
Original Articles

Study of Different Types of Glaucoma Burden in Patient Visiting at a Tertiary Care Hospital.

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INTRODUCTION

The word glaucoma originally meant 'clouded' in Greek; as such, it may have referred either to a mature cataract or to corneal edema that might result from chronic elevated pressure.

- Glaucoma cases were defined according to the International Society of Geographical and Epidemiologic Ophthalmology (ISGEO) criteria based on three categories. Category 1 cases were defined as optic disc abnormality (VCDR/VCDR asymmetry \pm 97.5 percentile of the normal population or NRR width between 11 and 1 O'clock or 5 and 7 O'clock reduced to \leq 0.1 VCDR), with a corresponding glaucomatous visual field defect. Category 2 cases were defined as having a severely damaged optic disc (VCDR or VCDR asymmetry \pm 99.5 percentile) in the absence of adequate performance in a visual field test.^[1,2]
- Glaucoma is the leading cause of global irreversible blindness. It has been estimated that 60.5 million people were affected by primary open-angle glaucoma (POAG) and primary angle-closure glaucoma (PACG) globally in 2010.^[3-5]
- Globally, POAG affects more people than angle-closure glaucoma (ACG) – with an approximate ratio of 3:1, and wide variations among populations.^[10] Yet ACG manifests in a much more aggressive and debilitating course (especially among Asians) than was recognized a generation ago: its treatment usually requires more than iridotomy alone, frequent medical or surgical intervention^[11]
- Glaucoma is generally asymptomatic until late in the disease, at which point permanent visual problems arise.^[6] Therefore early detection and appropriate treatment is essential^[7], which can be facilitated by better knowledge of glaucoma distribution.^[13]

- Therefore, we wanted to provide new epidemiologic information about burden of different types of glaucoma among patient visiting tertiary care hospital.

CLASSIFICATION OF GLAUCOMA

- We propose to simplify glaucoma classification into three major divisions, which are subdivided into primary and secondary categories:
 - (1) angle-closure glaucoma;
 - (2) open-angle glaucoma; and
 - (3) developmental glaucoma, in which some anomaly of the anterior segment manifests in the first years of life.^[1,14,15]

(1) ANGLE-CLOSURE GLAUCOMA

A. Primary angle-closure disease

I. Natural history

- a. Primary angle closure suspect
- b. Primary angle closure
- c. Primary angle-closure glaucoma

II. Anterior segment mechanisms of closure

- a. Iris–pupil obstruction (e.g., 'pupillary block')
- b. Ciliary body anomalies (e.g., 'plateau iris syndrome')
- c. Lens–pupil block (e.g., 'phacomorphic block' (swollen lens or microspherophakia))

B. Secondary angle-closures

I. Anterior 'pulling mechanism'

- a. Neovascular glaucoma
- b. Iridocorneal endothelial syndromes (e.g., Chandler's syndrome)
- c. Posterior polymorphous dystrophy
- d. Epithelial downgrowth
- e. Fibrous ingrowth

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- f. Flat anterior chamber
- g. Inflammation
- h. Penetrating keratoplasty
- i. Aniridia

II. Posterior 'pushing mechanism'

The iris is pushed forward by some condition in the posterior segment. Often the ciliary body is rotate anteriorly, allowing the lens to come forward also.

- a. Ciliary block glaucoma (malignant glaucoma)
- b. Cysts of the iris and ciliary body
- c. Intraocular tumors
- d. Nanophthalmos
- e. Suprachoroidal hemorrhage
- f. Intravitreal air injection (e.g., retinal pneumopexy)
- g. Ciliochoroidal effusions (e.g., panretinal photocoagulation)
 - (a) Inflammation (e.g., posterior scleritis)
 - (b) Central retinal vein occlusion
- h. Scleral buckling procedure
- i. Retrolental fibroplasias

2) Open-angle glaucoma

A. Primary open-angle glaucoma

B. Secondary open-angle glaucoma

- a. Pigmentary glaucoma
- b. Pseudoexfoliation glaucoma
- c. Steroid glaucoma
- d. Lens-induced glaucoma
- e. Glaucoma after cataract surgery
- f. Glaucoma after trauma
- g. Glaucoma associated with intraocular hemorrhage
- h. Glaucoma associated with retinal detachment
- i. Glaucoma after vitrectomy
- j. Glaucoma with uveitis
- k. Glaucoma with intraocular tumors
- l. Amyloidosis
- m. Increased episcleral venous pressure

