

Study of clinical profile of open angle glaucoma patients at tertiary care centre

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Abstract

Aim: To do appropriate study of clinical profile of patients with open angle glaucoma. **Materials and Methods:** Cross-sectional, observational, clinical study over 2 years. 80 patients with open angle glaucoma above 40 years of age underwent thorough ocular examination i.e., visual acuity, intra ocular pressure, fundus examination, gonioscopy, optical coherence tomography (OCT) of optic disc and autoperimetry. **Results:** 160 eyes of 80 patients were examined. 77.5% patients had primary open angle glaucoma whereas 22.5% had secondary open angle glaucoma. Maximum (42.5%) were in the age group of 51-60 years. 61.25 % were males and 38.75 % were females. Most common chief complaint was painless diminution of vision (54.55%), followed by headache (25%) and eye ache (23.75%). 13.75% were asymptomatic while 7.5% had frequent change of glasses. Most patients presented with more than one symptom. Amongst risk factors, 54.83 % were hypertensive, 35.48% had diabetes mellitus, 19.35% were myopic, 9.67% had positive family history of open angle glaucoma and 4.83% had coronary artery disease, rest 4.83% had no risk factors. Causes of secondary open angle glaucoma were aphakic glaucoma (22.22%) and pseudophakic glaucoma in (22.22%) followed by post vitrectomy glaucoma (16.66 %), post traumatic glaucoma (11.11%), neovascular glaucoma in (11.11%), pseudoexfoliation (5.55%), pigment dispersion syndrome (5.55%) and steroid induced glaucoma (5.55%). **Conclusion:** Early diagnosis and treatment can prevent loss of vision due to glaucoma, so primary health care system should also refer patients with risk factors to the specialists for further evaluation to prevent progression and for further management.

Keywords: Glaucoma-Intraocular pressure-Primary open angle glaucoma-Secondary open angle glaucoma-Optic neuropathy

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Introduction

Glaucoma is a group of eye diseases with multifactorial etiology, characterized by an acquired loss of retinal ganglion cells, progressive optic neuropathy with morphological abnormalities in the optic nerve head and, visual field defects, in which raised intraocular pressure is a major risk factor. In short, it is a pressure sensitive optic neuropathy and it is second leading cause of blindness after cataract worldwide[1]. Glaucoma is still today a mystery, stimulating for the scientific research. The prevalence of open-angle glaucoma is reported to be highest in Africa and that of narrow-angle in Asia[2]. Glaucoma is grossly divided into two types i.e. open angle glaucoma & closed angle glaucoma. In our study we included the cases of open angle glaucoma at a tertiary care centre. Open angle glaucoma (OAG) is also called as a 'silent thief of sight'[3,4]. It often progresses undetected until the optic nerve get irreversibly damaged, with varying degrees of permanent vision loss, so screening and early diagnosis of glaucoma is very important to start early treatment and slow down it's progression.

OAG is classically divided into primary open angle glaucoma (POAG) & secondary open angle glaucoma. Secondary open angle glaucoma is open angle glaucoma secondary to conditions like neovascular glaucoma, pigmentary glaucoma, pseudoexfoliation glaucoma etc. Glaucoma treatment is mainly based on IOP reduction to a level at which no additional damage is expected to occur. So, glaucoma is a significant public health problem in our country and requires an effort on part of the health care community to alleviate the suffering caused by the disease. In this research work, our purpose is to study the demographic data, clinical features and treatment being given in patients of open angle glaucoma. This study can underline how in glaucomatous patients a careful clinical history with an internal medicine perspective is compulsory.

Materials and Methods

Study was conducted at a tertiary care centre from August 2018 to December 2020.

Trial site

Tertiary care centre

Study Design

Hospital based observational study

Sample size

80

Study period

2 years

Sample size

Sample Size Calculation:

$$N (\text{Sample Size}) = 4 \times P \times Q / R^2$$

$$= 4 \times 4.7 \times 95.3 / 52$$

$$= 71.6$$

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Adding 10% of attrition = 71.6 + 7.1 = 78.7 rounding off to 80.

