

Clinico-Social Profile of Patients Presenting with Primary Open Angle Glaucoma – A Retrospective Study from Paschim Midnapore, West Bengal

Sanjib Kumar Purkait¹, Avik Dey Sarkar², Anil Kumar Ghanta³, Sanchari Sarkar⁴

^{1, 2, 4} Department of Ophthalmology, Midnapore Medical College & Hospital, Midnapore, West Bengal, India.

³ Department of Ophthalmology, Murshidabad Medical College, Berhampore, West Bengal, India.

ABSTRACT

BACKGROUND

Glaucoma is the second most leading cause of visual loss in the world. Different socio epidemiological parameters like gender, age, socio-economic status, educational status etc. has been directly linked to occurrence of glaucoma in previous studies. Review of the western literature showed that the risk factors associated with glaucoma were high intra ocular pressure (IOP), low blood pressure, low ocular perfusion pressure, narrow anterior chamber angles, thin corneas, pseudoexfoliation, a low body mass index (BMI), and myopia. We need to evaluate the clinical and epidemiological factors affecting primary open angle glaucoma.

METHODS

Records of patients with a diagnosis of primary open-angle glaucoma (POAG) were studied. All data, addressing demographics (gender, age and skin colour), socio-economic status, educational status, emotional status and clinical information concerning risk factors for developing glaucoma (family history of glaucoma, hypertension and diabetes mellitus) and any treatment history (e.g., corticosteroid intake) were noted. Findings from visual acuity examination, refraction, detailed anterior segment examination by slit lamp, fundus examination with 90 D, gonioscopy, applanation tonometry, VF examination by automated perimetry and A-scan USG were also carefully taken into account.

RESULTS

A total 920 patients were enrolled of which 67.94 % were males and 57.6 % were from urban population. 18.7 % cases had positive family history. Most of the patients came from lower and middle-income group (43.48 % and 48.37 % respectively). Cup-disc ratio of majority of eyes was found to be more than 0.30 (97.29 %). Different grades of disc changes and field changes were noted. Cup-disc ratio asymmetry of more than 0.20 was found in 355 (38.59 %) eyes. Paracentral and / or arcuate scotoma was detected in 585 eyes (31.80 %).

CONCLUSIONS

Understanding the socio-demography and socio-economy helps in early diagnosis and better assessment of the disease severity in POAG.

KEYWORDS

Glaucoma, POAG, CDR, Visual Fields

Corresponding Author:

*Dr. Anil Kumar Ghanta,
Udita CHSL, AC 143, Action Area 1,
Street No. 47, New Town,
Kolkata - 700156, West Bengal, India.
E-mail: anilghanta13@gmail.com*

DOI: 10.18410/jebmh/2021/338

How to Cite This Article:

*Purkait SK, Sarkar AD, Ghanta AK, et al.
Clinico-social profile of patients
presenting with primary open angle
glaucoma – a retrospective study from
Paschim Midnapore, West Bengal. J Evid
Based Med Healthc 2021;8(22):1792-
1796. DOI: 10.18410/jebmh/2021/338*

Submission 11-02-2021,

Peer Review 19-02-2021,

Acceptance 16-04-2021,

Published 31-05-2021.

*Copyright © 2021 Sanjib Kumar Purkait
et al. This is an open access article
distributed under Creative Commons
Attribution License [Attribution 4.0
International (CC BY 4.0)]*

BACKGROUND

Glaucoma is the second most leading cause of visual loss in the world.¹ Scientific studies undertaken in South India showed various prevalence rates of primary open-angle glaucoma (POAG).²⁻⁴ The Vellore eye survey² reported a prevalence of 0.41 % for POAG in the 30 – 60 years' age group, whereas the Andhra Pradesh eye diseases study³ estimated the prevalence of POAG in the urban population to be 2.56 % in those aged 40 years and older. Glaucoma is not a disease per se. It is an optic neuropathy characterised by a specific pattern of optic nerve head and visual field damage, which represents a final common pathway resulting from a number of different conditions that can affect the eye.

