

Clinical Subtyping of Glaucoma in A Tertiary Care Hospital in North India

Anil Pathak¹, Harvinder Nagpal², Shalla Samria³, Hema Chhabra⁴

¹Associate Professor, Department of Ophthalmology, GMC, Patiala

²Assistant Professor, Department of Ophthalmology, GMC, Patiala

³Junior Resident, Department of Ophthalmology, GMC, Patiala

⁴Junior Resident, Department of Pharmacology, GMC, Patiala

Corresponding author: Harvinder Nagpal

Email: drnagpal.2009@gmail.com

Abstract: The aim of this study was to investigate the clinical subtyping of glaucoma in a tertiary care hospital in North India. This prospective study involved 200 patients of glaucoma attending the Ophthalmology OPD of a tertiary care centre. The work up history and ophthalmic examination of patients was done. Standard definitions for various glaucoma subtypes were used for diagnosis. The diagnosis was made by a senior consultant in all cases. Compared to the Western population, angle closure glaucoma patients are more in Indian population. PACG is the most commonly encountered glaucoma. CACG is most common subtype of PACG with a female dominance. Pseudophakic glaucoma, Pseudoexfoliative and Steroid induced glaucoma are the common secondary glaucomas. Population based epidemiological studies are needed to validate or disapprove the data collected in a hospital based study.

Keywords: Glaucoma, subtyping, POAG, PACG, ACG.

Date of Submission: 23 -10-2017

Date of acceptance: 04-11-2017

I. Introduction

Glaucoma is a group of ocular diseases with multifactorial etiology characterized by a clinically characteristic optic neuropathy and associated visual field loss.^[1] The vast majority of glaucomatous patients are older than 60 years and due to longer life expectancy, the prevalence of glaucoma is increasing worldwide.^[2] In 2013, the number of people with glaucoma worldwide was estimated to be 64.3 million and is projected to increase to 76.0 million by 2020 and 111.8 million by 2040.^[3]

Glaucoma is the second leading cause of world blindness and accounts for 15% of global blindness. The regional burden of blindness is highest for India (23.5% of global blindness), with atleast 5.8 million blind due to glaucoma. India accounts for a minimum of 12.9% of primary open angle glaucoma (POAG) blindness and 12.7% of primary angle closure glaucoma (PACG) blindness in the world.^[4] Glaucoma is often divided into 2 major subtypes, open angle and angle closure based on the anatomical mechanism responsible for the elevated intraocular pressure (IOP). It may be further categorized as primary glaucoma due to an inherited disorder or secondary glaucoma due to disease, trauma or drugs. Glaucoma is also classified as acute; developing over hours or a few days or chronic; developing over a number of months or years.^[5]

Primary open angle glaucoma 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.^[6] POAG has a familial tendency and the prevalence of POAG increases substantially with age. Prevalence is approximately 1% in people under 40 year of age and is estimated to be 3-8 times higher in patients over 70 years of age (peak presentation at 7th decade). It is 3-4 times more common in black than in white populations, myopia and certain systemic diseases, such as arterial hypertension, diabetic mellitus and migraine have been associated with POAG.^[7]

PACG is the glaucoma which occurs without any known antecedent or other disease or new growth in the eye. The eyes have narrow angles and mostly they occur due to pupillary block.^[8] PACG is classified into acute, intermittent and chronic types. Acute angle closure glaucoma (AACG) is defined as severe attack of angle closure accompanied by pain and other usual symptoms. Intermittent angle closure glaucoma (IACG) is defined as patient with occludable angles, intermittent observed pressure elevations accompanied by prodromal symptoms, headache, haloes, blurred vision but with normal tension in the inter paroxysmal periods. Chronic angle closure glaucoma (CACG) is defined as patients with partially occluded chamber angle and constant intraocular pressure elevations. Some of the patients have no subjective symptoms.^[9] In India prevalence of PACG, primary angle closure and primary angle closure suspect was found to be 0.87%, 0.71% and 6.27% respectively.^[10]