Consent

Informed consent was taken from the patients who satisfy the inclusion criteria. An information sheet was given to all the participating patients and the tests to be performed on them were explained in local language.

Inclusion criteria

1. Patients of age above 40 years
2. Patients with suspected glaucomatous disc changes.
3. Patients with intraocular pressure > 21 mm Hg
4. Patients with successive Automated Perimetry suggestive of glaucomatous field defects.
5. Patient already diagnosed and on treatment of glaucoma.
6. Patients with open anterior chamber angle.

Exclusion criteria

1. Patients not willing for enrollment.
2. Anterior segment pathology precluding the visualization of angle e.g. any corneal opacity, iridocyclitis etc.
3. Patients suffering from other segment pathologies such as macular edema, Age related macular degeneration, Retinitis pigmentosa, Vitreous hemorrhage.
4. Patients with angle closure glaucoma.

Methodology

The patients with open angle glaucoma were evaluated with detailed history including patient name, age/sex, address, presenting complaints, ocular complaints like history of diminution of vision, ocular pain, headache, colored halos, redness, frequent change of presbyopic glasses, decrease of field of vision, past history, systemic illness: diabetes mellitus, hypertension, cardiovascular disorder, asthma, ocular or oral steroid use, ocular disease or ocular surgeries, laser, past record of intraocular pressure and duration of medical treatment, family history of glaucoma.

Ocular examination such as visual acuity assessment (unaided & Best corrected visual acuity), anterior segment examination by slit lamp biomicroscope, intraocular pressure assessment using Goldmann applanation tonometer, Disc evaluation by slit lamp biomicroscopy with +90D lens including optic disc size, shape and color, generalized enlargement of cup, vertical elongation of cup, cup disc ratio, focal thinning or notching of neuroretinal rim, and acquired changes in disc rim appearance, superficial splinter haemorrhage, localized or diffuse nerve fibre layer defects, exposure of lamina cribrosa, peripapillary atrophy, narrowing of circumferential vessels, nasal shifting of blood vessels.

Gonioscopy was done by Goldmann three mirrors non-indentation gonioscope and angle grading was done using Shaffer's classification. Fundus photography was done by specialized Zeiss Clarus 500 fundus cameras. Optical coherence tomography was done for retinal nerve fibre layer thickness with spectral domain optical coherence tomography.

Visual fields done by standard automated perimetry on Humphrey field analyzer using 30-2 testing protocol by SITA standard strategy.

Visual field reliability criteria included fixation loss of less than 20% and false positive and false negative of less than 33%. An abnormal visual field is defined as the presence of one of the following criteria defined by Anderson;

1. Glaucoma hemifield test outside normal limit,
2. P<5% for corrected pattern standard deviation,
3. A cluster of at least three contiguous non edge points with P<5% including at least one of these P<1% in pattern deviation plot.

Observation and Results

A total of 160 eyes of eighty patients were examined.

In this study 62 (77.5%) patients had primary open angle glaucoma and 18 (22.5%) patients had secondary open angle glaucoma. In POAG group 11(17.74%) patients belonged to 40-50 years of age, 27(43.54%) patients were in 51-60 years of age, 19 (30.64%) patients were in 61-70 years of age and 5(8.06%) patients were in 71-80 years of age. In secondary open angle glaucoma group 6(33.33%) patients were in 40-50 years of age, 7(38.88%) patients were in 51-60 years of age, 5 (27.77%) patients in 61-70 years of age and no patients were in the age group of 71-80 years.

The association between age group and primary and secondary open angle glaucoma was not found to be statistically significant. (Chi Square= 3.157 p-value= 0.3680)

In our study in both primary and secondary open angle glaucoma maximum number of patients i.e. 27(43.54%) patients in POAG group and 7(38.88%) patients in secondary open angle glaucoma group were in the age group of 51-60 years.