3) Developmental glaucoma

A. Primary congenital (infantile) glaucoma

- a. Congenital glaucoma
- b. Autosomal dominant juvenile glaucoma
- c. Glaucoma associated with systemic abnormalities
- d. Glaucoma associated with ocular abnormalities

B. Secondary glaucoma

- a. Traumatic glaucoma
- b. Glaucoma with intraocular neoplasm
- c. Uveitis glaucoma
- d. Lens-induced glaucoma
- e. Glaucoma after congenital cataract surgery
- f. Steroid-induced glaucoma
- g. Neovascular glaucoma
- h. Secondary angle-closure glaucoma
- i. Glaucoma with elevated episcleral venous pressure
- j. Glaucoma secondary to intraocular infection

AIMS AND OBJECTIVES

To determine burden of different types of glaucoma among patients visiting the tertiary care hospital from 2016 to 2017.

MATERIALS AND METHODOLOGY

- Cross-sectional study of 3400 patients visiting our hospital during year 2016-2017.
- All Participants underwent a standardized examination including slit-lamp biomicroscopy, Goldmann applanation tonometry, and optic disc assessment. Participants suspected to have glaucoma also underwent .
- visual field examination (24-2 & 30-2 SITA standard, Humphrey Visual Field Analyzer II), gonioscopy, and repeat applanation tonometry.
- Patients were diagnosed and classified into suitable subtype of glaucoma and Prevalance was calculated for each subtype.

DIAGNOSTIC DEFINITIONS

POAG

Primary open-angle glaucoma (POAG) can be considered a chronic, progressive, anterior optic neuropathy that is accompanied by a characteristic cupping and atrophy of the optic disc, visual field loss, open angles, and no obvious causative ocular or systemic conditions. In the m

ajority, but by no means all, cases the intraocular pressure (IOP) is elevated above the statistically 'normal' range, reflecting a reduced aqueous humor outflow facility.^[1,12]

PACG

Greater than 270° of irido-trabecular contact plus elevated IOP plus optic nerve and visual field damage. In

other words, angle closure glaucoma manifests the criteria of closure, plus demonstrable disc and/or visual field changes. The angle is abnormal in structure and function, with optic neuropathy.^[1,2]

Pigmentary Glaucoma

Pigmentary glaucoma is a secondary form of open-angle glaucoma produced by pigment dispersion in the anterior segment of the eye.^[1,2]

Pseudoexfoliative glaucoma

Pseudoexfoliative glaucoma (previously or classically known as pseudoexfoliation syndrome) occurs when several ocular tissues synthesize an abnormal protein. This protein may obstruct the trabecular meshwork and cause glaucoma.^[1,2]

Absolute Glaucoma

Absolute glaucoma is the end stage of all types of glaucoma. The eye has no vision, absence of papillary light reflex and papillary response and has a stony appearance.^[1,12]

Steroid induced (SI) glaucoma

Patients who experience a transient or sustained pressure rise after corticosteroid instillation are referred to as steroid responders; if glaucomatous damage ensues as manifested in the optic nerve or on visual field testing, then they truly can be said to have steroid glaucoma.^[1,2]

Neovascular glaucoma (NVG)

Neovascular glaucoma is caused by a fibrovascular membrane that develops on the surface of the iris and the angle. At first the membrane merely covers the angle structures, but then it contracts to form peripheral anterior synechia (PAS).^[1,2]

Phacomorphic glaucoma

Anterior lens subluxation or intumescence may precipitate acute or chronic angle closure glaucoma (phacomorphic glaucoma) due to the lens pressing against the iris and ciliary body and forcing them anteriorly.^[1,2]

Traumatic glaucoma

Traumatic injuries can produce elevated IOP through various mechanisms, including flat anterior chamber with formation of peripheral anterior synechiae; inflammation, including sympathetic ophthalmia; intraocular hemorrhage, including hyphema and ghost cell glaucoma; lens swelling with pupillary block; lens subluxation with pupillary block; lens-particle glaucoma; phacoanaphylaxis; posterior synechiae with pupillary block; epithelial downgrowth, and fibrous ingrowth.^[1,2]

