Original Article ISSN (O):2395-2822; ISSN (P):2395-2814

Clinical Profile of Primary Open Angle Glaucoma Suspects.

Pradnya Abhinav Mohan[1]

[1]Fellow Phaco-surgery, Department of Ophthalmology, DMIMS Jawaharlal Nehru Medical College Sawangi Meghe Wardha.

Received: February 2018
Accepted: February 2018

ABSTRACT

Background: Glaucoma is one of the leading causes of blindness around the world. The burden of blindness due to this in western world can be assessed by the fact that 2.25 million individuals aged 40 years and older have primary open angle glaucoma in United States . The figures from India is even more staggering. In India more than 10 million individuals aged 40 years and older have glaucoma and primary open angle glaucoma is estimated to affect more than 6 million persons. Out of these 6 million individuals more than 1.6 million have significant visual impairment. The pathology in primary open angle glaucoma can be described as acquired loss of optic nerve fibers due to chronic, progressive and multifactorial optic neuropathy which is generally irreversible. The progression of disease is relentless and the chances of vision loss in untreated cases are very high. The disease progression is silent and patients may realize about vision loss in late stages adding to the difficulties in treating open angle glaucoma. Thus it is important to screen the suspects and identify those who are at risk of developing primary open angle glaucoma so that they can be treated at an appropriate time. It is crucial to arrest the progression of open angle glaucoma before significant loss of vision occurs. We conducted this study to analyse clinical profile of primary open angle glaucoma suspects and study whether they develop glaucomatous field defects as early as 6 months. **Methods:** The study was approved by institutional ethical committee. In this prospective study of 4796 adult patients coming to general outpatient department of ophthalmology of a tertiary care institute situated in an urban area were screened. Out of these patients 52 patients who were primary open angle glaucoma suspects underwent thorough examination and they were followed up periodically for 6 months from their first visit. Patients were included in this study on the basis of a predefined inclusion and exclusion criteria. The data was tabulated and analyzed using SPSS 16.0 version software. **Results:** In our study, the total prevalence of primary open angle glaucoma suspects was found to be 1.08%. Prevalence of Ocular hypertensives being 0.31% and that of normal tension glaucoma suspects was 0.77%. Maximum age adjusted prevalence was found to be 2.83% in the age group of 50-59 years. Gender adjusted prevalence of POAG suspects was more for males as compared to females. Out of 52 POAG suspects 2 developed glaucomatous field defects at the end of 6 months while 2 more NTG suspects and I OHT who could be followed up for 1 year developed glaucomatous field defects at the end of 1 year follow up. Thinner central cornea was found to be a risk factor for progression to primary open angle glaucoma. **Conclusion:** With millions of affected individuals in India POAG remains a significant health Problem associated with the risk of significant visual loss. Since it remains asymptomatic till late stages it's a challenge to detect and treat this disease at an appropriate stage and hence it's important to screen the individuals for presence of this disease.

Keywords: Primary Open Angle Glaucoma, Progressive Optic neuropathy, Blindness, Screening, Intervention.

INTRODUCTION

Glaucoma is one of the leading causes of blindness worldwide. According to World Health Organization India has approximately 1% prevalence of blindness.[1] Of the estimated 8.9 million blind in India, 12.8% are due to glaucoma.[2] It is characterized by the progressive degeneration of the optic nerve, leading to visual impairment and blindness. Despite being one of the important causes of irreversible blindness worldwide glaucoma is rarely treated at an early stage because it remains asymptomatic until the disease has progressed fairly to an advanced stage.[3] This makes screening of patients an important health care measure aimed at preventing blindness in individuals who may be at increased risk of developing glaucoma. With appropriate screening and early detection and prompt treatment glaucoma usually can be identified and its progress arrested before significant effects on vision occur.[4] The useful parameters for glaucoma screening are intra ocular pressure, presence of optic disc cupping and visual field assessment. A glaucoma suspect is an individual with clinical findings and/or a constellation of risk factors that indicate an increased likelihood of developing Primary Open Angle Glaucoma (POAG).[5] Features

Name & Address of Corresponding Author
Dr Pradnya Abhinav Mohan
Fellow Phaco-surgery,
Department of Ophthalmology,
DMIMS Jawaharlal
Nehru Medical College
Sawangi, Meghe Wardha.