The term normal tension glaucoma refers to typical glaucomatous optic disc cupping and visual field loss in eyes that have normal IOP, open angles, and the absence of any contributing ocular or specific systemic disorders.^[6]

Juvenile open angle glaucoma (JOAG) is defined as when congenital glaucoma appears later in childhood or early adulthood.^[11] Patients less than 40 years of age with clinical picture similar to POAG were labelled as juvenile open angle glaucoma. JOAG constituted 3.38% of all glaucoma referrals and there was a striking male predominance.^[4]

In India, the distribution of various subtypes of glaucoma, in a study conducted in tertiary care hospital was: POAG (21.57%), PACG (36.62%), JOAG (3.38%), NTG (0.62%), secondary glaucomas (6.72%) and developmental glaucoma.^[4]

II. Material And Methods

This prospective study involved 200 patients of glaucoma visiting the Ophthalmology OPD of a tertiary care centre. The criteria for inclusion was intraocular pressure (IOP) more than 22 mmHg on two or more separate occasions and/or optic nerve head changes suggestive of glaucoma (focal notching of the disc, deepening of the cup, thinning of the neuroretinal rim, laminar dot sign, overpass cupping, saucerization of the cup, asymmetrical cupping in two eyes etc).

The work up of history and ophthalmic examination included the best corrected visual acuity (BCVA), slit lamp examination, gonioscopy using Goldmann single mirror and/or Zeiss four mirror gonioscope, Goldmann applanation tonometry, optic disc and posterior fundus examination (90-D lens).

Standard definitions for various glaucoma subtypes were used for diagnosis. The diagnosis was made by a senior consultant in all cases. The anterior chamber angle was classified using Shaffer's grading. Grade 2 or less in 270 degrees was considered occludable, and grade 3 or more as open. Field defects considered suggestive of glaucoma included isolated paracentral scotomas in presence of optic nerve head cupping, Arcuate scotomas, Roenne's nasal step, Siedel's scotoma and advanced constriction of fields. Disc changes suggestive of glaucoma included focal notching of the disc, deepening of the cup, thinning of the neuroretinal rim, laminar dot sign, saucerization of the cup and asymmetrical cupping in two eyes.

The criteria used for diagnosis of different subtypes of glaucoma was as below :

1. Open angle glaucoma was defined as a condition in a subset of patients with open angles, raised IOP associated with either glaucomatous cupping of the optic nerve head or visual field changes suggestive of glaucoma.
2. Patients less than 40 years of age with clinical picture similar to POAG were labelled as juvenile open angle glaucoma (JOAG).
3. Primary angle closure glaucoma was classified into acute, intermittent and chronic types after Clemmensen. Patients with either a functional block between the pupillary part of the iris and anterior lens surface with shallow anterior chamber depth or a subset of patients with a zipper-like closure of the angles (creeping angle closure glaucoma) and relatively normal anterior chamber depth both comprised the CACG group.
4. Normal tension glaucoma patients were classified as having open angles and progressive optic nerve head changes or visual field loss suggestive of glaucoma in absence of elevated IOP.
5. Secondary glaucoma in a patient was defined as increased IOP or changes suggestive of glaucomatous nerve head cupping in a patient with any ocular or systemic problems predisposing to glaucoma.

III. Observation And Results

The findings are summarized in the following tables and figures. The most common subtype of glaucoma in North India was PACG followed by POAG and secondary glaucomas. Normal tension glaucoma and JOAG formed the less common varieties. Highest number of patients were in the age group of 61 – 70 years for PACG, POAG and Secondary Glaucomas with female dominance in PACG group and male dominance in POAG group. Maximum numbers of NTG patients were in 51-60 yrs group and that of JOAG in 11- 20 years group.

PACG (40%) was the most common glaucoma subtype. Further, CACG was the most common PACG subtype constituting 70% of PACG patients. AACG constituted the lowest percentage (7.5%). The three most common secondary glaucomas were pseudophakic glaucoma, pseudoexfoliative glaucoma and steroid induced glaucoma.

