

## PROFILE OF PRIMARY OPEN ANGLE GLAUCOMA PATIENTS

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**ABSTRACT: Background:** Glaucoma is second leading cause of blindness worldwide. Most common form is Primary open angle glaucoma (POAG). It is chronic, slowly progressive, optic neuropathy, is insidious in onset and painless, until it has caused a significant loss of vision. Risk factors are Age, race, Inheritance, myopia, diabetes mellitus, hypertension, migraine, intake of caffeine. **Objective:** To identify risk factors in patients of primary open angle glaucoma at Nagari Eye hospital, ahmedabad, Gujarat. **Method:** It is a retrospective cross-sectional study. It was conducted in Nagari eye hospital Ahmedabad. Total of 123 patients of POAG were included in study after taking prior written informed consent. Diagnosis of DM and HT was confirmed on basis of previous reports and history of medication. Other risk factors like inheritance, diet etc were confirmed by asking proper history. Data was analyzed & frequency table was prepared with help of SPSS 13 software. **Observations & discussion:** Out of 123 Patients of POAG with mean age of 58.7±13.4 yrs, 24(19.5%) patients had DM, 44(35.8%) had hypertension, 21(17.1%) had family history of glaucoma. Findings of this study are comparable with findings of similar study done by S bhattarai. **Conclusion:** There is some association between primary open angle glaucoma & its treatment with systemic disease mainly hypertension & diabetes & their management. So patients of glaucoma can be advised to keep systemic diseases in control. Also patients of diabetes & hypertension can be advised for regular eye checkup for glaucoma.

**Key words:**-POAG, risk factors, diabetes mellitus, hypertension

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### Introduction:

Glaucoma is a second leading cause of blindness worldwide (K.Park). It is "Silent Killer" disease. It is having prevalence of 6.4 million in world. Overall prevalence of Glaucoma in India according to National survey on blindness (2001-2002) is 5.8%. POAG is more common than PCAG. In India, prevalence of POAG(Primary open angle glaucoma) is 1.7% as compared to prevalence of PCAG(primary closed angle glaucoma) that is 0.73%. Also there is female (1.7%) preponderance over males(2.9%).<sup>1</sup>

Primary open angle glaucoma is a chronic, slowly progressive, optic neuropathy which is characterized by increased/normal intraocular pressure, cupping of the optic nerve head and visual field abnormalities like paracentral scotoma, arcuate scotoma.<sup>2</sup>The disease occurs primarily in patients over 50 years of age, but can develop in younger patients as well. In India, it is estimated that 1.6% to 4.0% of the people have POAG and it is one of the leading causes of blindness.<sup>3</sup>Diabetes mellitus and high

myopia have higher prevalence of primary open angle glaucoma than others. Similarly Age, race, Inheritance, myopia, diabetes mellitus, hypertension, migraine, intake of caffeine, aging, cigarette smoking and thyrotoxicosis are considered as other important risk factors for the onset of primary open angle glaucoma.<sup>4</sup>

In initial stage, the intraocular pressure may not be raised permanently, but shows exaggerated diurnal variation.<sup>5</sup>Due to constant pressure on the ciliary muscle and its nerve supply, reading and close work often present with increasing difficulties with mild headache and eye ache. Early glaucomatous changes include asymmetry of the cup, visible fenestrations, vertically oval large cupping, splinter hemorrhages, and pallor areas with atrophy of retinal nerve fiber layers. Advanced glaucomatous changes include thinning of neural retinal rim, bayonetting blood vessels with marked cupping and thinning of lamina cribrosa due to mechanical pressure exerted by increased intra ocular pressure. A visual field

defect corresponds to the changes at the optic nerve and gradually spreads centrally as well as peripherally. Eventually only a small island of central vision (tubular vision) and temporal islands are left.<sup>6</sup>