Primary open-angle glaucoma (POAG), the most common type among all glaucoma cases, is used to define a chronic condition wherein the IOP is raised above a level compatible with the continued health and function of the eye, with a gonioscopically open angle or simply open angle. If the condition continues over a sufficient period, it may cause pathologic changes of the optic disc and the visual fields. If left untreated, the disease may lead to irreversible blindness.

Review of the western literature showed that the risk factors associated with glaucoma were high IOP, low blood pressure, low ocular perfusion pressure, narrow anterior chamber angles, thin corneas, pseudoexfoliation, a low body mass index (BMI), and myopia.⁵ Increased IOP is a major risk factor for glaucoma, and the only one that can be measured with the possibility of intervention.

POAG cases are usually asymptomatic until advanced stage where there may be marked optic nerve damage leading to irreversible blindness. So, much emphasis is to be given in the early diagnosis of such a blinding condition considering its seriousness on the basis of associated risk factors and objective findings.

Luciana dos Mares Guia Ribeiro, Ronilson Ferreira Freitas et al. conducted a quantitative study with cross-sectional and analytical design, named "Clinical and epidemiological study in patients with primary open-angle glaucoma", of which sample consisted of 425 patients treated in a unit of Specialized Care in Ophthalmology, located in the northern state of Minas Gerais, from 2004 to 2015. Results showed female predominance (56.8 %), the age group of 60 years or older (44 %), mixed skin (81.7 %) and minority of participant's present risk factors such as high myopia (6.3 %) and diabetes mellitus (17.9 %). Regarding the clinical examination, there was a prevalence of increased optic nerve excavation (≥ 0.8) and low thickness of the corneas (≤ 535 microns). They concluded most people develop advanced glaucoma, with increased optic nerve excavation and changed visual fields. Other common risk factors were: family history of glaucoma, decreased thickness of the cornea and hypertension. Early diagnosis and treatment could prevent vision loss. Primary care physicians should consider referring patients who have glaucoma risk factors, for an ophthalmologic examination.⁶

Another study by Zhao Y, Fu JL, Li YL, Li P, Lou FL et al. was to assess demographic and clinical characteristics of

glaucoma patients in an Ophthalmologic Hospital of Jinan, China from 2003 to 2012. In the study medical charts of patients with primary open-angle glaucoma (POAG), primary angle closure glaucoma (PACG), and secondary glaucoma (SG) were reviewed. The main outcome was measured of patients with glaucoma included basic demographic data (age at presentation, gender, and residence), clinical characteristics (admission date, intraocular pressure, and naked vision), and previous history (injury, cardiovascular disease, diabetes mellitus, hypertension, smoking, and alcohol consumption). Data from 1458 glaucoma patients were reviewed, of which PACG and SG patients accounted for 45.40 % and 47.19 %, respectively. The average age of all patients with glaucoma increased from 56.05 years in 2003 to 57.83 years in 2012, and the proportion of patients from rural areas rose from 46.43 % to 59.13 % during 10-year period. Female gender, cardiovascular disease, and hypertension were associated with PACG. POAG was related to smoking and alcohol consumption. There was positive correlation between SG, history of injury and diabetes mellitus.⁷

Objectives

1. To evaluate the clinical and epidemiological profile of patients with primary open-angle glaucoma.
2. To assess the socio-demography of the patients
3. To assess the relationship between socio-economic status and status of glaucoma
4. To assess the severity of the POAG with respect to disc changes and field changes

METHODS

It was a retrospective clinical chart review study. We studied records of patients with a diagnosis of primary open-angle glaucoma (POAG) followed in our Glaucoma Unit at Midnapore medical college and hospital (MMCH), Midnapore from April 1, 2017 to March 31, 2020. The Ethical Review Board of MMCH approved the study and each patient signed an informed consent. POAG was defined in the presence of open anterior chamber angle on gonioscopy, glaucomatous optic disc damage on clinical examination (focal or diffuse neuroretinal rim thinning, localized notching, or nerve fibre layer defect) and corresponding visual field (VF) defects. Besides open angle of the anterior chamber, presence of at least two of the other criteria were considered for diagnosis. The cases of low tension or normal tension glaucoma were also included in the study as variant of POAG. Cases of congenital glaucoma, patients attending glaucoma clinic irregularly, non-cooperative patients and ones with lental changes hampering fundoscopic examination and visual field study were excluded from the study. All data, addressing demographics (gender, age and skin colour), socio-economic status, educational status, emotional status and clinical information concerning risk factors for developing glaucoma (family history of glaucoma, hypertension and DM) and any treatment history (eg. Corticosteroid intake) were collected. Findings from visual