Table 1: SUBTYPES OF GLAUCOMA

Type Of Glaucoma	No. Of Patients (%)
Primary Angle Closure Glaucoma(Pacg)	80(40%)
Primary Open Angle Glaucoma (Poag)	72(36%)
Secondary Glaucoma	28(14%)
Normal Tension Glaucoma	16(8%)
Juvenile Open Angle Glaucoma (Joag)	4(2%)

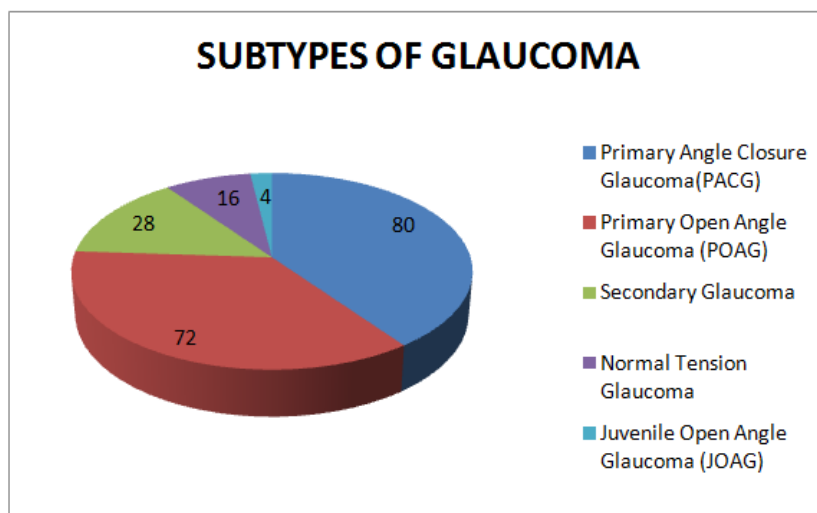


Table 2: AGE AND GENDER DISTRIBUTION OF GLAUCOMA SUBTYPES

Age (Yrs)	PACG		POAG		SECONDARY GLAUCOMAS		NTG		JOAG	
	M	F	M	F	M	F	M	F	M	F
0-10	-	-	-	-	-	-	-	-	-	-
11-20	-	-	-	-	1	-	-	-	2	1
21-30	-	-	-	-	1	2	-	-	1	-
31-40	2	3	7	3	1	-	-	-	-	-
41-50	7	10	10	5	2	4	-	3	-	-
51-60	8	17	12	6	4	3	6	1	-	-
61-70	12	16	13	7	5	3	3	2	-	-
71-80	2	3	7	2	2	-	1	-	-	-
81-90	-	-	-	-	-	-	-	-	-	-
TOTAL	31	49	49	23	16	12	10	6	3	1

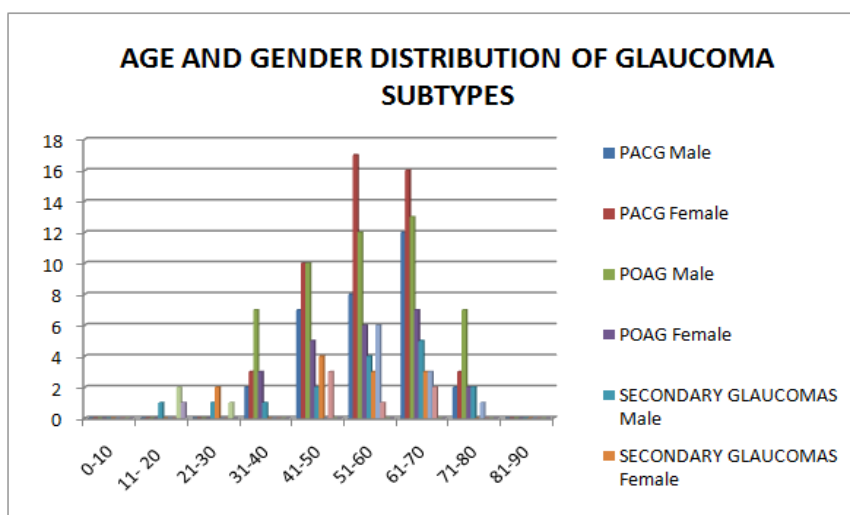


Table 3: DISTRIBUTION OF PACG SUBTYPES

Subtype of Glaucoma	Male	Female	Total
AACG	1	5	6 (7.5%)
IACG	5	13	18 (22.5%)
CACG	25	31	56 (70%)
Total	31	49	80 (100%)