Patients with glaucoma are more likely to have diabetes mellitus and patients with diabetes are more prone to have glaucoma.<sup>7</sup> Some authors believe that the small vessels involvement in diabetes mellitus makes the optic nerve susceptible to pressure related damage. Due to consequence of hyperglycemia, modified protein called as Glycoprotein is formed. Abnormal glycoprotein deposition in iris in diabetes affects pupil size and shape, and then alters aqueous drainage channels. Diabetic neuropathy involves the autonomic nervous system of iris. Pupillary responses are reduced and sluggish, dilates poorly, increasing intraocular pressure. In diabetes mellitus, there is usually narrowing of retinal arterioles (micro angiopathy), deposition of fat, calcium and cholesterol, which hinders the circulation of blood and nutrition supply of retina. Vascular sclerosis affecting the arterial supply of the optic nerve near the disc produces the ischemic atrophy of optic nerve, without corresponding increase of supporting glial tissues. As a result, cavernous spaces are formed within the optic nerve. The low ocular rigidity, characteristic of many myopic eyes results in artificially low intraocular pressure measurement. There will be the thinning of lamina cribrosa and sclera. The sclera is continuous with a sieve like network called as the lamina cribrosa through which the optic nerve exits the eye. The mean intraocular pressure increases after the age of 40 years, possibly due to reduced facility of aqueous outflow due to resistance at the trabecular meshwork, especially at the juxtacanalicular region due to age related

change in this tissue<sup>8</sup>. So in myopic eyes, slight increment in intraocular pressure can damage optic nerve head and tissues within it. The risk of developing visual field loss in myopic eyes is five times more in higher degree of myopia with increased intra ocular pressure. So there is an increased incidence of primary open angle glaucoma in myopic eyes.<sup>9</sup> Diabetes is a highly prevalent condition resulting in major medical problem throughout world. It causes an array of long term systemic and ocular complications which have considerable impact on both patients and society because it typically affects individuals in their productive years.<sup>10</sup> Common ocular complications are cataract, vascular and degenerative. Out of these Diabetic Retinopathy (DR) is a potential cause of blindness. In addition, many reports point to an increased incidence of POAG in DM. The influence of blood glucose on IOP and the effect of increased IOP on appearance and progression of diabetes have been widely studied and reported but with conflicting results.<sup>11</sup> The physiologic basis for the intraocular pressure blood pressure relationship may be an increased production of aqueous humor, induced by increased blood pressure. Therefore, high intraocular pressure may be preceded by high blood pressure. In several population studies, such as the Framingham Eye Study,<sup>12</sup> raised intraocular pressure has been associated with high blood pressure and other cardiovascular risk factors. This study was carried out to find out the prevalence of POAG and different risk factors associated with it like raised IOP, familial occurrence, diabetes mellitus and high myopia in primary open angle glaucoma. So, it is expected to be helpful in making the national programme of primary open angle glaucoma screening in patients with diabetes mellitus and high myopia.

### **Materials and Method:**

The study was carried out in Nagari eye hospital, Ahmedabad. It was a retrospective

cross-sectional study. Total of 150 patients with glaucoma are screened. From which 123

patients with confirmed diagnosis of Primary open angle glaucoma was included in study after taking prior written informed consent. A complete ophthalmological examination was done including ophthalmoscopy, gonioscopy, Humphrey visual field analyzer, slit lamp biomicroscopy, applanation tonometry and automated perimetry. Following patients with various pathological profiles like secondary glaucoma, narrow angle, ocular pathologies that obscure the view of the optic nerve head, and pathologies that could alter intraocular

pressure (e.g. uveitis and high refractive errors >5 dioptre) were excluded.

Diabetes Mellitus and Hypertension were confirmed on basis of previous reports and prescription of medication. Participants who could not provide a prescription were asked to return the next day with all of their prescriptions. Presence of other risk factors, were confirmed by history. Statistical analysis of data was done & frequency tables were prepared with help of SPSS 13 software.