In this study, in POAG group out of 62 patients, 37 (59.67%) were males and 25 (40.32%) were females, so F:M ratio is 1.48:1 and in secondary open angle glaucoma group out of 18 patients 12 (66.66%) were male and 6 (33.33%) were females, making ratio 2:1.

In this study, 34 patients were having hypertension (54.830%), 22 were having diabetes mellitus (35.48%), 12 were having myopia (19.35%), 6 were having positive family history of OAG (9.67%) and 3 were having coronary artery disease (4.83%) rest 3 (4.83%) had no risk factors.

The association between gender and primary and secondary open angle glaucoma was not found to be statistically significant. (Chi Square=0.2871, p-value=0.5921)

In our study painless diminution of vision was the most common complaint seen in 55 (54.55%) patients followed by headache in 20 (25%) patients, eye ache in 19 (23.75%) patients, 11(13.75%) patients were asymptomatic while 6(7.5%) patients had frequent change of glasses, most patients presented with more than one symptom.

In our study 18 patients had secondary open angle glaucoma. Causes of secondary open angle glaucoma were aphakia in 4 (22.22%) patients and pseudophakia in 4 (22.22%) patients followed by post vitrectomy in 3 (16.66%) patients, glaucoma due to trauma in 2 (11.11%) patients, neovascular glaucoma in 2 (11.11%) patients, pseudoexfoliation in 1 (5.55%) patient, pigment dispersion syndrome in 1 (5.55%), steroid induced glaucoma in 1 (5.55%) patient.

Table 1: Types of open angle glaucoma

Sr. no	Type of Open Angle Glaucoma	Frequency (n=80)	Percentage (%)
1.	Primary Open Angle Glaucoma	62	77.5%
2.	Secondary open angle glaucoma	18	22.5%
3.	Total	80	100%

Table 2: Age- wise distributions in study patients

Sr No	Age	Primary Open Angle Glaucoma		Secondary Open Angle Glaucoma		Total	
		Frequency (n=62)	Percentage (%)	Frequency (n=18)	Percentage (%)	Frequency (n=80)	Percentage (%)
1.	41-50	11	17.74%	6	33.33%	17	21.25%
2.	51-60	27	43.54%	7	38.88%	34	42.5%
3.	61-70	19	30.64%	5	27.77%	24	30.0%
4.	71-80	5	8.064%	0	0%	5	6.25%
5.	Total	62	100%	18	100%	80	100%

Table 3: Gender wise distribution in study patients

Sr. no	Gender	Primary open angle glaucoma (n=62)	Percentage (%)	Secondary open angle glaucoma (n=18)	Percentage (%)	Total (n = 80)	Percentage (%)
1.	Male	37	59.67%	12	66.66%	49	61.25%
2.	Female	25	40.32%	06	33.33%	31	38.75%
3.	Total	62	100%	18	100%	80	100%

Table 4: Presenting complaints in study patients

Sr. No	Presenting complaints	Frequency (n=80)	Percentage (%)
1.	Decreased vision	55	68.75%
2.	Headache	20	25%
3.	Eye ache	19	23.75%
4.	Asymptomatic	11	13.75%
5.	Frequent change of glasses	6	7.5%
	Total	111	

Table 5: Systemic and ocular risk factors in poag patients

Sr. no.	Risk Factors	Frequency (n=62)	Percentage (%)
1.	Hypertension	34	54.83%
2.	Diabetes Mellitus	22	35.48%
3.	Myopia	12	19.35%
4.	Family History	6	9.67%
5.	Coronary Artery Disease	3	4.83%
6.	No risk factors	3	4.83%

Table 6: Causes of secondary open angle glaucoma

Sr. no	Causes of Secondary Open Angle Glaucoma	Frequency (n=18)	Percentage (%)
1.	pseudophakia	4	22.22
2.	Aphakia	4	22.22
3.	Post vitrectomy	3	16.66
4.	Glaucoma due to ocular trauma	2	11.11
5.	Neovascular glaucoma	2	11.11
6.	Pseudoexfoliation syndrome	1	5.55
7.	Pigment dispersion syndrome	1	5.55
8.	Steroid induced glaucoma	1	5.55
	Total	18	100%

Discussion

Types of open angle glaucoma

In our study, we included 80 patients with OAG of them 62 (77.5%) patients had primary open angle glaucoma and 18 (22.5%) had secondary open angle glaucoma.

