



## Prevalence of Glaucoma among Family Members of Glaucoma Patients

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### Abstract

**Background:** *Epidemiologic findings in the Baltimore Eye Survey maintained that POAG family history indicates an important risk factor for disease development. The Barbados Eye Study also suggests that people more vulnerable to developing POAG are elderly males with a family history of glaucoma. Primary Open Angle Glaucoma is known to be hereditary although the exact mode of transmission has not been determined. Primary open angle glaucoma is more prevalent among eyes with Exfoliation Syndrome (14%) than among eyes without Exfoliation Syndrome (2%).*

**Objectives:** *The purpose of the study is to detect glaucoma in family members of the patients with established Primary Open Angle Glaucoma in Kashmir Valley*

**Materials and Methods:** *This observational study was conducted in the Department of Ophthalmology, Government Medical College, Srinagar which is the tertiary care centre in the valley. The study was conducted for a period of one and a half year in Family members of diagnosed cases of glaucoma (POAG)*

**Results:** *100 Family members (first degree relatives) of diagnosed primary open angle glaucoma were screened for the presence of glaucoma. 57% (57 Members) were male and 43% (43 Members) female. The study group consisted of 50% (50) siblings, 48% (48) children and 2% (2) Parents. The overall prevalence of glaucoma in first degree relatives was 12%. No significant gender preponderance was found. The mean age for glaucoma was higher ( $52.17 \pm 8.726$  years) than that for no glaucoma ( $45.32 \pm 4.471$  years). The prevalence of glaucoma was 100% (2 members) among parents, 14% (7 members) among siblings and 63% (3 members) among children. The prevalence rate of glaucoma increases with increasing age, the prevalence being 6.5% in the age group of 40-49 years, 23.8% in the age group of 60-79 years. Glaucomatous involvement was bilateral in all the members but the severity of damage was asymmetric. Average Retinal Nerve Fiber Layer (RNFL) thinning on Optical Coherence Tomography (OCT) was seen in all the 12 members (100%) in both eyes. Right eye showed borderline thinning in 3 members, early thinning in 5 members, moderate thinning in 3 members and severe thinning in 1 member whereas Left eye showed borderline thinning in 1 member, early thinning in 7 members, moderate thinning in 3 members and severe thinning in 1 member.*

**Conclusion:** *Primary open angle glaucoma is more common in family members of Primary open angle glaucoma patients.*

### 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. Primary Open Angle Glaucoma (POAG) is the most common type of glaucoma. A family history of glaucoma places a person at

greater risk of developing the disease. Having a first degree relative (parent, sibling, or child) with glaucoma has been consistently associated with an increased risk of chronic open angle glaucoma in prevalence surveys<sup>1,2</sup>. First-degree relatives of those with Open Angle Glaucoma have a 10-fold risk of disease compared with the general population<sup>3</sup>. Epidemiologic findings in the *Baltimore Eye Survey* maintained that POAG family history indicates an important risk factor for disease development<sup>1</sup>. The *Barbados Eye Study* also suggests that people more vulnerable to developing POAG are elderly males with a family history of glaucoma<sup>2</sup>. Primary Open Angle Glaucoma is known to be hereditary although the exact mode of transmission has not been determined. Primary Open Angle Glaucoma is believed to be polygenic and multifactorial<sup>4</sup>. Three genes most commonly associated with glaucoma are Myocillin [MYOC], Optineurin [OPTN] and WDR36 that are present on the loci GLC1A, GLC1E and GLC1G respectively<sup>5</sup>

### Objectives

To detect glaucoma in family members of the patients with established Primary Open Angle Glaucoma in Kashmir Valley

### Materials and Methods

The present observational study was conducted in the Department of Ophthalmology, Government Medical College, Srinagar which is tertiary care centre in the valley. The study was conducted for a period of one and a half year. Subjects were