Developmental glaucoma

The developmental glaucomas are a group of disorders with improper development of the eye's aqueous outflow system, usually manifesting in infancy and childhood, characterized by an elevated intra-ocular pressure, enlargement of globe (buphthalmos), corneal edema and optic nerve cupping, and presenting clinically with the characteristic triad of epiphora, photophobia and blepharospasm.^[1,2]

DISCUSSION AND RESULT

- This is an epidemiological study to evaluate the burden of glaucoma at the tertiary care hospital.
- There was a significant increase in glaucoma proportion from year 2016 to 2017, and this was higher among males.
- Our study noted a higher male preponderance for all PAOG, PACG, secondary and developmental glaucoma.
- Out of 3400 patients examined we found higher proportion of POAG (7.61%). Proportion of PACG and secondary glaucoma was 2.29% and 5.44% respectively. Least Proportion was that of developmental glaucoma, 0.67%.
- Among the secondary glaucomas the highest number of cases (35.68%) were found to be of pseudoexfoliative glaucoma.
- Considering the gender distribution, POAG and secondary glaucoma both were found to be more common in males. (POAG: 62.54% males, 37.46% females; SECONDARY GLAUCOMA: 58.37% males and 41.63% females)
- In PACG and developmental glaucoma male (51.28% and 47.82% respectively) and females (48.72% and 52.18% respectively) are almost equally affected.

Glaucoma and eye diseases awareness continues to be a major public health issue even in the most developed countries and a challenge for health care system. Having described the high prevalence and distribution of glaucoma in this comprehensive and representative study, we are obliged to recommend a strategy for the prevention blindness and visual impairment from glaucoma. The clinical care of glaucoma remains challenging. Public health control strategies with high quality integrated glaucoma care services will be required to reduce morbidity and blindness.

GLAUCOMA DISTRIBUTION: YEAR 2016 (TABLE-1)

MONTH	PRIMARY GLAUCOMA		SECONDARY GLAUCOMA							CONGENITAL GLAUCOMA
	POAG	PACG	PIGMENTARY	PSUEDOEXFOLIATIVE	ABSOLUTE	STEROID INDUSED	NVG	PHACOMORPHIC	TRAUMATIC	
JAN	1	1	0	1	2	3	0	2	0	2
FEB	0	1	0	2	1	0	1	0	0	0
MAR	2	12	0	3	1	0	6	2	0	1
APR	1	0	0	1	0	0	0	0	1	2
MAY	9	0	0	1	0	0	3	0	2	0
JUN	14	8	0	5	0	1	8	0	0	0
JUL	25	4	0	2	1	0	3	4	1	1
AUG	15	6	0	0	2	0	2	1	0	1
SEP	13	4	0	1	2	0	0	0	0	0
OCT	10	6	0	2	0	0	2	0	0	2
NOV	12	1	0	0	3	0	1	0	0	1
DEC	0	4	0	1	0	3	0	2	0	0
TOTAL	102	47	0	19	12	7	26	11	4	10

GLAUCOMA DISTRIBUTION: YEAR 2017 (TABLE-2)

MONTH	PRIMARY GLAUCOMA		SECONDARY GLAUCOMA							CONGENITAL GLAUCOMA
	POAG	PACG	PIGMENTARY	PSUEDOEXFOLIATIVE	ABSOLUTE	STEROID INDUSED	NVG	PHACOMORPHIC	TRAUMATIC	
JAN	2	2	0	0	0	0	0	0	0	0
FEB	16	0	9	6	0	0	0	0	0	2
MAR	10	4	3	11	0	0	1	0	0	1
APR	13	4	0	0	1	0	1	0	0	3
MAY	7	0	5	2	0	0	0	0	0	0
JUN	9	1	3	2	0	4	6	0	1	1
JUL	19	4	0	3	0	2	2	0	6	2
AUG	5	5	0	2	0	1	1	0	2	0
SEP	14	6	0	0	0	0	0	0	0	2
OCT	17	1	2	1	0	0	0	0	0	1
NOV	21	2	0	0	0	0	0	0	0	1
DEC	24	2	3	18	0	0	0	0	2	0
TOTAL	157	31	26	47	1	7	14	0	11	13