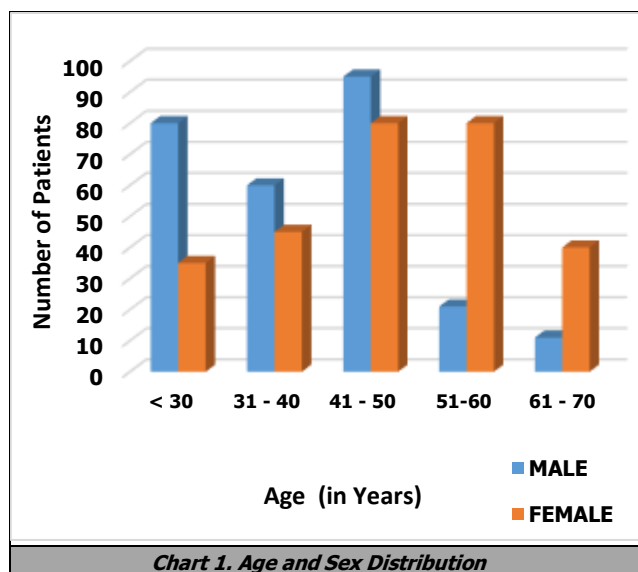
acuity examination, refraction, detailed anterior segment examination by slit lamp, Fundus examination with 90D, gonioscopy, applanation tonometry, VF examination by automated perimetry and USG A scan were also carefully taken into account. Arterial blood pressure was noted for all the cases. Specific criteria was set for each parameter studied and the cases were categorised accordingly into different groups for ease of further comparison.

Statistical Analysis

Statistical analyses were performed using SPSS Statistics version 20 software (IBM Corp., Armonk, NY, USA). Results of descriptive analyses were expressed as means ± standard deviations for quantitative variables, and as counts and percentages for categorical variables. A p - value less than 0.05 was considered as statistically significant.

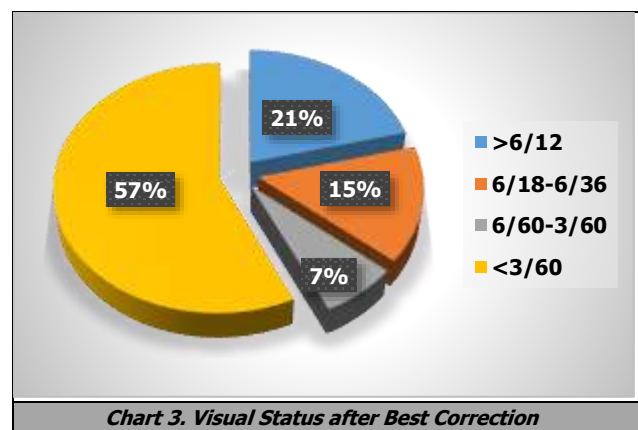
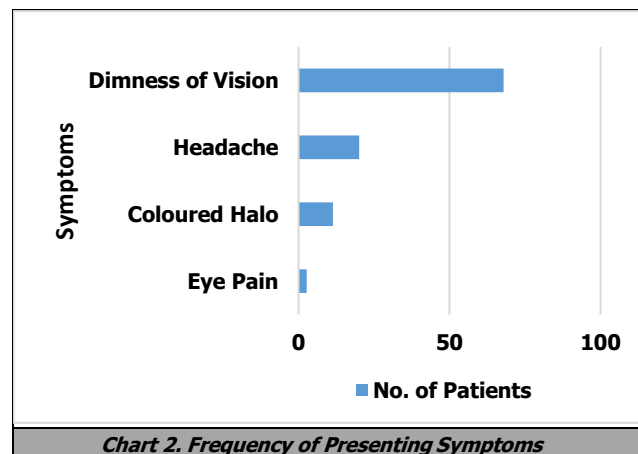
RESULTS

