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## Glaucoma-Silent Thief of Sight, a Study on Prevalence and Risk Factors among Adult Patients Attending Ophthalmology Department in a Tertiary Care Hospital

Priyadharshini N\*

Department of Biotechnology, Anna University, India

### \*Corresponding author:

Neela Priyadharshini,  
Department of Biotechnology, Anna University,  
Chennai 600025, India

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### Keywords:

Intra-ocular pressure; Glaucoma

## 1. Abstract

**1.1. Background:** Globally, glaucoma is the second leading cause of blindness, next to cataract. As per American academy of ophthalmology study 2014, it was estimated that 76 million people worldwide would suffer from glaucoma by 2020, and it is expected that by 2040 that number will increase to 111.8 million. Glaucoma is a progressive disorder that can cause visual field abnormalities and irreversible damage to the optic nerve, both of which can result in permanent visual loss. The aim of the study is to determine the prevalence of glaucoma, types, ocular features and the associated co morbidities and precipitating factors among the adult population. Hence early diagnosis, evaluation and timely appropriate intervention can save severe visual loss.

**1.2. Material and Methods:** This is a hospital based cross sectional study that was conducted in Department of Ophthalmology at MMCH &RI Kanchipuram from January to June 2023. A total of 68 patients were enrolled for this study. A semi-structured questionnaire was used to collect the demographic details followed by complete ocular examination with specific relevance to glaucoma evaluation was done. The data collected were entered in Microsoft Excel and analysed by using software SPSS 21.

**1.3. Results:** Among the study participants 16 (24%) of them were diagnosed with glaucoma. The age group above sixty years had 1.176 (95% CI: 0.979 -1.414) odds of risk of getting glaucoma compared with other age groups. The patients who had family history of glaucoma had 66 (95% CI: 9.437 - 461.607) odds of risk in

inheriting glaucoma, compared with no family history of glaucoma which was found to be statistically significant.

**1.4. Conclusion:** The prevalence of glaucoma was considerably high in older age. Major risk factors confirmed by this study included older age, diabetes and hypertension. Ocular biometric components such as the axial length (axial myopia) and the corneal radius of curvature were found to be important glaucoma risk factors at younger age.

## 2. Introduction

Glaucoma is defined as an optic neuropathy, with or without raise in intraocular pressure (IOP) associated with visual field changes.

It is the second leading cause of permanent vision loss and [2] Intolerance of the retinal ganglion cells to the prevailing intraocular pressure result in by progressive retinal ganglion cell and nerve fibre loss with distinctive clinical signs of glaucoma [1]. According to research, one in two glaucoma patients are unaware of the condition and the loss of vision often occurs gradually over a long period, and symptoms only occur when the disease is advanced. Hence glaucoma is also known as the “silent thief of sight” [3].

Several studies have shown that old age and intraocular pressure (IOP) as major risk factors. Other risk factors for glaucoma include, race, gender, family history, diabetes, hypertension, thyroid disorders, migraine and obstructive sleep apnoea [4-6].

The pathophysiologic process behind vision loss in glaucoma is retinal ganglion cell loss due to a variety of causes acting on their

axons or cell bodies. Due to increased intraocular pressure (IOP) and vascular compromise, there is reduced axoplasmic flow inside the retinal ganglion cells at the lamina cribrosa and altered micro-circulation at the optic nerve level leading to peripheral and central visual field defects [7,8].

Adult Glaucoma is classified into 2 broad categories: open-angle glaucoma and angle-closure glaucoma. Primary open-angle glaucoma (POAG) is the most common type of glaucoma accounting for 60-70% of cases. Early diagnosis of disease by complete screening of eye among the at-risk patients are mandatory to prevent the progression of the disease [9]. Elevated intraocular pressure (IOP) is the only modifiable risk factor and is a critical predictor of the course of the disease. Treatment such as medications, lasers, and interventional procedures are aimed to lower the IOP [10].

Study of prevalence of glaucoma, its type and the associated factors is essential for early detection and to understand the pathophysiology.

### 3. Objectives

- To determine the prevalence of glaucoma types among adult population.
- To identify risk factors associated with glaucoma among the study group.
- To study the various visual defects in glaucoma patients.

## 4. Material and Methods

### 4.1. Study Design

A hospital based cross sectional study

### 4.2. Study Area

Department of Ophthalmology, MMCH &RI Kanchipuram

### 4.3. Study Duration

January to June 2023

### 4.4. Study Population

Outpatients aged 18 and above visiting Department of Ophthalmology

### 4.5. Inclusion Criteria

- Age group above 18 years of age
- Patient willing to participate in this study

### 4.6. Exclusion Criteria

- Patient with ocular infection and inflammation, orbital and retinal pathologies .
- Patient with Perforating Injuries, Foreign bodies, Corneal Injuries, Corneal Haze, Corneal Opacities.

