



## Prevalence of Primary Open-Angle Glaucoma in Diabetics Attending Postgraduate Department of Ophthalmology GMC Srinagar

Authors

Dr Sajad Mohi Ud Din, Dr Saleema Dar, Dr Farooq Runyal, Dr Anshuli Sood  
GMC Srinagar, India

### Abstract

**Background:** In 1971 Becker stated “diabetes mellitus occurs more often in patients with primary open angle glaucoma than in non-glaucomatous populations. Armstrong et al reported a prevalence of POAG of 4.1% in the diabetic patients compared with 1.4% in the controls. However a number of studies have not found association between diabetes and POAG

**Objectives:** 1) To study the hospital based prevalence of POAG among the diabetic patients attending postgraduate department of ophthalmology G.M.C. Srinagar.

2) To screen all diabetics for glaucoma

**Material and Methods:** This cross sectional study was conducted on 100 diabetic patients for a period of one & a half year at postgraduate department of ophthalmology G.M.C Srinagar. Diabetic patients above 50 years were selected as per inclusion and exclusion criteria. Detailed history was noted in all the patients and they underwent ophthalmic evaluation and investigation.

**Results:** The study group consisted of 100 diabetic patients (52 females and 48 males) in the age group of 50 to 86 years with mean age of  $62.15 \pm 6.48$  years. Overall proportion of POAG cases observed was 5%, NTG cases observed were 2%, OH cases observed were 1% and remaining 93% patients were normal. Among POAG patients, bilateral eye involvement was seen in 4 cases while one patient had only right eye involvement. NTG & OH cases had bilateral eye involvement. Statistically no sex predisposition was present ( $p > 0.05$ ). Mean CD ratio of POAG & normal diabetics was respectively 0.680 & 0.400 ( $p < 0.05$ ). Neuroretinal rim (NRR) thinning, cupping, vascular changes and peripapillary changes were observed in glaucomatous patients. On OCT, mean linear vertical Cup Disc Ratio as well as Cup Disc Area ratio was found significantly higher in POAG & NTG patients than OH & normal patients. On OCT mean RNFL thickness was found significantly less in POAG & NTG patients than in OH & normal patients in all quadrants

**Conclusion:** It is concluded that there is excess of POAG among diabetics; thereby showing an association between POAG & Diabetics.

### Introduction

Glaucoma is a chronic, progressive optic neuropathy caused by a group of ocular conditions which lead to damage of the optic nerve and retinal nerve fiber layer (RNFL) with loss of

visual function<sup>1</sup>. Many studies suggest a correlation between Diabetes & POAG<sup>2</sup>. Diabetics are at higher risk of developing glaucoma. Micro-angiopathy and compromise of micro-circulation of the optic disc is possible contributing

mechanism in the pathogenesis of glaucoma. Armstrong *et al*<sup>3</sup> reported a prevalence of POAG of 4.1% in the diabetic patients compared with 1.4% in the controls. Davies *et al*<sup>4</sup> indicated that a high glucose level in aqueous humor of patients with diabetes may increase fibronectin synthesis and accumulation in trabecular meshwork and accelerate the depletion of trabecular meshwork cells, a characteristic feature of the outflow system in POAG. The striking similarity between high glucose-induced alterations in trabecular meshwork cells and those of vascular endothelial cells may represent a common biochemical link in the pathogenesis of POAG and diabetic microangiopathy.

### Aims and Objectives

- To study the hospital based prevalence of POAG among the diabetic patients attending postgraduate department. of ophthalmology G.M.C, Srinagar
- To screen all diabetics for glaucoma

### Materials and Methods

This Hospital-based cross sectional prospective study was carried out in the Postgraduate department of ophthalmology G.M.C Srinagar for a period of one & a half year (from January 2013 to June 2014). Total of 100 diabetic patients aged above 50 yrs coming directly to postgraduate department of ophthalmology GMC or referred here for evaluation were subjected to detailed clinical study for detection of POAG after taking proper consent. Inclusion criteria included age >50yrs and open angle on gonioscopy. Patients having closed angle, secondary glaucoma, uveitis, trauma, pigment dispersion syndrome, exfoliation syndrome, rubeosis were excluded from the study. Diabetic patients above 50 years were selected as per inclusion and exclusion criteria. Detailed history was noted in all the patients and they underwent ophthalmic evaluation and investigations including Best-corrected Visual Acuity, torch light examination of anterior segment, Slit lamp examination(SLE), Fundus

evaluation, Tonometry with applanation tonometer, Gonioscopy by goldmann three mirror Goniolens, Visual field testing using automated perimeter (SITA Standard), Optical coherence tomography (OCT), Pachymetry for central corneal thickness (CCT).