1840 eyes of 920 patients, meeting the inclusion criteria were enrolled for the study. The prevalence was found to be 0.34 %. About two-third cases (67.94 %) were males. Among males, majority (68 %) were in the age group between 41 and 70 years, whereas majority of females (69.5 %) were between 30 and 60 years. 390 patients (42.4 %) belonged to rural population while 530 patients (57.6) were from urban areas. Most of the patients came from lower and middle-income group (43.48 % and 48.37 % respectively). Only 75 (8.15 %) cases belonged to higher income group. Prevalence was found little more (54.90 %) in those who were highly strung and only 140 (15.21 %) cases were illiterate. Most (67.94 %) of the patients came with complaint of dimness of vision. Family history of glaucoma was recorded in 170 (18.47 %) cases.



Diabetes mellitus and hypertension were associated with 100 (10.86 %) and 115 (12.50 %) cases respectively. Hypothyroidism was detected in 55 (5.97 %) patients, all of whom were females. Ischemic heart disease was found only

in 10 (1.08 %) cases. History of corticosteroid drug intake for more than two weeks was obtained in 145 (15.76 %) patients.



Myopia was associated with 430 (46.73 %) cases whereas hypermetropia in 285 (30.98 %) cases. Rest 205 patients (22.29 %) were emmetropes. Visual status after best correction was 6 / 12 or better in majority of the eyes (41.58 %). The eyes were categorised into three groups according to mean IOP level (A, B and C). Group A included eye with mean IOP value of less than 21 mmHg (31.80 %), Group B (33.97 %) with values between 21 and 24 mmHg while Group C with values more than 24 mmHg (34.23 %). Cup-disc ratio of majority of eyes was found in more than 0.30 (97.29 %). It was more than 0.5 in 1255 eyes (68.20 %). Cup-disc ratio asymmetry of more than 0.20 was found in 355 (38.59 %) eyes. Special finding signifying optic nerve head damage was seen in majority of cases (92.92 %).

Special Feature	No. of Cases	Percentage
Peripapillary atrophy	290	31.52
Nasal shift	170	18.48
Bayonetting of disc edge	130	14.13
Saucerization	75	8.15
Notching of disc-cup margin	50	5.43
Laminar dot sign	45	4.90
Overpass cupping	35	3.80
Baring of circumlinear vessels	30	3.26
Disc haemorrhage	5	0.54

Table 1. Special Fundus (O.N.H.) Signs

Paracentral and / or arcuate scotoma was detected in 585 eyes (31.80 %) and field constriction (localized or generalised) with or without scotoma was noted in 255 eyes

(13.86 %). Majority of eyes with IOP value less than 21 mmHg were associated with no detectable visual field damage whereas considerable no. of eyes with mean IOP level more than 21 mmHg were associated with either central or peripheral (or both) visual field damage.

Visual Field Defects	CDR	CDR 0.3	CDR > 0.3	CDR > 0.8
	< 0.3	- 0.5	0.5 - 0.8	0.8
No field changes	50	400	235	0
Enlargement of blind spot	0	45	55	5
Paracentral and / or arcuate scotoma	0	50	475	60
Localised and / or generalised constriction of visual field with nasal step and scotoma	0	10	115	130
Others	0	30	55	125

Table 2. Relationship between Cup-Disc Ratio (CDR) and Visual Field Defects

DISCUSSION

Primary open angle glaucoma is prevalent throughout the world as a cause of permanent and irreversible loss of vision. So early detection has immense importance. Available data suggest that the prevalence of POAG varies from race to race. The prevalence estimates for POAG in east Asia varies from 0.5% to 2.3 %.^{8,9} The reported prevalence of POAG in India is between 0.41 % and 2.56 %.^{2,3,4} In this study, a prevalence rate of 0.34 % has been found among 269200 OPD patients. In comparison to most of the studies, the rate is towards the lower values. Virtually every study that has examined the relationship between age and POAG has confirmed that the older the individual, the greater the prevalence of glaucoma. In this study also, the prevalence was more towards the older age group.