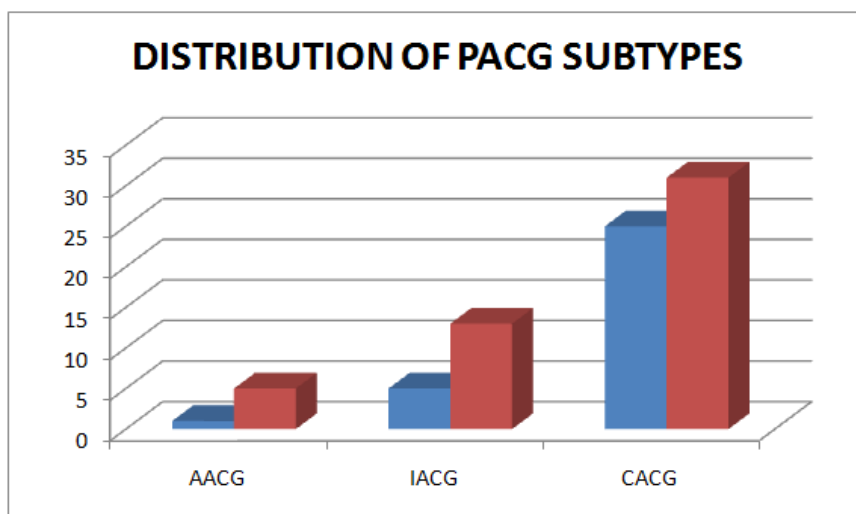
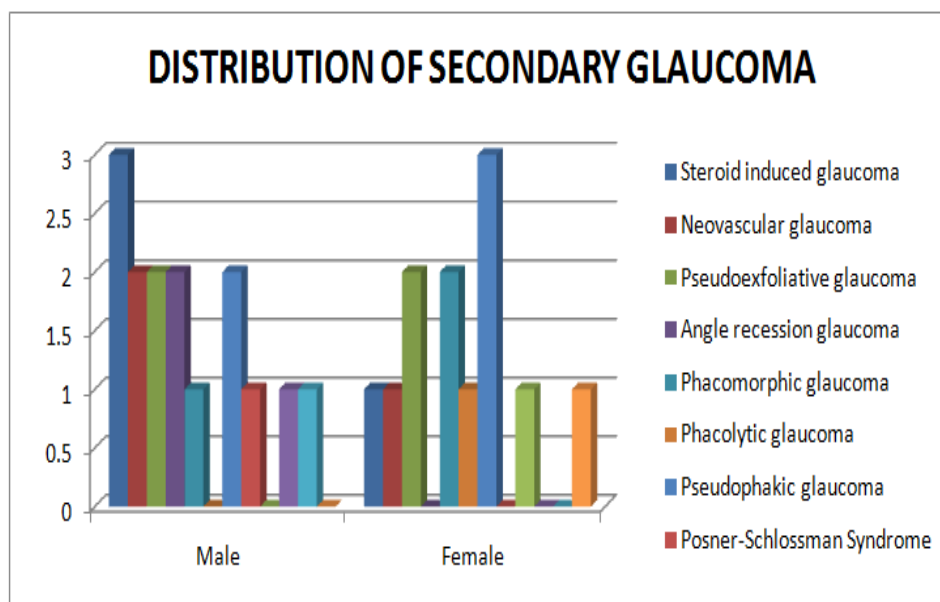