### 4.7. Sampling Technique

Non-probability convenient sampling

### 4.8. Sample Size

According to a study by Hashemi et al considering the prevalence

of glaucoma is 4.6% and absolute precision 5% with 95% confidence interval the sample size is calculated by

$$N = 4pq / D^2$$

$$= 4 \times 4.6 \times (100-4.6) / 25$$

$$N = 68$$

(p = prevalence, q = (1 - p), d = absolute precision).

### 4.9. Data Collection

This hospital based cross sectional study was conducted at Department of Ophthalmology at MMCH &RI Kanchipuram over a period of six months from January - June 2023. After getting informed written consent from the patients, the questionnaires were administered to collect the necessary data on socio-demographic variables, medical and past ocular history followed by doing intraocular pressure measurement by the Principal Investigator. Intra-ocular pressure of patients is measured with a Schiottz Tonometer. Complete eye examination was done to all the study participants and the details are recorded.

### 4.10. Measurement of Variables

- Age was a continuous variable expressed in numbers.
- Gender was a categorical variable (male/female)

### 4.11. Data Analysis

Data was entered in Microsoft excel 2019 and analysed using software SPSS (Statistical Package of Social Sciences) version 21. Continuous variables and categorical variables were interpreted using frequencies (mean±SD) and proportions (%). Independent T test is used to compare the variables. P< 0.05 is considered as statistically significant.

### 4.12. Ethical Issues

- Participants were informed about the study and informed consent was obtained
- This study was presented to Institutional Ethical Committee of MMCH & RI, Kanchipura

## 5. Results

This cross-sectional study was conducted in 68 patients attending outpatient department of Department of Ophthalmology in menakshi-----a tertiary care centre and the prevalence of glaucoma was analysed.

Figure 1 shows the prevalence of glaucoma among participants. 16 (24%) of them were diagnosed with glaucoma and rest of them (76%) had non glaucomatous eyes.

Table 1 describes the association of socio demographic variables with Glaucoma. Age and family history of glaucoma had significant association with Glaucoma patients.

The age group more than sixty years had 1.176 (95% CI: 0.979 -1.414) odds of risk of getting glaucoma compared with other age groups. The patients who had family history of glaucoma had 66

(95% CI: 9.437 - 461.607) odds of risk in getting glaucoma compared with no family history of glaucoma which was found to be statistically significant.

Figure 2 shows the type of glaucoma among patients. Among the glaucoma patients 43.80% had primary open angle glaucoma,

31.20% had angle closure glaucoma and 25% had secondary glaucoma.

Table 2 describes the visual field defects among the study participants.

GLAUCOMATOUS-FUNDUS FINDINGS GONIOSCOPY FINDINGS GOLDMANN APPLANATION TONOMETRY (Figure 3).

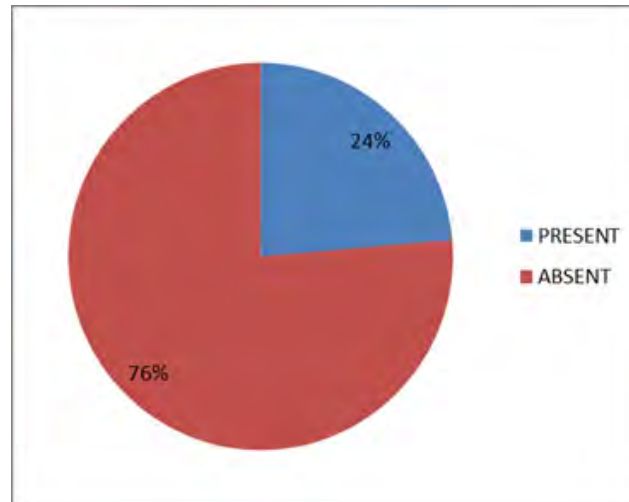
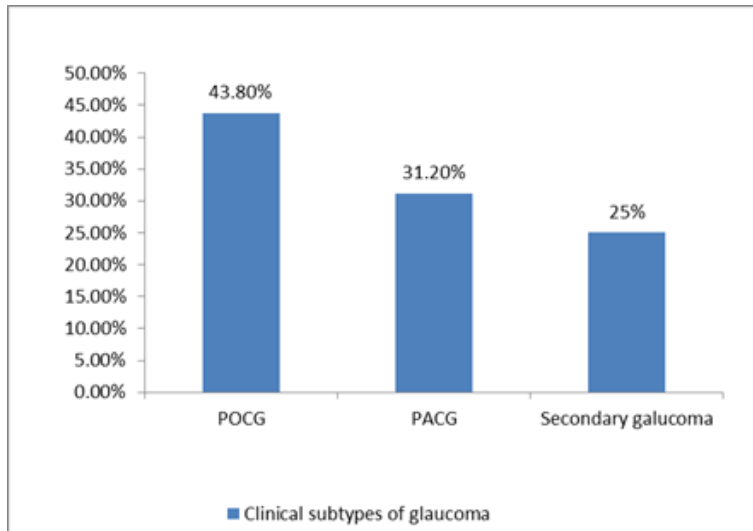


