



## Screening of Normal Tension Glaucoma (NTG) Above 40 yrs Old Attending to Ophthalmology OPD-A Hospital Based Study

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### KEYWORDS

Glaucoma,  
Incidence,  
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### ABSTRACT:

**Introduction:** Glaucoma is the leading cause of irreversible visual loss in the world and also in India. Because of the relatively asymptomatic initial phase of the disease, it is often detected by chance and is frequently associated with extensive and irreversible damage at the time of diagnosis.

**Method:** In this prospective study which is hospital-based study was conducted in the outpatient of the Ophthalmology Department in a Private medical college between January 2023 and December 2023. A total of 400 screenings were done in that 50 patients (100 eyes) of established Normal tension glaucoma after complete evaluation. Informed consent was taken from each patient. The collected data was entered in Microsoft Excel. Coding of the variables was done. Analysis was done using SPSS software (Version 27, IBM). Descriptive statistics was used. Association between categorical tests. The outcomes of the treatment groups were compared using a test to reach the hypothesis, a P value less than 0.5 was considered significant.

**Results:** The prevalence of normal tension glaucoma (NTG) in a sample of 50 patients (12.5%) and 100 eyes (25%). Of total 50 patients, The largest age group is 41–50 years, with 19 individuals representing 38% of the sample. Among the study participants 21(42%) were females and 29(58%) were males. There are 24 eyes with a visual acuity of 6/60, and 30 eyes with a visual acuity of 6/36, reflecting varying degrees of visual impairment. The sample is categorized based on four variables: ocular surgery, trauma, history of steroid intake and so such history. 15 have diabetes mellitus, 13 hypertension, 6 have both diabetes mellitus and hypertension

**Conclusion:** We concluded that the findings of this study highlight the importance of further research in the field of normal tension glaucoma to improve our understanding of its underlying importance.

### Introduction

Glaucoma, which was named after the Greek term for "clouded," may have originally referred to either a mature cataract or corneal edema caused by chronic high pressure<sup>1</sup>. It is defined as a disruption in the structural or

functional integrity of the optic nerve that can typically be alleviated by lowering the intraocular pressure (IOP)<sup>2</sup>. The two most prevalent forms of the disease are Primary Open Angle Glaucoma (POAG) and Primary Angle



Closure Glaucoma (PACG), and their occurrence varies among different ethnic groups<sup>3</sup>.

Over 2.2 billion individuals around the world suffer from either distance or near vision impairment. Approximately half of these cases could have been prevented or remain unaddressed, affecting about 1 billion people<sup>4</sup>. This figure includes those with moderate to severe distance vision impairment or blindness due to uncorrected refractive error (88.4 million), cataracts (94 million), glaucoma (7.7 million), corneal opacities (4.2 million), diabetic retinopathy (3.9 million), and trachoma (2 million), as well as those with near vision impairment resulting from uncorrected presbyopia (826 million)<sup>5</sup>. Vision impairment significantly impacts the quality of life for adult populations, with those affected often experiencing lower workforce participation and productivity rates and higher levels of depression and anxiety<sup>6</sup>. In the case of older adults, vision impairment can lead to social isolation, difficulty walking, an increased risk of falls and fractures, and a greater likelihood of entering nursing or care homes sooner than necessary<sup>7</sup>.

Glaucoma is the fourth leading cause of preventable blindness worldwide. Despite a decline in overall blindness prevalence in India, blindness and visual impairment remain a significant public health issue, with notable disparities in prevalence and causes across various regions. In light of these facts and the scarcity of region-specific data on glaucoma in the western region of India<sup>8</sup>.

The study's objectives were as follows: to screen eligible patients for glaucoma according to the established inclusion criteria, to classify glaucoma cases based on their clinical presentation, and to explore the relationship between glaucoma occurrence and various variables.