Data collected was subjected to different statistical tests including Fisher Exact test, unpaired t-test and Chi-square test using statistical package for social sciences (SPSS) version 20. P<0.05 was taken significant

### Results

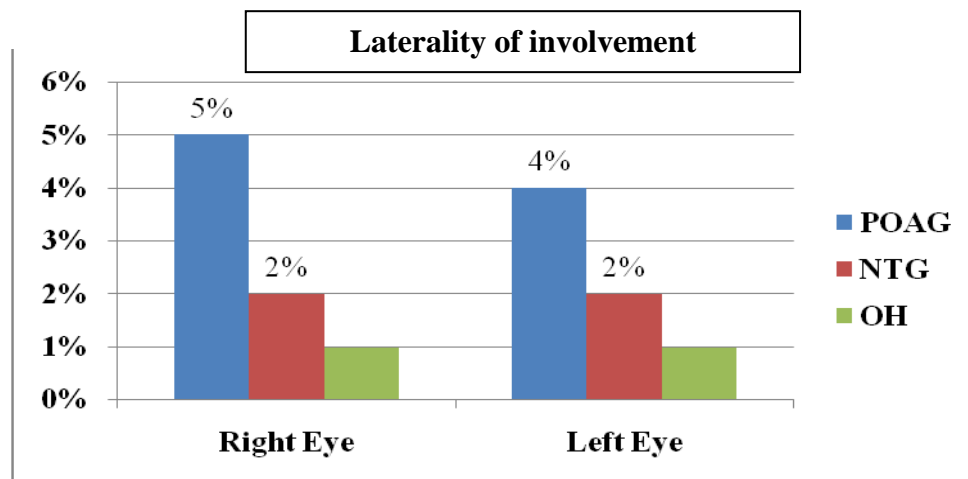
100 diabetic patients with 52 females and 48 males in the age group of 50 to 86 years with mean age of 62.15±6.48 years were included in the study. Observation was made in both eyes of all the subjects.

**Table 1:** Age & Sex wise distribution of the Study group

Age group	Sex		Total
	Male	Female	
50-59	15 (42.86%)	20 (57.14%)	35 (35%)
60-69	26 (52%)	24 (48.0%)	50 (50%)
70-79	5 (38.5%)	8 (61.5%)	13 (13%)
≥ 80	2 (100%)	0 (0%)	2 (2%)
<b>Total</b>	48 (48%)	52 (52%)	100 (100%)

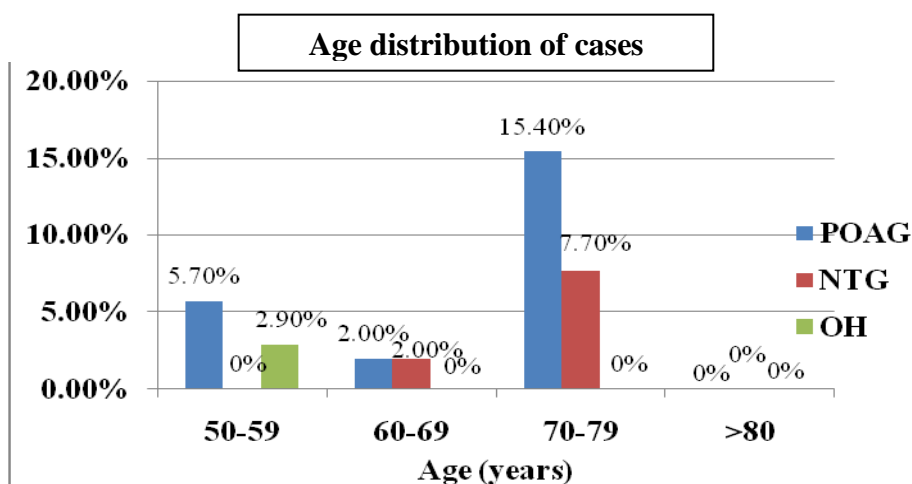
Overall proportion of POAG cases observed was 5%, NTG cases observed were 2%, OH cases observed were 1% and remaining 93% patients were normal. Among females 3.8% had POAG, 1.9% had NTG, 1.9% had OH & 92.3% females were normal. Among males 6.3% had POAG, 2.1% had NTG & 91.7% males were normal. Statistically on applying Fisher Exact test, no sex predisposition was present (p>0.05)

Among POAG patients, bilateral eye involvement was seen in 4 cases while one patient had only right eye involvement. NTG & OH cases had bilateral eye involvement.