like appearance of the optic disc or retinal nerve fiber layer that is suspicious for glaucomatous damage, visual field defects suspicious for glaucomatous damage, consistently elevated intra-ocular pressure associated with normal appearance of the optic disc in an individual with open anterior chamber angles by gonioscopy should be considered to be due to primary open angle glaucoma unless and until proved otherwise.[6]

The important factors implicated in the development of glaucomatous optic nerve damage include Elevated intraocular pressure, older age, family history of glaucoma, African or Hispanic/ Latino descent and thinner central corneal thickness.[7] For confirming "Glaucoma" as a diagnosis, all suspects and high risk patients have to be thoroughly examined for visual field defects characteristic of glaucoma.[8] Primary Open angle is excluded if known secondary causes for potential open angle glaucoma, such as pseudoexfoliation, pigment dispersion and traumatic angle recession is present.[9] By routinely examining the intraocular pressure, features suggestive of optic nerve atrophy, gonioscopy and visual field charting the ophthalmologist can detect glaucoma at a very early stage and can prevent the disastrous consequence of late interventions (blindness) in glaucoma.[10] The basic aim of managing a patient with POAG is reducing the intraocular pressure and The American Academy of Ophthalmology recommends that there should be a 25% reduction of the baseline or untreated intraocular pressure and every patient should be treated on an individual basis depending upon the severity and stage of the disease. The topical agents like brominidine, timolol or pilocarpine can be used as monotherapy. In patients in whom there is progression of the disease combination therapy like timolol with newer antiglaucoma drugs like Prostaglandin analogues and topical carbonic anhydrase inhibitors, etc[11] can also be used. Surgery may be needed in patients who do not respond to mono or combination therapy and in whom the disease progression is relentless.[12]

We conducted this study to find out the earliest field changes in patients who were glaucoma suspects and to follow them up for progression of the disease.

MATERIALS AND METHODS

This was a prospective study in which the patients attending ophthalmology OPD of our institute were screened for POAG. The study was conducted after obtaining due approval from institutional ethical committee. The duration of study was 1 year. A total of 4796 adult patients attending general ophthalmic outpatient department were screened. Primary open angle glaucoma suspect was defined as any person having open angles on gonioscopy and fulfilling any one of the following criteria but with no definite glaucomatous field defects on perimetry.

1) Intraocular pressure >21mm Hg in either of the eyes by applanation tonometry.
2) Cup to Disc ratio > 0.6 with ISNT rule violation
3) Difference of cup to disc ratio of > 0.2 between the two eyes

POAG suspects showing Intraocular pressure > 21 mm Hg on at least two occasions, healthy optic discs, no glaucomatous field defects on white on white perimetry were labeled as ocular hypertensives and POAG suspects showing optic nerve head changes, IOP<21 mm of Hg with absence of field changes were labeled as normal tension glaucoma suspects.

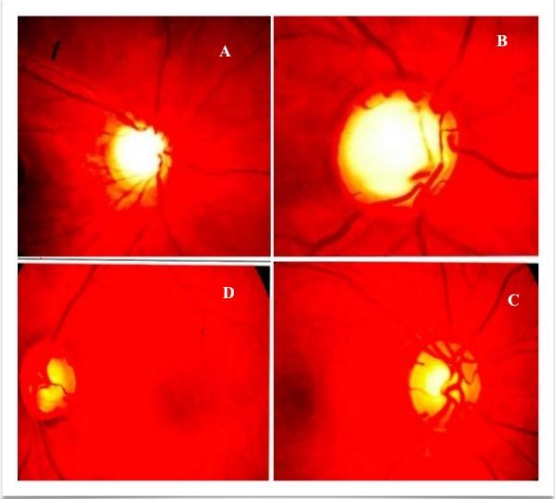

Figure 1 : Fundoscopy showing (Clockwise from left) (A) a suspicious disc with cup disc ratio of 0.6 with ISNT Rule violation + (B) a suspicious disc with cup disc ratio of 0.7 with ISNT Rule violation + in POAG suspect (C) Normal disc with 0.3 cup disc ratio and healthy Neuro retinal rim. (D) a suspicious disc with cup disc ratio of 0.6 with notching with optic disc hemorrhage.