## Materials & Methods

In this prospective study which is hospital-based study was conducted in the outpatient of the Ophthalmology Department in a Private medical college between January 2023 and December 2023. The total of 400 screening was done in that 50 patients (100 eyes) of established Normal tension glaucoma after complete evaluation. Informed consent was taken from each patient. The selected participants underwent a comprehensive ophthalmic examination like visual acuity check by Snellen chart,

Intra Ocular Pressure measurement by Goldmann applanation tonometry, Anterior segment examination by slit lamp biomicroscopy (to rule out pigment dispersion, pseudo exfoliation and other secondary causes of glaucoma), Gonioscopy by one mirror Goldmann gonio lens (Shaffer grading system) and Optic disc examination by slit lamp biomicroscopy 90D lens.

**Inclusion & Exclusion criteria:** All adult patients visiting tertiary eye care centre. Patients who were willing to take part in the study by oral informed consent were included in the study.

All glaucoma suspects were then subjected to Visual field analysis using Humphrey's visual field analyzer, optical coherence tomography (OCT) and Diurnal variation of intraocular pressure (DVT), Socio-demographic details, any relevant ophthalmic history pertaining to glaucoma (like any ocular surgery, trauma, history of steroid intake or medication which can lead to glaucoma) and systemic illnesses were also assessed.

The collected data was entered in Microsoft Excel. Coding of the variables was done. Analysis was done using SPSS software (Version 27, IBM). Descriptive statistics was used. Association between categorical tests. The outcomes of the treatment groups were compared using a test to reach the hypothesis, a P value less than 0.5 was considered significant.

The following definitions were used to classify persons into specific diagnostic categories:

**Primary open angle glaucoma (POAG):** Anterior chamber angles open and normal appearing by gonioscopy, typical features of glaucomatous optic disc and visual field defects corresponding to the optic disc changes.

**Ocular hypertension (OHT):** Intraocular pressure  $\geq 21$  mmHg without evidence of optic nerve damage or visual field abnormalities characteristic of glaucoma; open and normal-appearing anterior chamber angle by gonioscopy.

**Normal tension glaucoma (NTG):** Intraocular pressure  $\leq 21$  mmHg with evidence of optic nerve damage or visual field abnormalities characteristic of glaucoma; open and normal-appearing anterior chamber angle by gonioscopy.

**Primary angle closure suspect(PACS):** Greater than  $270^\circ$  of iridotrabecular contact, absence of PAS, normal IOP, disc and visual fields.



Primary angle closure (PAC): Greater than 270° of iridotrabecular contact, either elevated IOP and/or PAS, normal disc and visual fields

Primary angle closure glaucoma (PACG): Greater than 270° of iridotrabecular contact–Elevated IOP plus optic nerve and visual field damage

Secondary glaucoma: Glaucomatous optic nerve damage and/or visual field abnormalities suggestive of glaucoma coupled with ocular disorders that contribute to a secondary elevation in IOP such as neovascularization, trauma, cataract, and uveitis.

### Result

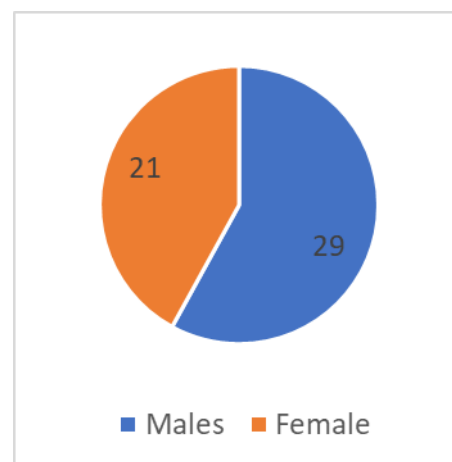
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**Table 1:** Age distribution among the study participants

Age	Frequency (n)	Percentage (%)
40 – 50 years	23	46
51 – 60 years	19	38
61 – 70 years	8	16

Individuals aged 40 to 50 years constitute the largest segment, with 23 participants representing 46% of the total sample. This indicates that nearly half of the group falls within this age range. Those aged 51 to 60 years form the second-largest category, with 19 individuals, accounting for 38% of the sample. Lastly, the smallest group consists of individuals aged 61 to 70 years, with 8 participants making up 16% of the total. ( Table 1)