### Results:

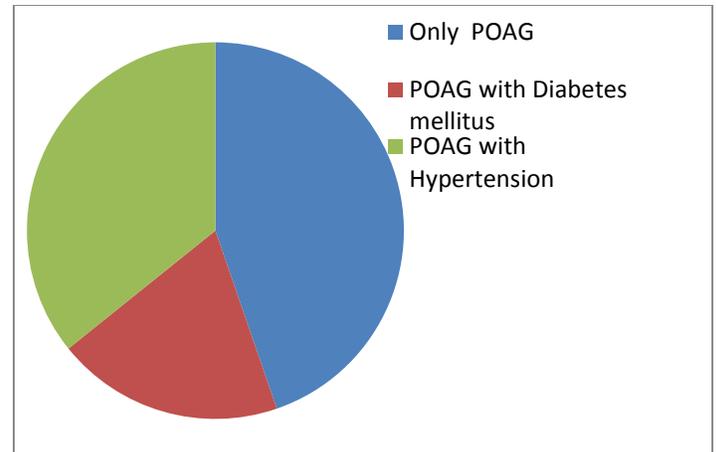
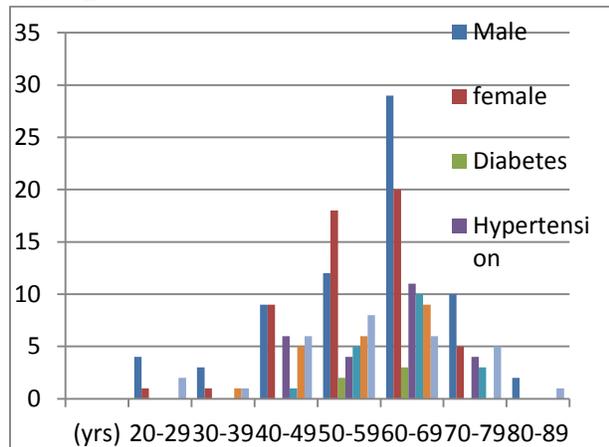
Our study included 123 POAG patients of which maximum patients (39.83%) were in the age group of 60-69 years. There was no significant sex predilection with male: female ratio being 56:43(1.302). Out of 123 Patients of POAG with mean age of  $58.7 \pm 13.4$  yrs, 69(56.1%) were males and 54(43.9%) were females. 24(19.5%) patients had Diabetes mellitus(DM) and 44(35.8%) had hypertension(HT). Among 24 patients of DM, 16 patients are having duration of DM >5 yrs, 13 patients were male and 11 were female patients. For both DM and HT maximum number of patients belongs to age group 60-69 yrs. Among 44 patients of HT, 28 patients are having duration of HT >5 yrs, 25 were male patients and 19 were female patients. 21 (17.1%) had family history of glaucoma positive in parents, grandparents or siblings. More than 50% of total study population was myopic. 29(23.6%) patient were having addiction of various forms of nicotine. Duration of addiction was more than 10-15 yrs in most of them. In 123 patients, 89(72.4%) were vegetarian, 20(16.3%) were non-vegetarians and 14(11.4%) were having mixed diet. In female patients, there are 6.97% patients suffering from Hypothyroidism and 2.32% patient was in postpartum phase. Most of females (>80%) are house wives. Most of the male are govt. employees with clerical or administrative jobs. Findings of this study are comparable with findings of similar study done by S bhattarai.

Age (yrs)	Male	Female	Diabetes	HT	DM + HT	Family history	Addiction
20-29	4	1	0	0	0	0	2
30-39	3	1	0	0	0	1	1
40-49	9	9	0	6	1	5	6
50-59	12	18	2	4	5	6	8
60-69	29	20	3	11	10	9	6
70-79	10	5	0	4	3	0	5
80-89	2	0	0	0	0	0	1
Total	69	54	5	25	19	21	29

Table 1

	Total Patients	Patients with Duration > 5 yrs
Diabetes mellitus	24	16
Hypertension	44	28
Addiction(smoking, tobacco)	29	29