Table 4: DISTRIBUTION OF SECONDARY GLAUCOMA

Subtype	Male	Female	Total
Steroid induced glaucoma	3	1	4 (14.28%)
Neovascular glaucoma	2	1	3 (10.7%)
Pseudoexfoliative glaucoma	2	2	4(14.28%)
Angle recession glaucoma	2	-	2 (7.14%)
Phacomorphic glaucoma	1	2	3 (10.7%)
Phacolytic glaucoma	-	1	1 (3.57%)
Pseudophakic glaucoma	2	3	5 (17.85%)
Posner-Schlossman Syndrome	1	-	1 (3.57%)
Malignant glaucoma	-	1	1 (3.57%)
Aphakic glaucoma	1	-	1 (3.57%)
Inflammatory glaucoma	1	-	1 (3.57%)
Pigmentary glaucoma	-	1	1 (3.57%)
Phacoanaphylactic glaucoma	1	-	1 (3.57%)
otal	16	12	28(100%)



IV. Discussion

In 2001, Das et al in a major eye hospital based study found that POAG was present in 523 (21.57%) patients of glaucoma. The peak age of presentation in POAG was seventh decade and mean age of presentation was 60.43 years.^[4] In our study also we found that POAG constituted 72 (36%) of all glaucoma patients. Maximum number of patients was in the age group of 61-70 years. There was male preponderance. Ramakrishnan R et al in 2003 in The Aravind Comprehensive Eye Survey conducted on rural population of Southern India observed that definite POAG was present in 3.8% in those aged 40 years and older. This is higher than that reported for white populations in North America, Europe and Australia but still lower than that reported for populations of West African origin. Increasing age, male gender were significantly associated with POAG.^[12]

Klein BEK et al conducted the Beaver Dam Study in white population and found prevalence of 0.9% of POAG in Caucasians of age 43-54 years and 4.7% in those over 75 years of age.^[13] Leske MC et al in his Barbados study on 4317 black participants in 1994 found an overall prevalence of POAG in men was 8.3% and in women of 5.7%.^[14]

Shiose Y et al conducted a population based study in 1990 and found higher rates of angle closure glaucoma in Chinese population than in Caucasians with an overall prevalence of 0.34%. Also, angle closure cases were three times more common than POAG.^[15] Congdon N et al mentioned that among Asians and Eskimos, PACG makes up 80-90% of primary glaucoma. Among Eskimos, prevalence was 2-8% as compared to 0.1% among Caucasians.^[16] Hence Angle Closure Glaucoma patients were more in asian population than in western population. Vijaya L et al in 2006 concluded that prevalence of primary angle closures in rural population of Southern India was 1.58% and there was female preponderance.^[17]

In 2001, Das et al in a major eye hospital based study found that PACG constituted the largest group of glaucoma patients. Out of 2425 glaucoma patients, 888 (36.62%) were of PACG. The peak age of presentation was sixth decade of life and the mean age of presentation was 55.13 years. Females were marginally more than males.^[4] In our study also we found that PACG constituted 80 (40%) of all glaucoma patients. Maximum numbers of patients were in the age group of 61-70 years. There was female preponderance. Thus the findings of our study are similar to those of Das et al which is another hospital based eye study.

Das et al also found that JOAG in patients less than 40 years of age with clinical picture similar to POAG constituted 3.38% of glaucoma referrals in a tertiary care hospital. There was a male predominance.^[4] In our study also we found that JOAG constituted 4 (2%) of all glaucoma patients. There was male preponderance and the maximum number of patients were in age group of 11-20 years.

Das et al also found that NTG was present in 0.62% of all glaucoma referrals. The peak age of presentation was in the seventh decade of life.^[4] Shiose Y et al in 1991 done a population based study and found high prevalence of low tension glaucoma in Japanese (2.04%) which reflect a racial peculiarity in the age specific trend of the IOP^[18]. In this study, we found that NTG constituted 16 (8%) of all glaucoma patients. Maximum number of patients were present in age group of 51-60 years.

V. Conclusion

Thus it is concluded that compared to the western population, Angle Closure Glaucoma is more common in Indian population. The PACG subtype is the most commonly encountered glaucoma. CACG is the most commonly encountered subtype of PACG with female dominance. POAG is the second most common type followed by secondary glaucomas. Male dominance is seen in POAG. Pseudophakic Glaucoma, Pseudoexfoliative Glaucoma and Steroid induced Glaucoma are the common secondary glaucomas. NTG and JOAG are relatively rare. Population based epidemiologic studies and surveys are needed to validate or disapprove of the data collected in a hospital based study.