**Chart 1:** Gender distribution among the study participants



Among the study participants 21(42%) were females and 29(58%) were males (Chart 1)

**Table 2:** Visual acuity among the study participants

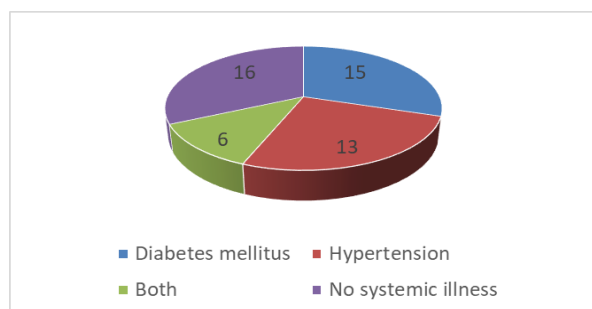
Visual acuity	No. of. Eyes (n = 100)	Percentage (%)
5/60	1	1
6/60	24	24
6/36	30	30
6/24	26	26
6/18	14	14
6/12	13	13
6/6	6	6

The visual acuity distribution of a sample of 100 eyes, details the number of eyes for each level of visual acuity. Visual acuity measures the clarity or sharpness of vision and is represented by fractions. In this sample, 1 eye has a visual acuity of 5/60, indicating very poor vision. There are 24 eyes with a visual acuity of 6/60, and 30 eyes with a visual acuity of 6/36, reflecting varying degrees of visual impairment. The 6/24 visual acuity level is seen in 26 eyes, indicating moderate impairment. Additionally, 14 eyes have a visual acuity of 6/18, and 13 eyes have a visual acuity of 6/12, indicating relatively better vision. Finally, 6 eyes achieve a visual acuity of 6/6, which is considered normal vision.

**Table 3:** Intraocular pressure among the study participants

Intraocular pressure	No. of. Eyes (n = 100)	Percentage (%)
12 – 13 mm Hg	19	19
14 – 15 mm Hg	32	32
16 – 17 mm Hg	29	29
18 – 19 mm Hg	11	11
20 – 21 mm Hg	9	9

In this sample, 19 eyes have an IOP between 12 and 13 mm Hg, constituting 19% of the sample. The most common IOP range is 14 to 15 mm Hg, observed in 32 eyes, or 32% of the sample. An IOP of 16 to 17 mm Hg is present in 29 eyes, making up 29% of the sample. A smaller portion of the sample, 11 eyes (11%), has an IOP of 18 to 19 mm Hg, and the least common IOP range, 20 to 21 mm Hg, is found in 9 eyes, representing 9% of the sample.

**Chart 2:** Systemic illness among the study participants

In this sample, 15 individuals have diabetes mellitus, indicating they are managing this chronic condition. Another 13 individuals are affected by hypertension, dealing with high blood pressure. Additionally, 6 individuals have both diabetes mellitus and hypertension, indicating they are coping with multiple chronic conditions simultaneously. The largest group, consisting of 16 individuals, has no systemic illness, meaning they do not have either of these chronic conditions. (Chart 2)

**Table 5:** Field defect among the study participants

Field defect	No. of. Eyes (n = 100)	Percentage (%)
Superior arcuate	25	25
Inferior arcuate	20	20
Paracentral	16	16
Both Superior arcuate and Inferior arcuate	18	18
Fixation	21	21

In this sample, 25 eyes (25%) exhibit a superior arcuate defect, which is a loss of vision in an arc-shaped area in the upper part of the visual field. An inferior arcuate defect, affecting 20 eyes (20%), involves a similar arc-shaped vision loss in the lower visual field. Paracentral defects, which are areas of vision loss near the center of the visual field, are present in 16 eyes (16%). Additionally, 18 eyes (18%) have both superior and inferior arcuate defects, indicating vision loss in arc-shaped areas in both the upper and lower visual fields. Lastly, 21 eyes (21%) show fixation defects, which are problems with maintaining steady gaze fixation. This distribution highlights the prevalence and types of field defects within the sample, with superior arcuate and fixation defects being the most common.