In every case best corrected visual acuity (BCVA) for distance and near vision was assessed. Thorough external ocular examination was done starting with torch light examination, pupillary reflex followed by slit lamp examination. Intra ocular pressure was recorded using Goldmann applanation tonometer. Readings were taken at 3 different times of the day'". Gonioscopy was performed using three mirror Goldman contact lens to exclude the patients with narrow angles. Pachymetry with Tomey ultrasonic pachymeter (AL-3000) was done to assess the central corneal thickness. The intraocular pressure was adjusted according to central corneal thickness using table given by Patwardhan et al. The pupils were dilated with 1% Tropicamide single drop. Then optic disc changes assessed with +90D non contact fundus lens. Visual field examination was done by using Humphrey Automated Visual Field Analyzer. The test used was central 30-2 SITA Standard with fovea on. The glaucomatous field defect was said to be present if Anderson's criteria was fulfilled. All the above findings were recorded as per proforma given.

Follow up was carried out at 1 week, 1 month, 3 months, 6 months after initial examination. Some patients remained in follow up for 1 year. Though the disease is slowly progressive our aim was to find out whether the glaucoma suspects develop glaucomatous visual field defects as early as 6 months from initial examination.

Inclusion criteria

1) Primary open angle glaucoma suspects, ocular hypertensives and normal tension glaucoma suspects as defined by the criteria described above.

Exclusion criteria

1) Patients with Angle closure glaucoma.
2) Patients with advanced lens changes.
3) Definite glaucomatous field defects on white on white perimetry.
4) Glaucoma secondary to any systemic or ocular cause.
5) Patients having retinal or neurological diseases affecting visual fields.

RESULTS

Out of 4796 patients who were screened 75 patients were found to be having primary open angle glaucoma (POAG), 28 patients were found to have primary angle closure glaucoma (PACG), 50 patients were found to have secondary glaucoma and 52 patients were found to be open angle glaucoma suspects. Out of these open angle glaucoma suspects 37 patients were normal tension glaucoma suspects while 15 patients were ocular hypertensives.

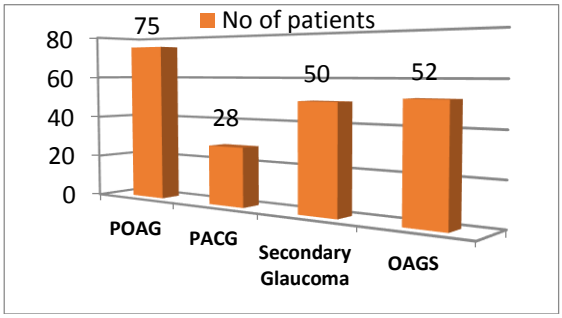

Figure 2: Types of Glaucoma found during screening of the studied cases

The analysis of the cases showed that the most common age group of glaucoma suspect was 50-59 years (2.83%) followed by 60-69 years (1.56%). The least common affected age group was found to be less than 30 years of age (0.11%).

Table 1: Age Adjusted Prevalence of Glaucoma suspects.

Age	OPD Population	POAG Suspects	%
< 30	874	1	0.11
30-39 yrs	784	3	0.38
40-49 yrs	1067	8	0.74
50-59 yrs	810	23	2.83
60-69 yrs	765	12	1.56
70-79 yrs	496	5	1.00
Total	4796	52	1.08

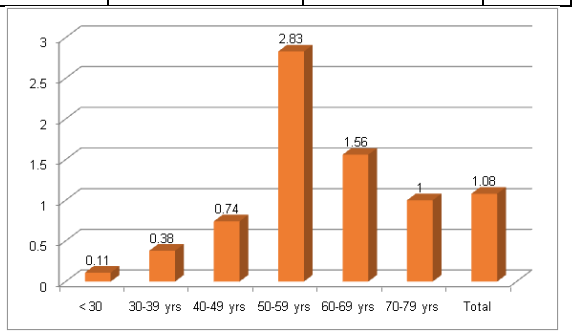

Figure 3: Age Adjusted Prevalence of Glaucoma suspects.