Bibliography

- [1]. Falkenberg HK, Bex PJ. Sources of motion-sensitivity loss in glaucoma. Invest Ophthalmol. Vis. Sci. 2007;16 (6): 2913–21.
- [2]. Coleman AL. Glaucoma. Lancet 1999; 354 (9192):1803–10.
- [3]. Tham YC, Li X, Wong TY, Quigley HA, Aung T, Cheng CY. Global Prevalence of Glaucoma and Projections of Glaucoma Burden through 2040: A Systematic Review and Meta-Analysis. Ophthalmology 2014; 121 (11):2081-90.
- [4]. Das J, Bhomaj S, Chaudhuri Z, Sharma P, Negi A, Dasgupta A. Profile of glaucoma in a major eye hospital in North India. Indian J Ophthalmol 2001; 49(1):25-30.
- [5]. Mansukani S. On Managed Care's Doorstep, Glaucoma. P & T Digest. 2002; 11 Suppl 11:S6-10.
- [6]. Stamper RL, Lieberman MF, Drake MV. Becker – Shaffer's Diagnosis and Therapy of the Glaucomas. 8th edition. 2009.

- [7]. Zimmerman R, Sakiyalak D, Krupin T, Rosenberg LF. Primary open angle glaucoma. In: Ophthalmology. Yanoff M, Duker JS, editors. 2nd edn. Spain: Mosby-Elsevier Science; 2004. 1482- 4.
- [8]. Jain MR. Primary angle closure glaucoma. Textbook of glaucoma present and future. 1st ed. New Delhi: Jaypee Brother; 1991. p. 106.
- [9]. Clemmensen V. Problems in gonioscopic screening in Greenland: Technique, classification of findings and diagnosis. *Acta Ophthalmol* 1971;49:59-64.
- [10]. Vijaya L, George R, Arvind H, Baskaran M, Raju P, Ramesh SV, Paul PG, Kumarsmanickavel G, McCarty C. Prevalence and causes of blindness in the rural population of the Chennai Glaucoma Study. *British Journal of Ophthalmology* 2006; 90: 407-410.
- [11]. Shields MB. Pupillary block glaucomas. In *Textbook of glaucoma*. 4th ed. Baltimore: Lippincott Williams and Wilkins; 1998. 177-87.
- [12]. 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(8):1484-98.
- [13]. Klein BEK, Klein R, Sponsel WE et al. Prevalence of glaucoma. *Ophthalmology* 1992; 99:1499-504.
- [14]. Leske MC, Connell AMS, Sechatch AP, Hyman L. The Barbados Eye Study – prevalence of open angle glaucoma. *Arch Ophthalmol* 1994; 112:621-9.
- [15]. Shiose Y, Kitazawa Y, Tsukaras S et al. A collaborative glaucoma survey for 1988 in Japan. *Rinsho Ganka* 1990; 44:653-9.
- [16]. Congdon N, Wang F, Tielsch JM. Issues in the epidemiology and population based screening of primary angle closure glaucoma. *Surv Ophthalmol* 1992; 36:411-23.
- [17]. Vijaya L, George R, Arvind H, Baskaran M, Paul PG, Ramesh S. Ve, Raju P, Kumaramanickavel G, McCarty C. Prevalence of Angle Closure Disease in a Rural Southern Indian Population. *Arch Ophthalmol* 2006; 124:403-409.
- [18]. Shiose Y, Kitazawa Y, Tsukahara S, Akamatsu T, Mizokami K, Futa R. Epidemiology of glaucoma in Japan. A nationwide survey. *Jpn J Ophthalmol* 1991; 35:133-55.

*Nagpal H. "Clinical Subtyping of Glaucoma in A Tertiary Care Hospital in North India." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* 16.11 (2017): 09-14