The Blue Mountains Eye Study¹⁰ reported a higher prevalence of glaucoma in women. In our Study after adjusting for age, we found no difference in gender prevalence. Majority of rural patients came after being referred by local physician or surgeon while most of the patients from urban and city areas came directly on seeking treatment for dimness of vision. Only a small no of cases (75) under study belonged to the higher income group. Those who were emotionally highly strung were prone to have IOP rise more often. Majority of cases were non vegetarians (83.70 %), reflecting the dietary habit of this region. Miller and Paterson (1962) reported POAG in 8% of siblings and 2.7 % of their descendants. Shin, DH et al. (1977) found a positive family history in up to 50 % of patients with POAG.¹¹ Ghosh AK (1986) found a positive family history in 14 %. In the present study, we have found a positive family history of glaucoma in 18.47 % of POAG cases. Kass, MA et al. (1989) suggested that patients who received corticosteroid therapy, may develop an IOP elevation in days, weeks, months or even years after initiating treatment. In our study, history of corticosteroid intake (either systemic or topical) has been found to be present in 145 (15.76 %) cases. Becker (1971) had found both POAG and ocular hypertension being common in diabetes. The Baltimore Eye Survey¹² has shown no relationship between diabetes and POAG. In this study, Diabetes mellitus was found to be present in 100 (10.86 %)

cases. Kahn, HA et al. (1977) failed to find out any association between glaucoma and either systolic or diastolic blood pressure.¹³ Ghosh, AK (1986) reported 16 % association of essential hypertension with POAG. In the present study, systemic arterial hypertension was associated in 12.50 % cases of POAG. Smith, KD et al. (1993) detected hypothyroidism in 23 % of the patients with glaucoma.¹⁴

In our study, association of hypothyroidism was found in 5.97 % of patients with POAG. Ghosh, AK (1986) reported an association of Ischaemic heart disease in 4 % of POAG cases. In the present study it was found in only 10 cases (1.08 %). Daubs JG, et al. (1981) reported about higher IOP in myopic individuals.¹⁵ Ghosh, AK (1986) observed that majority of the eyes with POAG were emmetropic (52 %), while myopia was found in 20 % and hypermetropia in 28 %. In this study, myopia (46.73 %) was more common which agrees with most of the previous studies. In this study normal or low IOP values (less than 21 mmHg) were found in 585 (31.80 %) cases. These values closely resemble the report of Klein et al. (1992) and Smith (1985). Klein et al. (1992) reported 31.7 % prevalence of normal tension glaucoma among total eyes of POAG under study. Smith J (1985) reported prevalence of 30 %. Many investigators reported about the positive relationship between increasing IOP and visual field damage. Armaly (1970) reported that a large cup, (cup-disc ratio greater than 0.3) was associated with more glaucomatous optic nerve damage. Anderson DR et al. (1989) and Sponsel WE (1988) supported the contention that larger cups acquired as a result of glaucomatous damage were more susceptible to damage at a given IOP level. Most of the eyes under present study were associated with cup-disc ratio more than 0.30 which agrees with most of the previous studies. In this study, the vertical diameter was taken into consideration. It has been found that cup-disc ratio asymmetry was more important for glaucomatous optic nerve head damage.

CONCLUSIONS

Primary open angle glaucoma is the most common form of glaucoma. It has some familial tendency and is more prevalent with increasing age, myopia and systemic disease like diabetes mellitus, with no appreciable gender predilection. It is mainly a disease of older age group (> 30 years), asymptomatic in early stage, generally presenting only after marked field changes at an advanced stage. Early detection is possible with thorough clinical examination and due consideration of the possible risk factors (family history, raised IOP, cup-disc ratio, association with systemic diseases, refractive error, etc.). In most of the cases, cup-disc ratio of more than 0.5 is seen with presence of special fundus feature in considerable no. of cases. Although no change in visual field is generally seen in the early stage, scotoma or central field defects are common later, detected on perimetry. Most of the cases with IOP level more than 21 mmHg are associated with optic nerve head damage. And greater the optic nerve head damage, greater is the chance of visual field damage. Early diagnosis and treatment can prevent the loss of vision due to this disease. As such

detailed understanding of the implicated risk factors will allow a better assessment of the glaucoma risk potential in each individual and thereby have a tremendous impact on clinical assessment and regular follow-up of cases.