**Table 6:** Ophthalmic history pertaining to glaucoma

Ophthalmic history	No. of. Eyes (n = 50)	Percentage (%)
Ocular surgery	16	32%
Trauma	10	20%
History of steroid intake	11	22%
No history	13	26%

Within this sample, 16 eyes (32%) have a history of ocular surgery, indicating that nearly one-third of the sample has undergone surgical procedures related to eye

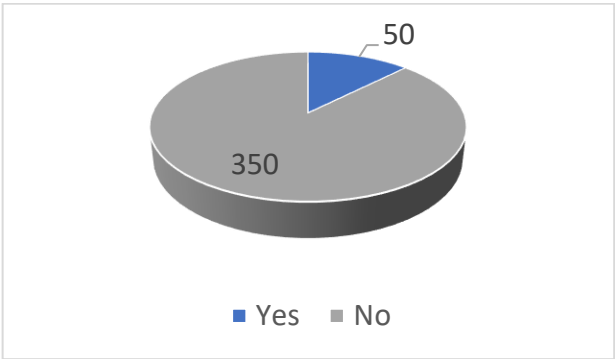


health. Trauma, which includes any injury to the eye, is reported in 10 eyes (20%). A history of steroid intake, which can impact eye health and potentially lead to conditions like cataracts or glaucoma, is noted in 11 eyes (22%). Additionally, 13 eyes (26%) have no significant ophthalmic history, meaning they have not experienced surgery, trauma, or steroid intake. This distribution provides insight into the prevalence of different ophthalmic histories within the sample, with ocular surgery being the most common, followed by steroid intake, trauma, and those with no significant history.

Table 7: Ophthalmic history with glaucoma

Variable	Ophthalmic history				P value
	Ocular surgery	Trauma	History of steroid intake	No history	
Normal tension glaucoma	16 (32%)	10 (20%)	11 (22%)	13 (26%)	0.000*

Chart 3: Prevalence of Normal tension glaucoma



The prevalence of normal tension glaucoma (NTG) in a sample of 50 patients (12.5%) and 100 eyes (25%). The sample is categorized based on four variables: ocular surgery, trauma, history of steroid intake, and no history of such factors. The figures indicate the number of eyes and the corresponding percentage for each variable:

- **Ocular surgery:** 16 eyes (32%) have undergone ocular surgery.
- **Trauma:** 10 eyes (20%) have a history of trauma.
- **History of steroid intake:** 11 eyes (22%) have a history of taking steroids.
- **No history:** 13 eyes (26%) have no history of ocular surgery, trauma, or steroid intake.

The presence of normal tension glaucoma in these groups is statistically analyzed, with the P value provided as 0.000. The P value indicates a highly significant association, meaning there is a strong statistical relationship between these ophthalmic histories and the prevalence of normal tension glaucoma. (Table 7, Chart 3).

Discussion:

There are around 11.2 million people in India aged 40 and above who suffer from glaucoma. Of these, approximately 6.48 million have primary open angle glaucoma, while an additional 2.54 million have primary angle-closure glaucoma<sup>9</sup>. It is estimated that the number of individuals with any form of primary angle-closure disease could reach as high as 27.6 million<sup>9</sup>.

Normal tension glaucoma poses a challenge in terms of diagnosis, as a diagnosis can only be made after determining the diurnal variation in intraocular pressure, with readings never exceeding 21 mm Hg even after correcting for central corneal thickness. Consequently, measuring central corneal thickness is a crucial aspect of diagnosing this condition<sup>10</sup>.

Conclusion:

In conclusion, the findings of this study highlight the importance of further research in the field of normal tension glaucoma to improve our understanding of its underlying importance. Future Scope: Future research in normal tension glaucoma should focus on identifying new biomarkers and To prevent permanent vision loss, it is essential to promote screening camps at the institutional level for early detection and intervention.

developing personalized treatment strategies based on individual patient characteristics.

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