Family members of diagnosed cases of glaucoma (POAG). INCLUSION CRITERIA included first degree relatives (Parents, Siblings, Children) of Primary Open Angle Glaucoma patients, Wide and open angle on Gonioscopy, Age>40 years and no other systemic diseases. Patients with spherical refractive errors of more than 6D, astigmatism of more than 3D, Closed angle on gonioscopy, Cataracts and corneal opacities, Drug induced glaucoma (corticosteroids), Secondary glaucoma patients, History of intra-ocular surgery and Pathological changes in the posterior chamber were excluded from study. All the subjects underwent a complete eye examination vis. Visual Acuity Testing, Refraction, Intra-ocular Pressure measurements, Fundus examination using direct ophthalmoscope, Slit-lamp examination of anterior segment, Bio-microscopic examination of Optic Nerve Head, Retinal Nerve Fiber Layer, and Retina (using 78D), Gonioscopy, Humphrey Automated Perimetry using 30-2 SITA Standard, Optical Coherence Tomography (Retinal Nerve Fiber Layer Analysis and Optic Disc Analysis.

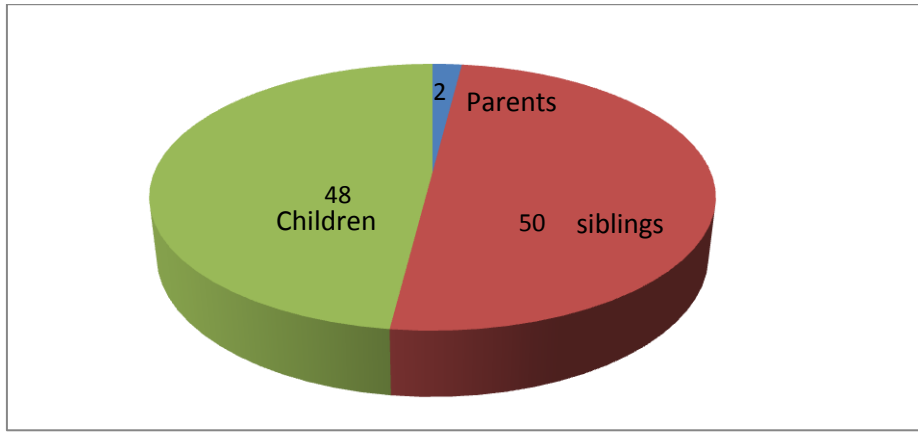
### Observations and Results

In our study 100 first degree relatives (57 male and 43 female) of diagnosed cases of Primary Open Angle Glaucoma were screened. The age group (Table 1) screened was 40-70 years with mean age of  $46.14 \pm 5.571$  years. The mean age for males was  $46.44 \pm 6.1$  year and that for females  $45.74 \pm 4.7$  years. Majority of the subjects were in the age group of 40-49.

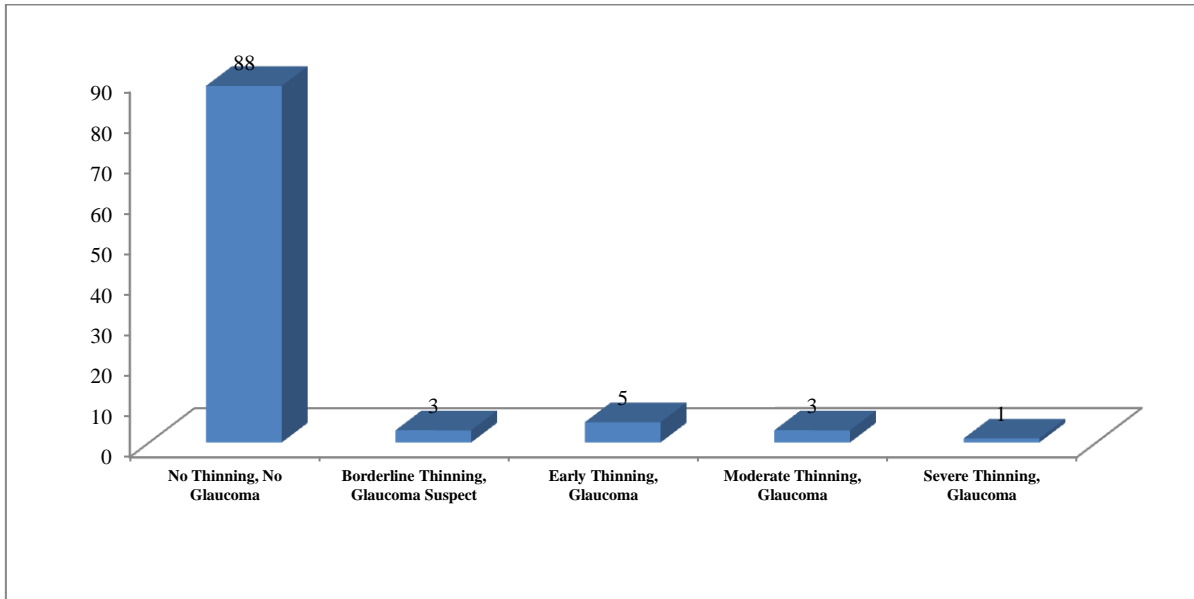
### Age and Gender Distribution of the Selected Study Group