Table 2



### Discussion:

Glaucoma occurs in elderly, rarely being seen earlier than 40 years of age and tends to run in families. Its inheritance is thought to be multifactorial and polygenic, although genetic analysis in some families with juvenile POAG has identified a link to long arm of chromosome 1.<sup>13</sup> Patients who develop frank disease probably inherit a number of abnormal genes. This history is an important risk factor for POAG suggesting that there is a strong genetic predisposition but identified genes to date accounts for only <5% cases. In our study we had 21(17.1%) patients with family history of glaucoma positive in parents, grandparents or siblings. Addiction like smoking, chewing tobacco has a huge negative impact on health overall. It is useful to investigate effect of cigarette smoking on risk of POAG. In Blue mountain eye study, intraocular pressure was found to be elevated modestly among non smokers.<sup>15</sup> We found nicotine consumption in 29 subjects which is 23.6% of total. In our study, out of the total 123 patients, 19.5 % ( 24) had diabetes mellitus and 35.8 % ( 44) had hypertension. This shows Diabetes and hypertension are the important risk factors for POAG.

In a their study, Nielsen NV <sup>16</sup> of Denmark showed that prevalence of Primary open angle glaucoma in diabetes mellitus patient was over

genes appear to influence height of intra ocular pressure, the facility of outflow and the cup: disc ratio.<sup>14</sup> Analytical epidemiological studies and clinical research are needed to determine whether the differing rates are related to genes, environment or combination of two. A positive family

all 6%. Similarly the study of Klein et al <sup>17</sup> revealed 4.2% of POAG in diabetic patients. The physiologic basis for the intraocular pressure-blood pressure relationship may be an increased production of aqueous humor, induced by increased blood pressure. Therefore, high intraocular pressure may be preceded by high blood pressure. In several population studies, such as the Framingham Eye Study, intraocular pressure has been associated with blood pressure and other cardiovascular risk factors<sup>12</sup>.

In a study by Suraj shakya et al<sup>18</sup> POAG associates positively with hypertension and diabetes in all ethnic groups. Computed from discordant case-control pairs, the overall Odds ratio for their study population was 2.72, suggesting a stronger association between hypertension and POAG in Nepal and concurring with the results of the Blue Mountains Eye Study and Rotterdam Study <sup>19</sup>. They also demonstrated a strong association

between POAG and diabetes (OR 3.15). This reliance on detection within the established medical community has the same disadvantage as many earlier studies—namely, the potential for detection bias since diabetics are more likely to receive eye examinations and be screened for glaucoma. However, in the Blue Mountains Eye Study the entire study population underwent glaucoma screening (The need for very large numbers of patients in incidence rate studies would have precluded such detailed screening examinations.). The age-sex adjusted odds ratio (OR) for glaucoma in diabetics compared with those without diabetes was 2.12 (95% confidence intervals (CI) 1.18–3.79), and the authors concluded that there was a real

**Conclusion:**

There is some association between primary open angle glaucoma & its treatment with systemic disease mainly hypertension & diabetes & their management. So patients of glaucoma can be advised to keep systemic diseases in control. Also patients of diabetes & hypertension can be advised for regular eye checkup for glaucoma. The therapeutic implications of this finding suggest that ophthalmologists and other eye care practitioners should not only examine their patients for effects of hypertensive and diabetic retinopathies, but also screen them for overt or occult signs of glaucoma by simple fundus examination and measurement of intraocular pressure. If necessary, patients should be

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association between glaucoma and diabetes. On the other hand, the Baltimore Eye Study<sup>20</sup> which was conducted similarly to the Blue Mountains Eye Study, found an age-race adjusted odds ratio of 1.03 (95% CI 0.85–1.25). Chances of glaucoma detection in diabetics because of their frequent ophthalmic check-ups due to potential ocular complication could be another factor. Besides, further insights are being gained in to the etiopathogenesis of POAG in diabetes. Hence, further research with larger study groups is needed to conclusively define the presence of a positive and significant correlation between different risk factors and primary open angle glaucoma.

referred to the higher center with specialized glaucoma services for detailed glaucoma evaluation. Conversely, general practitioners, internists, cardiologists, and endocrinologists should recommend glaucoma screening for patients with diabetes or hypertension. The discovery of novel environmental factors that modify the risk of POAG may provide new insights into disease pathogenesis. Second, this discovery of lifestyle factors and knowledge of systemic disease association with POAG that could guide us to take primary preventive measures and this might diminish the consequences & economic burden of visual disability incurred by POAG which is projected to be considerable by the year 2020.

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