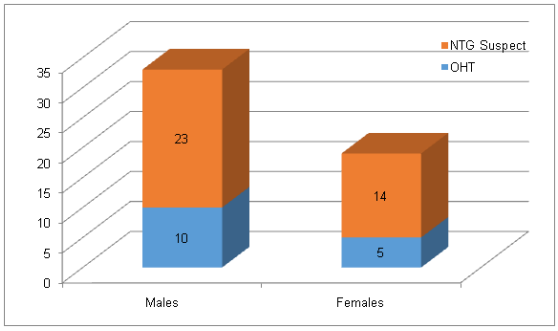

Figure 4: Gender distribution of the cases with suspected POAG.

Table 2: Symptoms in the studied cases.

Symptom	No Of Cases	Percentage
Defective Vision	24	46.15 %
Eye Strain	10	19.23 %
Headache	11	21.15%
Frequent changes of glasses	1	1.9 %
Asymptomatic	6	11.53 %

Table 3: Systemic illnesses in the studied cases.

Symptom	No Of Cases	Percentage
Diabetes Mellitus	2	3.84 %
Hypertension	8	15.38 %
Ischemic Heart disease and Hypertension	1	1.92 %
Diabetes an Hypertension	5	9.6 %
No Systemic illness	36	69.23 %

The analysis of gender distribution of the studied cases revealed that the prevalence of POAG was more common in males than in females. Out of the 2561 screen male patients total POAG suspects were found to be 33 (1.28%) while out of 2235 screened female patients POAG suspects were found to be 19 (0.85%).

The analysis of the symptomatology of the studied cases showed that the most common type of symptom seen in the patients was found to be defective vision (46.15%) followed by headache (21.15%) and eye strain (19.23 %).

The analyses of association of glaucoma suspects with presence of systemic illnesses showed that

majority of these patients were not having any systemic illness (69.23 %). The most common systemic illness seen in these patients was found to be hypertension (15.38%) followed by combination of diabetes and hypertension (9.6%).

50% of the glaucoma suspects had better visual acuity than 6/12, while 45% had visual acuity between 6/12-6/24. The causes of decreased visual acuity were refractive errors, nuclear sclerosis, senile immature cataract, posterior sub capsular cataract, posterior capsular opacity and drusens at macula. The best corrected visual acuity of majority of patients improved to 6/6. Best corrected visual acuity of 4 patients could not improve beyond 6/12 as one had posterior capsular opacity, 2 had posterior sub capsular cataract and 1 had drusens at macula.

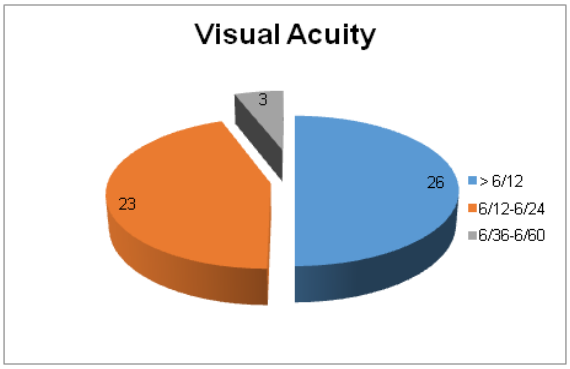

Figure 5: Visual Acuity in the studied cases

Central Corneal Thickness adjusted intra ocular pressure in the suspected cases showed that 3 out of 15 ocular hypertensives had IOP less than 21 mm of hg while 8 out of 37 NTG suspects were found to have intraocular pressure more than 21 mm of hg.

Table 4: Central Corneal Thickness adjusted intra ocular pressure in the suspected cases

Suspect Type	Total	Central Corneal Thickness adjusted intra ocular pressure		
		<21	21-25	>25
Ocular hypertension	15	3	9	3
NTG Suspect	37	29	8	0

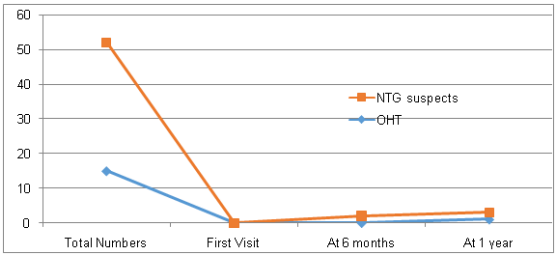

Figure 6: Visual Field Defects in glaucoma suspects

Finally the follow up of the patients showed that the majority of glaucoma suspects didn't develop glaucomatous field defects by the end of 6 months. 2 NTG suspects developed visual field defects by the end of 6 months while 2 more NTG suspects and I OHT who could be followed up for 1 year developed glaucomatous field defects at the end of 1 year follow up.