OVERALL GLAUCOMA DISTRIBUTION(TABLE-3)

PRIMARY GLAUCOMA TYPE	TOTAL
POAG	259
PACG	78
CONGENITAL GLAUCOMA	23
SECONDARY GLAUCOMA	185
<u>SECONDARY GLAUCOMA SUBTYPES</u>	
PIGMENTARY	26
PSUEDOEXFOLIATIVE	66
ABSOLUTE	13
SI	14
NVG	40
PHACOMORPHIC	11
TRAUMATIC	15

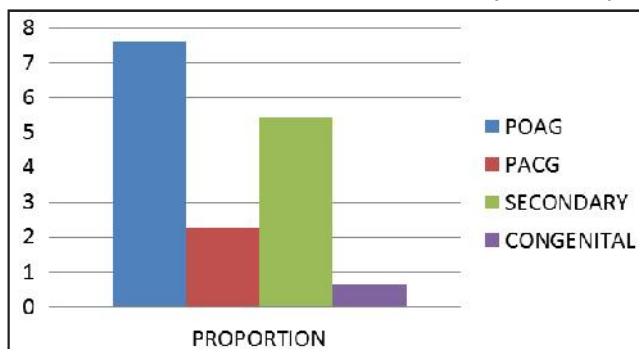
AGE & SEX WISE DISTRIBUTION OF GLAUCOMA-YEAR 2016 (TABLE-4)

MONTH	PRIMARY GLAUCOMA		SECONDARY GLAUCOMA							<u>CONGENITAL GLAUCOMA</u>
	POAG	PACG	PIGMENTARY	PSUEDOEXFOLIATIVE	ABSOLUTE	STEROID INDUSED	NVG	PHACOMORPHIC	TRAUMATIC	
< = 50 M	15	14	0	0	0	0	6	0	1	4
F	8	12	0	1	0	1	7	0	2	2
51-60 M	21	3	0	4	3	2	3	2	0	0
F	7	4	0	4	2	2	1	3	0	0
61-70 M	14	5	0	3	4	1	7	4	1	1
F	7	5	0	4	2	1	0	2	0	1
71-80 M	19	1	0	2	1	0	2	0	0	0
F	7	3	0	0	0	0	0	0	0	1
> = 80 M	3	0	0	1	0	0	0	0	0	1
F	1	0	0	0	0	0	0	0	0	0

AGE & SEX WISE DISTRIBUTION OF GLAUCOMA-YEAR 2017 (TABLE-5)

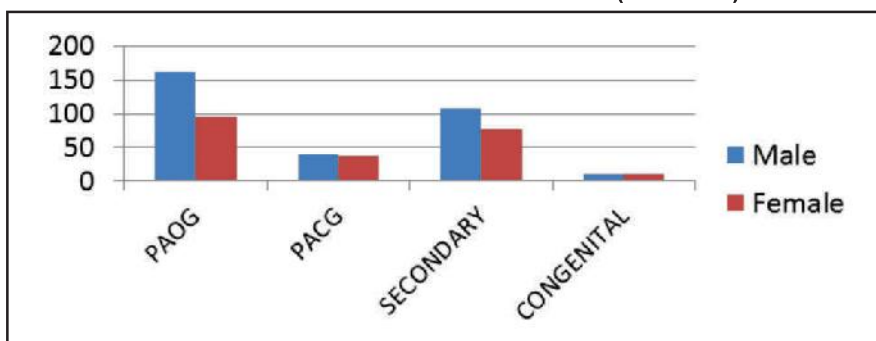
MONTH	PRIMARY GLAUCOMA		SECONDARY GLAUCOMA							CONGENITAL GLAUCOMA
	POAG	PACG	PIGMENTARY	PSUEDOEXFOLIATIVE	ABSOLUTE	STEROID INDUSED	NVG	PHACOMORPHIC	TRAUMATIC	
< = 50 M	20	9	1	6	0	1	2	0	9	3
F	7	7	5	4	0	2	2	0	0	4
51-60 M	26	4	4	6	0	0	1	0	1	1
F	27	0	8	7	0	0	2	0	0	2
61-70 M	22	2	2	9	1	0	2	0	1	0
F	17	5	0	6	0	4	2	0	0	0
71-80 M	15	2	4	7	0	0	1	0	0	1
F	10	0	2	0	0	0	1	0	0	1
> = 80 M	7	0	3	2	0	0	1	0	0	0
F	6	2	0	0	0	0	0	0	0	1