Limitations

The most important drawback of our study is that it was a hospital-based rather than population-based. This may, partially, just reflect the demographic and clinical characteristics of glaucoma patients in a specific region, instead of the broader population. Apart from that, we included the data from both eyes in the analysis; this may create a bias by doubling the effect of a single patient. Other important limitations of this study include the absence of more advanced glaucoma diagnostic tools such as optical coherence tomography and the absence of normal-tension glaucoma (NTG) which has a high prevalence in South Asia. In future proposals, a population-based participant source should be considered to avoid a potential referral bias inherent to any hospital-based study.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

Financial or other competing interests: None.

Disclosure forms provided by the authors are available with the full text of this article at jebmh.com.

REFERENCES

- [1] Quigley HA. Number of people with glaucoma worldwide. *Br J Ophthalmol* 1996;80(5):389-393.
- [2] Jacob A, Thomas R, Koshi SP, et al. Prevalence of primary glaucoma in an urban south Indian population. *Indian J Ophthalmol* 1998;46(2):81-86.
- [3] Dandona L, Dandona R, Srinivas M, et al. Open angle glaucoma in an urban population in southern India. *The Andhra Pradesh Eye Disease Study Ophthalmology* 2000;107(9):1702-1709.
- [4] Ramakrishnan R, Nirmalan PK, Krishnadas R, et al. Glaucoma in a rural population of southern India: the Aravind comprehensive eye survey. *Ophthalmology* 2003;110(8):1484-1490.
- [5] Sreekanth B. A hospital based clinical study on primary open angle glaucoma. *International Journal of Scientific Study* 2017;5(9):139-143.
- [6] Ribeiro LMG, Freitas RF, Ribeiro LMG, et al. Clinical and epidemiological study in patients with primary open-angle glaucoma. *Rev Bras de Oftalmol* 2018;77(1):9-13.
- [7] Zhao Y, Fu JL, Li YL, et al. Epidemiology and clinical characteristics of patients with glaucoma: an analysis of hospital data between 2003 and 2012. *Indian J Ophthalmol* 2015;63(11):825-831.
- [8] Foster PJ, Baasanhu J, Alsbrik PH, et al. Glaucoma in Mongolia: a population based survey in Hovsgol province, northern Mongolia. *Arch Ophthalmol* 1996;114(10):1235-1241.
- [9] Bourne RRA, Sukdom P, Foster PJ, et al. Prevalence of glaucoma in Thailand: a population based survey in Rom Klao district, Bangkok. *Br J Ophthalmol* 2003;87(9):1069-1074.
- [10] Mitchell P, Smith W, Attebo K, et al. Prevalence of open-angle glaucoma in Australia. The Blue Mountains Eye Study. *Ophthalmology* 1996;103(10):1661-1669.
- [11] Shin DH, Becker B, Kolker AE. Family history in primary open-angle glaucoma. *Arch Ophthalmol* 1997;95(4):598-600.
- [12] Tielsch JM, Katz J, Quigley HA, et al. Diabetes, intraocular pressure and primary open-angle glaucoma in the Baltimore Eye Survey. *Ophthalmology* 1995;102(1):48-53.
- [13] Kahn HA, Leibowitz HM, Ganley JP, et al. The Framingham Eye Study. II. Association of ophthalmic pathology with single variables previously measured in the Framingham Heart Study. *Am J Epidemiol* 1977;106(1):33-41.
- [14] Smith KD, Arthurs BP, Saheb N. An association between hypothyroidism and primary open-angle glaucoma. *Ophthalmology* 1993;100(10):1580-1584.
- [15] Daubs JG, Crick RP. Effect of refractive error on the risk of ocular hypertension and open angle glaucoma. *Trans Ophthalmol Soc UK* 1981;101(1):121-126.