Figure 1: Prevalence of glaucoma

Table 1: Association of socio demographic factors with glaucoma (n = 68)

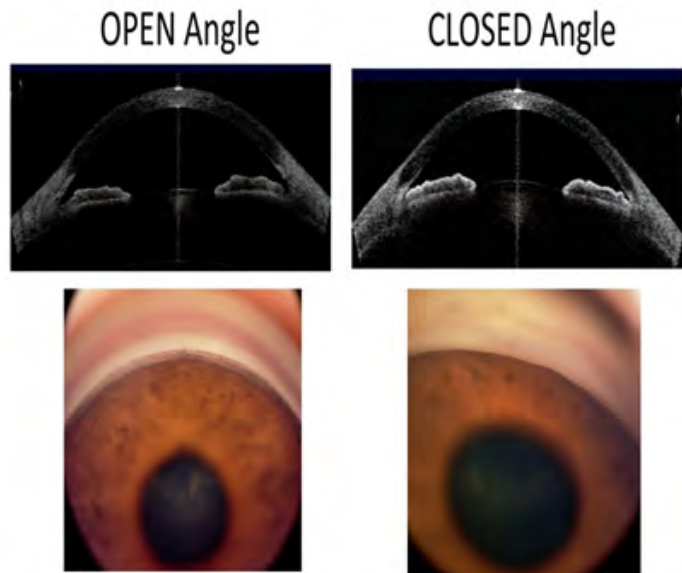
S No	Characteristics	Glaucoma	Non glaucoma	p value	
1	Age (years)	≤ 60 years	09 (18.7%)	0.006*	
		> 60 years	07 (35%)		20 (65%)
2	Gender	Male	10 (18.8%)	0.522	
		Female	6 (40%)		15(60%)
3	Family history of glaucoma	Yes	12 (100%)	0.0001*	
		No	4 (7.2%)		56 (92.8%)
4	Ocular trauma	Present	5 (9%)	0.06	
		Absent	11 (84.6%)		13(15.4%)
5	Hypertension	Normotensive	10 (21.7%)	0.01*	
		Hypertensive	06(27.3%)		22 (91.2%)
6	Diabetes	Under control	9 ( 18.4%)	0.03*	
		Uncontrolled DM	04(21%)		19(79%)
7	IOP	< 10 mmHg	0 (0)	0.001*	
		10 – 21 mm Hg	12(100%)		0
		≥ 21 mmHg	4 (100%)		0



**Figure 2:** Clinical subtypes of glaucoma

**Table 2:** Ophthalmic parameters of participants

S No	Parameters	Glaucoma	Non Glaucoma	p value
1	Axial length	23.56±0.02	23.16±0.016	0.000*
2	Corneal thickness	522.67±1.528	524.38±1.271	0.026*
3	AC depth	2.58±0.20	2.63±0.021	0.001*
4	Lens thickness	4.31±0.03	4.28±0.008	0.01*
5	Radius of corneal curvature	7.74±0.01	7.63±0.008	0.001*
6	Corneal white to white diameter	11.71±0.005	11.72±0.008	0.165





**Figure 3:**

## 6. Discussion

Glaucoma represents the leading cause of worldwide irreversible blindness. The aim of the study was to determine the prevalence of glaucoma types and its associated factors. From the study we found that the overall prevalence of glaucoma is 24% which is similar to a study conducted by Wubet et al [11] where he found the prevalence is around 26%. A study conducted by Hassan et al shown that the prevalence of glaucoma is 4.7% which is very low and contrast to our study report and this may be due to sample size selection [12].

In our study we found that age, IOP measurement, co-morbidities like DM and HT and family history in the analysis comparable to the study conducted by Garudadri et al [13]. Another study by Zhou M et al [14] also stated that age, diabetes and intra-ocular pressure are the significant risk factors associated with glaucoma similar to our study.

Another study by Nangia V et al also shown that glaucoma was associated with older age, higher mean blood pressure which is also similar to our study report [15].

In our study the clinical subtypes of glaucoma, POAG, PACG and secondary glaucoma contributed to 43.80%, 31.20% and 25% respectively which is similar to the study conducted by Jacob et al [16] found that prevalence (95% CI) of POAG, PACG, and ocular hypertension were 40.1%, 43.2% and 30.8% respectively.

As elevated IOP is an important risk and prognostic factor for glaucoma, reduction of intraocular pressure is mandatory to reduce the deleterious glaucomatous changes and hence thereby saving further visual loss and improving living quality of life.

## 7. Conclusion

The prevalence of glaucoma was considerably high among adult

population of 60 and above. Major risk factors confirmed by this study included family history, older age, high blood pressure and co-morbid conditions. Primary open-angle glaucoma [43.80%] is the most common subtype of glaucoma detected in this study. Hence it is, mandatory to increase public awareness about the identifiable risk factors for the early detection of glaucoma and thereby preventing visual and field loss.

## 8. Limitations

- Small size and single –centered study.
- The larger sample size might be considered for generalising results.

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