OVERALL GLAUCOMA PROPORTION(CHART-1)



POAG = 7.61
 PACG = 2.29
 SECONDARY = 5.44
 CONGNITAL = 0.67

SEXWISE GLAUCOMA DISTRIBUTION (CHART-2)



GLAUCOMA	MALE(PROPORTION %)	FEMALE(PROPORTION%)
POAG	162(62.54)	97(37.46)
PACG	40(51.28)	38(48.72)
SECONDARY	108(58.37)	77(41.63)
CONGENITAL	11(47.82)	12(52.18)

CONCLUSION

- In our study, highest proportion of glaucoma was found of POAG with male preponderance and lowest proportion was of developmental glaucoma.
- These estimates are important in guiding the designs of glaucoma screening, treatment, and related public health strategies.
- Glaucoma and eye diseases awareness continues to be a major public health issue even in the most developed countries and for our health care systems.
- In general higher awareness could lead to improved detection because the health-seeking pattern of an aware population is likely to be more robust. The current level of awareness does not seem to translate into this ideal state, and reasons for this could be due to failure of subjects to report for routine eye health screenings, high health care costs, or failure of strategy used in public awareness programs. This indicates that there is a specific need to look into the strategies and approaches that could help overcome this deficit.

REFERENCES

1. Foster P, He M, Liebmann J: Epidemiology, classification and mechanism. In: Weinreb RN, Friedman DS, editors: Angle closure and angle closure glaucoma, The Hague, Kugler, 2006.
2. entokey.com/introduction-and-classification-of-the-glaucomas/
3. Kingman S. Glaucoma is second leading cause of blindness globally. *Bull World Health Organ* 2004;82:887–8.
4. Quigley HA, Broman AT. The number of people with glaucoma worldwide in 2010 and 2020. *Br J Ophthalmol* 2006;90:262–7.
5. Wong TY, Loon SC, Saw SM. The epidemiology of age related eye diseases in Asia. *Br J Ophthalmol* 2006;90:506–11
6. Quigley HA. Glaucoma. *Lancet*. 2011;377(9774):1367–77. [https://doi.org/10.1016/S0140-6736\(10\)61423-7](https://doi.org/10.1016/S0140-6736(10)61423-7).
7. Weinreb RN, Khaw PT. Primary open-angle glaucoma. *Lancet*. [https://doi.org/10.1016/S0140-6736\(04\)16257-0](https://doi.org/10.1016/S0140-6736(04)16257-0).
8. Noertjojo K Maberley D Bassett K Courtright P. Awareness of eye diseases and risk factors: identifying needs for health education and promotion in Canada. *Can J Ophthalmol* . 2006; 41: 617–623.
9. Pfeiffer N Krieglstein GK Wellek S. Knowledge about glaucoma in the unselected population: a German survey. *J Glaucoma* . 2002; 11: 458–463.
10. Quigley H, Broman A: Number of people with glaucoma worldwide in 2010 and 2020, *Br J Ophthalmol* 90:262, 2006.
11. Alsagoff Z, et al: Long-term clinical course of primary angle-closure glaucoma in an Asian population, *Ophthalmology* 107:2300, 2000.
12. Foster PJ, Buhrmann R, Quigley HA, Johnson GJ. The definition and classification of glaucoma in prevalence surveys. *Br J Ophthalmol*. 2002;86:238–242.
13. Ramakrishnan R, Nirmalan PK, Krishnadas R, Thulasiraj RD, Tielsch JM, Katz J, et al. Glaucoma in a rural population of southern India: the Aravind comprehensive eye survey. *Ophthalmology* 2003;110:1484-1490.