In a study by Chaitra et al[5] (2015) they found that in glaucoma subgroup, POAG suspects were the predominant group of patients (48.33%) and secondary open angle glaucoma constituted (15.6%) of all the cases. Patients included in this study were in the range of 40 to 80 years. Mean age of primary open angle glaucoma was 58.77 ± 12.35 years and mean age for secondary open angle glaucoma was 52.12 ± 10.25 . This revealed that the risk of POAG increases with increasing age. A study by Tidke P[6] in 2017, found that mean age of primary open angle glaucoma was 54.22 ± 13.28 years (25-82 years), maximum patients of POAG were in the 55-60 years age group which was 30%.

In a study by Dr. Kanhei Charan Tudu et al[7] in 2017, it was found that mean age of POAG patients was 58.22 ± 8.95 , majority of patients of primary open angle glaucoma belong to age group 51-60 years (32.86%) followed by 61-70 years (23.21%). This is due to the fact that increasing age itself is a risk factor for glaucoma progression. In a study by Rekha P. Khandelwal, et al[8] in 2018 maximum patients of primary open angle glaucoma were in the age range of 40-70 years. In Ramyash Singh Yadav et al study[9] in 2016 found that age group of POAG was 30-82 years with mean age 60.1 years.

In Chaitra et al., study[5], done in 2015 the mean age at presentation for POAG was 60.8 ± 9.105 years. In Jayachandra Das study[10], done in 2001 the mean age in years at presentation for POAG was 60.54 years. Age is a key factor in glaucoma progression. With aging, vessels undergo atherosclerosis, resulting in increased shear stress,

and compromise of capillary flow and nutrient exchange subsequently leads to optic disc damage.

Gender wise distribution

In our study, in POAG group out of 62 patients, 37 (59.67%) were males and 25 (40.32%) were females, making sex ratio 1.48:1 and in secondary open angle glaucoma group out of 18 patients 12 (66.66%) were male and 6 (33.33%) were females, making ratio 2:1.

In Rekha P. Khandelwal et. al study[8] in 2018 in open angle glaucoma group male: female ratio was 2. 3:1, there were 44 males (69.84%) and 19 (30.16%) females.

In Ramyash Singh Yadav et al[9] in 2016, in primary open angle glaucoma study found male: female ratio 2.1:1, there were 48 males (68.6%) and 22 (31.4%) females. In Tidke P et al. study[6] in 2017, for POAG cases there were 27 females (54%) and 23 males (46%).

In Jayachandra Das study[10], done in 2001, in POAG cases males accounted for 57.36% and females for 42.64%.

So our results were comparable with other studies.

Presenting complaints

In our study painless diminution of vision was the most common complaint seen in 55 (54.55%) patients followed by headache in 20 (25%) patients, eye ache in 19 (23.75%) patients, 11 (13.75%) patients were asymptomatic while 6 (7.5%) patients had frequent change of glasses, most patients presented with more than one symptom.

In Dr. Kanhei Charan Tudu et al study[7] done in 2017, they found in glaucoma study group that reduced vision was the most common complaint as seen in 63.57% of cases, next common complaint was headache seen in 42.14% of cases followed by eye pain in 29.64% of cases. In Inderjeet Kaur et al study[11], done in 2017 majority 47% of patients presented with no symptoms whereas 20% presented with complaints of eye ache and headache, 17% had painless diminution

of vision and 11 % patients presented with frequent change in presbyopic glasses. In a study conducted by Gogate et al study[12], painless diminution of vision was most common symptom in patients (82.5%). So our results were comparable with other studies. Most patients were asymptomatic, so it is essential to screen patients for glaucoma in patients above 40 years of age, so that we can detect glaucoma as early as possible and prevent progression of glaucoma.

