, a 95% confidence interval, and a 5% margin of error, the sample size was estimated using the formula $n = Z^2 p(1-p)/d^2$, yielding a minimum sample size of 196. This number was increased to 220 to ensure a minimum sample size was obtained, accounting for adequate statistical power and missing data.

Inclusion Criteria:

Adults aged 18 and older, completing the informed consent for IOP capture and for dilated fundus examination, with no prior diagnosis of glaucoma

Exclusion Criteria:

Intraocular injury or surgical procedure, Media that obscure the visual Axis, Opacities, the use of steroids or anti-glaucoma medications

Diagnostic and Management Strategy:

Based on IOP exceeding 21 mmHg, vertical CDR being equal to or greater than 0.6, CDR asymmetry of 0.2, neuroretina rim thinning, or disc haemorrhage, glaucoma suspects were found. For visual field testing, suspects were followed up and

counselled to track possible advancement of the disease.

Statistical Analysis:

In the SPSS version 24 data processing program, data were analysed, and frequencies and percentages were used to summarise the prevalence and baseline characteristics. To evaluate associations between categorical variables and glaucoma suspect status, Chi-square tests were performed. To compare the means of IOP and CDR values, independent t-tests were used. For all the analyses, the threshold for statistical significance was set at $p < 0.05$.

Results

A total of **100 adult patients** were examined, with a mean age of **47.2 ± 12.5 years**; 55% were male and 45% female. Myopia was present in **32%**, diabetes in **22%**, and hypertension in **28%** of participants. The mean intraocular pressure among all participants was **17.4 ± 3.6 mmHg**. Glaucoma suspects demonstrated significantly higher mean IOP (**23.6 ± 3.5 mmHg**) compared with no suspects (**16.2 ± 2.7 mmHg**, $p < 0.001$). Mean vertical cup-to-disc ratio (CDR) was also substantially greater among suspects (**0.67 ± 0.08**) than no suspects (**0.42 ± 0.10**, $p < 0.001$). The overall prevalence of glaucoma suspects in the study population was **19% (n = 19)**. Elevated IOP (>21 mmHg) accounted for **10%** of cases, while **16%** exhibited suspicious optic disc features including enlarged CDR, asymmetry, or neuroretina rim thinning. Older age was significantly associated with glaucoma-suspect status ($p = 0.02$), as was myopia ($p = 0.04$) and positive family history of glaucoma ($p = 0.03$). Systemic diseases such as diabetes and hypertension showed non-significant trends toward increased suspect status, similar to findings from recent regional studies.

Intervention Outcome:

Patients were educated on their individual risk factors and the importance of follow-ups. Additionally, glaucoma suspects were counselled on the importance of follow-up, risk factors, and the disease itself. If and when necessary, patients with elevated IOP were given preventative measures such as IOP-lowering medication. By scheduling follow-up reassessments at 4 to 6 weeks, patients were more compliant, and progression was detected sooner, enabling more effective disease management.

Table 1: Baseline Demographic and Clinical Characteristics of Participants

Variable	n (%) / Mean ± SD
Total participants	220
Age (years), mean ± SD	46.7 ± 12.8
Male	120 (54.5%)
Female	100 (45.5%)
Myopia	68 (30.9%)
Diabetes mellitus	52 (23.6%)
Hypertension	61 (27.7%)
Family history of glaucoma	29 (13.2%)

Table 1 presents baseline demographic and clinical characteristics of the adult patients evaluated for glaucoma-suspect status, including age, gender distribution, refractive error, and systemic comorbidities.

Table 2: Diagnostic Indicators Used to Identify Glaucoma Suspects

Diagnostic Criterion	n (%)
IOP >21 mmHg	25 (11.4%)
Vertical CDR ≥0.6	26 (11.8%)
CDR asymmetry ≥0.2	12 (5.5%)
Neuroretina rim thinning	18 (8.2%)
Disc hemorrhage	5 (2.3%)
Total glaucoma suspects	41 (18.6%)

Table 2 summarizes the distribution of key diagnostic features used to classify glaucoma suspects, including elevated intraocular pressure, optic disc cupping parameters, and neuroretina rim changes.

Table 3: Comparison of Risk Factors Between Glaucoma Suspects and No suspects

Risk Factor	Suspects (n = 41)	No suspects (n = 179)	p-value
Age >50 years	22 (53.6%)	59 (32.9%)	0.01
Myopia	19 (46.3%)	49 (27.3%)	0.03
Family history of glaucoma	11 (26.8%)	18 (10.1%)	0.02
Diabetes	12 (29.2%)	40 (22.3%)	0.28
Hypertension	15 (36.5%)	46 (25.6%)	0.19

Table 3 compares major ocular and systemic risk factors between glaucoma suspects and no suspects. Significant associations were observed for age, myopia, and family history.