DISCUSSION

Open angle glaucoma is one of the commonest ocular conditions causing visual disability in the long run. Since the condition does not cause any symptoms like pain, irritation or acute visual loss, the patients usually do not come to know about the disease till the disease has sufficiently advanced to cause significant loss of vision. Thus, it is quite essential to diagnose such cases much before advanced damage to retinal ganglion cells occur. From this point of view, screening of glaucoma suspects is important.

In this study, 4796 adult patients coming to general ophthalmic outpatient department were screened. 52 cases of Primary open angle glaucoma suspects were found. These were studied further to find out their clinical profile, and they were followed up periodically for at least 6 months to detect the visual field changes to diagnose them as established glaucoma cases. In our study the prevalence of NTG suspects and ocular hypertension was found to be 0.77% and 0.31% respectively. Similar prevalence rates were found in the study conducted by Anand Palimkar et al.[13] Another study by Jayachandra Das et al found the prevalence of NTG suspects to be 17.48% while ocular hypertension was found in 2.39% patients.[14] The difference in prevalence may be due to design of study (prospective vs retrospective) and due to the fact that the higher incidence is quite expected if the study was conducted in glaucoma clinic rather than those studies which were conducted at general ophthalmology outpatient department.

Maximum age adjusted prevalence of POAG suspects was found to be 2.83% in the age group of 50-59 years that is sixth decade. The maximum age adjusted prevalence found in Barbados eye study was 5.5% in the age group of 70-79 years. The difference might be due to racial difference of the study population. The maximum age adjusted prevalence of 1.63% was found in the Andhra Pradesh eye disease study which was in the age group of 60-69 years. This difference might be due to regional variation.[15]

Out of 2561 male patients attending general ophthalmic outpatient department 1.28% were primary open angle glaucoma suspects, while out of 2235 female patients screened 0.85% were glaucoma suspects. The gender adjusted prevalence POAG suspects in the Andhra Pradesh Eye disease study was 0.34% males while 0.74% in females. This difference might be because out of 2522 screened population 53.4%were females in the Andhra Pradesh eye disease study. Out of 52 glaucoma

suspects 33 were male that is male constituted 63% of glaucoma suspects in the present study. In Barbados eye study 57% of the glaucoma suspects were males. Thus the results were comparable.[16]

After adjusting intraocular pressure according to central corneal thickness 3 out of 15 ocular hypertensives that is 20% were found to have IOP < 21mm of Hg, while 8 out of 37 NTG suspects (21.62%) were found to have IOP >21 mm of Hg. In study done by Thomas R et al 39% of the ocular hypertensives had CCT adjusted IOP < 21mm of Hg.[17] In the study by Rene'-Pierre Copt et al 31% of the patients labeled as normal tension glaucoma were found to have POAG.[18] Thus, in the present study the 21.62% of the NTG suspect patients might be preperimetric POAG patients. Majority of the POAG suspects did not develop glaucomatous visual field defect at the end of 6 months. 2 of the normal tension glaucoma suspects showed development of field defects at the end of 6 months. 2 more NTG suspects and 1 ocular hypertensive patient who could be followed up till 1 yr were found to develop field defects. All 5 of them had central corneal thickness <500 µm which suggests that thinner central cornea is an independent risk factor.

The Los Angeles Latino Eye Study suggests that CCT is an important independent risk factor for the prevalence of open angle glaucoma which correlates with this study.[19] The study by Jost B. Jonas et al suggests that central corneal thickness may not play a major role in the pathogenesis progressive glaucomatous optic nerve damage.[20] In the same study 63 out of 118 (53.38%) of ocular hypertensives showed the progression of visual field loss at 6 months ,while 13.8% of 203 eyes of preperimetric glaucoma developed defects at 6months.