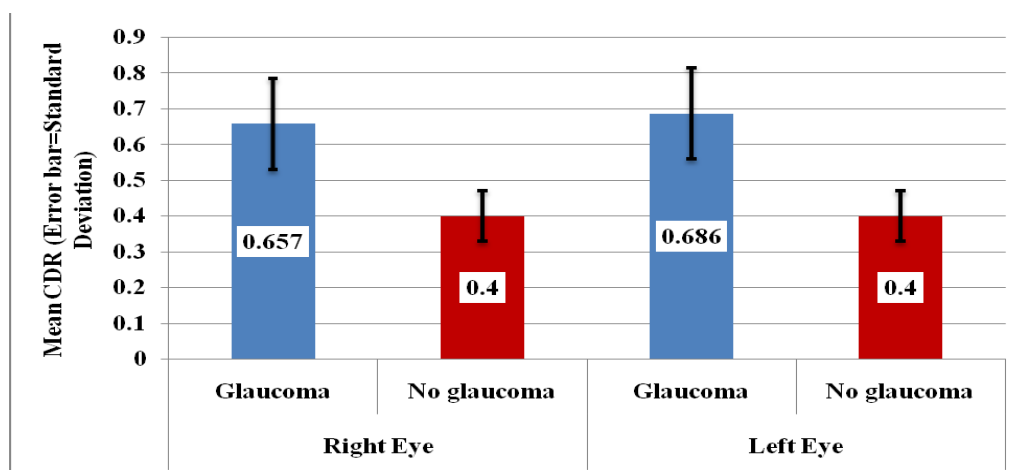
POAG was found in 5.7% in age group of 50-59 years, 2% in age group of 60-69 years, 15.4% in age group of 70-79 years. NTG was found in 2%

in age group of 60-69 years, 7.7% in age group of 70-79 years. OH was found in 2.9% in age group of 50-59 years.



Right eye had thinning of neuro-retinal rim in 80% (4 out of 5), notching in 60% (3 out of 5), and vascular changes in 80% (4 out of 5) POAG patients. Left eye had thinning in 75% (3 out of 4), notching in 50% (2 out of 4), and vascular

changes in 50% (2 out of 4) POAG patients. Thinning & notching was present in both eyes of NTG patients. NRR was healthy in OH & all non glaucomatous patients.



On OCT, mean linear Cup Disc Ratio as well as Cup Disc Area ratio was found significantly higher in POAG & NTG patients than OH & normal patients.

### Discussion

Patients having typical glaucomatous visual field and/or optic nerve head damage with open angle on gonioscopy with absence of signs of secondary glaucoma were classified as having primary open angle glaucoma (POAG). Glaucoma patients having IOP less than 21 mmhg were classified as having normal tension glaucoma (NTG). Eyes with elevated IOP but no glaucomatous damage were classified as ocular hypertensive (OH). All other patients were said to be normal.

Overall proportion of POAG cases observed in present study was 5% (5 out of 100), NTG cases observed were 2% (2 out of 100), OH cases observed were 1% (1 out of 100) and remaining 93% patients were normal. Our results were comparable with Armstrong et al<sup>3</sup> who showed prevalence of POAG as 4% in diabetics. Similar results were found in epidemiological study of diabetics in Denmark (1983)<sup>5</sup> where prevalence of POAG & OH found were 6% & 3% respectively. Among POAG patients, bilateral eye involvement was seen in 80% (4 out of 5) cases while 20% (1 out of 5) had only right eye involvement. NTG & OH cases had bilateral eye involvement. This finding was in concordance with the literature that primary open-angle glaucoma is generally a bilateral disease of adult onset though the presentation may be asymmetric so that one eye may have moderate or advanced damage, whereas the fellow eye may have minimal or no detectable damage<sup>6</sup>.

Though percentage of males was more than females in our study, however on using Fisher Exact test this observation was statistically insignificant ( $p=0.707$ ). Similarly no sex predisposition was found by Anhchuong Le et al. (2003)<sup>7</sup> and Palimkar A et al. (2001)<sup>8</sup> On the contrary Naila Ali et al. (2007)<sup>9</sup> had reported that males are more prone to glaucomatous optic neuropathy. Our study is consistent with the other studies which agree that increasing age is a risk factor for the development of glaucoma. In Beaver Dam Eye Study<sup>10</sup> (study on population of white individuals in Wisconsin), the prevalence

increased with age from 0.9% among people between 43 and 54 years of age to 4.7% among those of 75 years or older. Mean CD ratio found in our study was significantly higher in glaucomatous patients than non glaucomatous patients. Higher CD ratio was also present in most of studies including Framingham, Baltimore, Beaver Dam, & Barbados studies. Our RNFL findings on OCT were comparable with studies by George Kampougeris et al<sup>11</sup> (2013) and Maria Pomorska et al<sup>12</sup>.

### Conclusion

There is excess of Primary open-angle glaucoma among diabetics; same was found in many studies done previously. Primary open-angle glaucoma is generally a bilateral disease though the presentation may be asymmetric. There is no sex predisposition. POAG patients have neuroretinal rim & peripapillary changes, higher IOP (except in NTG), higher CD ratio as compared to normal patients. Ocular hypertensives have only raised IOP & no field or optic nerve changes.

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