Systemic and ocular risk factors

In our study hypertension was present in 54.83 % of patients, diabetes mellitus in 35.48 %, myopia in 19.35 %, and family history was positive in 9.67% of patients and coronary artery disease in 4.83 % however 4.83 % of patients were having no risk factors.

Rekha P. Khandelwal et al. study[8] in 2018 found hypertension in 26 patients (74.29%), diabetes mellitus in 15 patients (42.88%), other risk factors (IHD, bronchial asthma and thyroid disorder) in 4 patients (11.43%), and myopia in 35 patients (55.56%) while no systemic illness in 28 (44.44%) patients of open angle glaucoma.

Dr. Kanhei Charan Tudu et al. Study[7] in 2017, found that in glaucoma study group out of 108 patients hypertension was more common risk factor i.e., it was present in 64 patients (60.95%) than diabetes which was present in 34 patients (31.48%) followed by family history in 7 (6.8%) and hypothyroidism in 3 patients (2.7%)

Michel et al[13] (2004) in blue mountain eye study concluded that Hypertension, particularly if poorly controlled, appears related to a modest increased risk of OAG, independent of the effect of BP on IOP and other glaucoma risk factors. The Blue Mountain study[14] and Beaver Dam studies[15] reported that diabetes mellitus is a risk factor for POAG progression.

In the Barbados Eye Study[16] an association between myopia (-0.5 D) and glaucoma, including suspects, was found, with an OR of 1.5 (95% CI, 1.1–2.0). In The Baltimore Eye Survey by Tielsh et al[17] (1994) found family history as an important risk factor for POAG. Connell AM et al[16] (1995) the Barbados Eye Study found a positive family history in POAG patients. Mukesh B N et al[18] revealed family history of glaucoma has been known to be associated with POAG.

Secondary glaucoma causes

In our study 18 patients had secondary open angle glaucoma. Causes of glaucoma were post vitrectomy in 3 (16.66 %) patients, followed by aphakia in 4 (22.22%) patients and pseudophakia in 4 (22.22 %) patients, glaucoma due to trauma in 2(11.11%) patients, neovascular glaucoma in 2 (11.11%) patients, pseudoexfoliation in 1 (5.55%) patient, pigment dispersion syndrome in 1 (5.55%), steroid induced glaucoma in 1 (5.55%) patient (Table 2). In Ritu Gadia, MD et al study[19] in 2021 they found common causes of secondary glaucoma were post vitrectomy (14%), trauma (13%), corneal pathology(12%), aphakia (11%), neovascular glaucoma (10%), pseudophakia (10%), steroid induced glaucoma (8%), uveitic glaucoma (8%), and miscellaneous causes (14%). In Chaita et al., study[5], in 2015 they found that secondary glaucoma formed 15.6% of total number of patients and three most common secondary glaucomas were lens induced (23.07%), pseudoexfoliation (17.94%) and uveitic glaucoma (15.38%). So, our results were comparable with other studies.

Conclusion

Increasing age is the most important risk factor in both types of open angle glaucoma, so it is important to screen all the patients having age more than 40 years. Primary open angle glaucoma was more common than secondary open angle glaucoma. Pseudophakic glaucoma and aphakic glaucoma were the most common cause of secondary open angle glaucoma. Men were more affected than women. Decreased vision was the most common presenting complaint of the patient.

Patients with risk factors such as hypertension and diabetes mellitus, myopia, family history and coronary artery disease could represent “high risk patients” with POAG so, they may require evaluation on more frequent basis to assess the progression of POAG. Structural changes significantly correlate with functional changes, therefore both evaluation of optic disc and visual field analysis are needed to assess glaucomatous damage and to monitor progression of glaucoma. Early diagnosis and treatment can prevent loss of vision due to glaucoma,

so primary health care system should also refer patients to the specialist for further who have risk factors to prevent glaucoma progression and for further management.

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