CONCLUSION

Primary open angle glaucoma is one of the important causes of loss of vision in elderly. Since the disease remains asymptomatic till there is significant loss of vision screening is important in high risk patients. Central corneal thickness is a significant factor in determining the course of the disease and risk of progression is more in patients with thinner central cornea.

REFERENCES

1. Lee SY, Mesfin FB. Blindness. [Updated 2017 Oct 9]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2017 Jun-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK448182/
2. George R, Ve RS, Vijaya L. Glaucoma in India: estimated burden of disease. J Glaucoma. 2010 Aug;19(6):391-7.
3. Garway-Heath DF. Early diagnosis in glaucoma. Prog Brain Res. 2008;173:47-57.
4. Tatham AJ, Weinreb RN, Medeiros FA. Strategies for improving early detection of glaucoma: the combined structure–function index. Clinical Ophthalmology (Auckland, NZ). 2014;8:611-621.
5. Foster PJ, Buhrmann R, Quigley HA, Johnson GJ. The definition and classification of glaucoma in prevalence surveys. The British Journal of Ophthalmology. 2002;86(2):238-242.
6. Bruno CA, Alward WL. Gonioscopy in primary angle closure glaucoma. Semin Ophthalmol. 2002 Jun;17(2):59-68.
7. Sng CC, Ang M, Barton K. Central corneal thickness in glaucoma. Curr Opin Ophthalmol. 2017 Mar;28(2):120-126.
8. Broadway DC. Visual field testing for glaucoma – a practical guide. Community Eye Health. 2012;25(79-80):66-70.
9. Gadia R, Sihota R, Dada T, Gupta V. Current profile of secondary glaucomas. Indian Journal of Ophthalmology. 2008;56(4):285-289.
10. Weinreb RN, Aung T, Medeiros FA. The Pathophysiology and Treatment of Glaucoma: A Review. JAMA. 2014;311(18):1901-1911.
11. Hommer A. [Combination therapy in the medical treatment of glaucoma]. Klin Monbl Augenheilkd. 2013 Feb;230(2):133-40. doi: 10.1055/s-0032-1328095. Epub 2013 Jan 20.
12. Mizoguchi T, Nishigaki S, Sato T, Wakiyama H, Ogino N. Clinical results of Trabectome surgery for open-angle glaucoma. Clinical Ophthalmology (Auckland, NZ). 2015;9:1889-1894.
13. Palimkar A, Khandekar R, Venkataraman V. Prevalence and distribution of glaucoma in central India (Glaucoma Survey - 2001). Indian Journal of Ophthalmology. 2008;56(1):57-62.
14. 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; 49:25-30. 45.
15. Dandona L, Dandona R, Srinivas M, Mandal P, John RK, Mc Carty CA, et at Open — angle glaucoma in an urban population in southern India : The Andhra Pradesh eye disease study. Ophthalmology 2000; 107 : 1702-9
16. M. Cristina Leske, A. M. S. Connell, Andrew P. Schachat, Leslie Hy-man.The Barbados Eye Study, Prevalence of Open Angle Glaucoma, Arch Ophthalmol. 1994;112:821-829
17. Thomas R, Korah S, Muliyil J. The role of central corneal thickness in the diagnosis of glaucoma. Indian J. Ophthalmol 2000; 48 : 107.
18. Copt R P, Thomas R, Mermoud A, Corneal Thickness in Ocular Hyper-tension, Primary Open-angle Glaucoma, and Normal Tension Glaucoma Arch Ophthalmol. 1999; 117;14.
19. Francis B A, Varma R, Chopra V, Lai M Y, Shtir C, and Azen S P, Intraocular Pressure, Central Corneal Thickness, and Prevalence of Open — Angle Glaucoma : The Los Angeles Latino Eye Study; Am J Ophthalmol 2008; 146:741—746.
20. Jonas J B, Stroux A, Velten I, Juenemann A, Magus P, and Budde W M, Central corneal thickness correlated with glaucoma damage and rate of progression. Invest Ophthalmol Vis Sci. 2005, 46:1269-1274

How to cite this article: Mohan PA. Clinical Profile of Primary Open Angle Glaucoma Suspects. Ann. Int. Med. Den. Res. 2018; 4(2):OT07-OT11.

Source of Support: Nil, **Conflict of Interest:** None declared