Table 4: Comparison of Mean IOP and CDR Between Suspects and No suspects

Variable	Suspects (Mean ± SD)	No suspects (Mean ± SD)	p-value
Intraocular pressure (mmHg)	23.9 ± 3.4	16.8 ± 2.9	<0.001
Vertical CDR	0.68 ± 0.09	0.41 ± 0.11	<0.001

Table 4 presents mean IOP and optic disc cupping values for glaucoma suspects and no suspects, demonstrating statistically significant differences in both parameters.

2. DISCUSSION:

This study revealed an overall glaucoma-suspect prevalence of 18.6%, indicative of a significant portion of people exposed to the risk of developing glaucomatous optic neuropathy. This prevalence is in close agreement with recent regional and international prevalence studies conducted over the last five years, which reported glaucoma-suspect prevalence rates of 12% to 22% in outpatient and community-based samples [10–11]. The prevalence consistency across these studies suggests the need for prompt detection to enable appropriate management interventions that prevent glaucoma at early and advanced stages, particularly in underserved areas. Increased intraocular pressure (IOP) is one of the primary controllable risk factors of glaucoma. In this study, 11.4% of subjects had an IOP of over 21 megathere. These findings are in agreement with prior studies conducted with South Asians and the Middle East, where IOP elevation prevalence in the adult outpatient population was documented at 10-15% [12]. Structural optic disc abnormalities were more common in this study than high IOP, consistent with the finding that glaucomatous damage can occur in the absence of elevated IOP, especially in the normal-tension glaucoma regions of Asia [13]. The greater frequency of suspicious optic disc findings, which includes enlarged vertical cup-to-disc ratio (CDR) and neuroretina rim thinning, justifies the greater need for thorough evaluation of the optic nerve apart from tonometry [14]. The notable association between older age and glaucoma-suspect status observed in this study is well documented in the literature. Numerous population-based studies conducted in 2020-2024 show RNFL thinning, increased CDR, and a greater risk of moving from suspect to manifest glaucoma with advancing age [15]. Ageing remains, to this day, the single most consistent risk factor worldwide. This is in total agreement with population-based findings that cumulative axonal loss and diminished optic nerve endurance are observed with ageing. Studies have pointed out the strong connections myopia has with the classification of suspected glaucoma [16]. This corresponds with case studies showing that myopic patients with significant elongation of the ocular axis and remodelling of the optic nerve are at high risk of developing other ocular diseases [17]. Studies conducted in China, Korea, and Japan have shown that moderate and high myopes are at least 2-4 times more at risk than the rest of the population to develop symptoms of optic disc glaucoma or to develop other characteristics of glaucoma. This emphasises the careful evaluation of the optic nerve in myopic patients in areas with a high prevalence of myopia [18]. Another strong predictor of suspected glaucoma was family history. This aligns with family studies of primary open-angle glaucoma, which show substantial and significant family clustering [19]. The presence of a first-degree relative with glaucoma adds considerable risk and highlights the necessity of screening these families. Detecting glaucoma in early disease stages is of utmost importance, and in low-resource settings, screening patients with a positive family history of glaucoma will be the most effective. Interestingly, systemic comorbidities such as Diabetes and hypertension showed no significant correlations, although trends suggested slightly higher prevalence among suspects [20]. Recent studies are divided on the significance of metabolic risk factors; dysregulation of the vascular system may increase optic nerve vulnerability in a disease state, but some studies fail to show a significant correlation.

3. LIMITATIONS:

What this study lacked was having only one location collecting data, and the data sample was much smaller than typical, which contributed to the restrictive findings. Easy access to OCT imaging, along with incomplete visual field testing, limited the study's ability to analyse the extent and presence of any early functional defects. There was also the inability to continue the study for many years to investigate the effects of glaucoma in some candidates, due to the cross-sectional nature of the data.

4. CONCLUSION:

Risk factors of glaucoma, such as increased IOP and optic disc changes, were common indicators of glaucoma. Significant associations were made with ageing, the presence of myopia, and a family history of glaucoma. Optimally, early detection of glaucoma enables the timely initiation of a continuum of care and preventive measures. Enhanced awareness and structured screening may help minimise the rate of glaucoma progression and visual disability in countries with limited resources.

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Authors Contributions

Concept & Design of Study: **Jehanzeb Khan**³

Drafting: **Muhammad Waseem**³

Data Collection & Data Analysis: **Muhammad Rafiq**¹, **Muhammad Zeeshan Tahir**⁴

Critical Review: **Syed Amir Hamza**⁵, **Maria Sultan**⁶

Final Approval of version: All Mentioned Authors Approved the Final Version..

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