			Sex		Total
			F	M	
Age group	40-49	Count	32	45	77
		% within Age group	41.6%	58.4%	100.0%
	50-59	Count	11	10	21
		% within Age group	52.4%	47.6%	100.0%
	60-69	Count	0	1	1
		% within Age group	0.0%	100.0%	100.0%
	70-79	Count	0	1	1
		% within Age group	0.0%	100.0%	100.0%
Total		Count	43	57	100
		% within Age group	43.0%	57.0%	100.0%

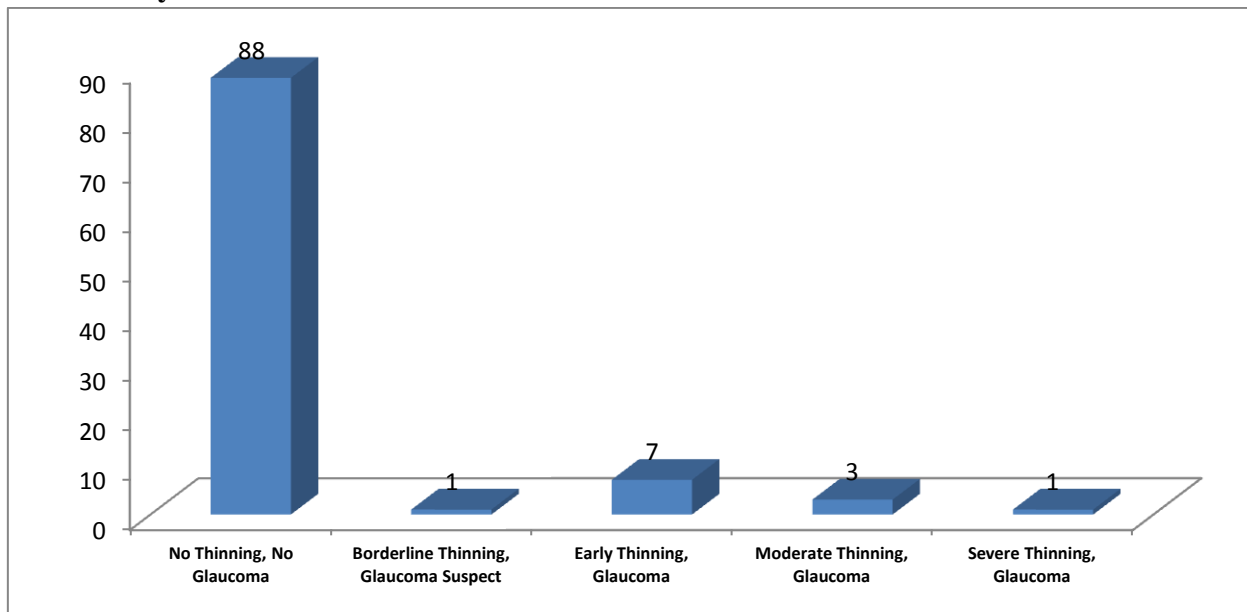
**Relation of the study subjects with POAG Patient**



**Diagnosis Right Eye**



**Diagnosis Left Eye**



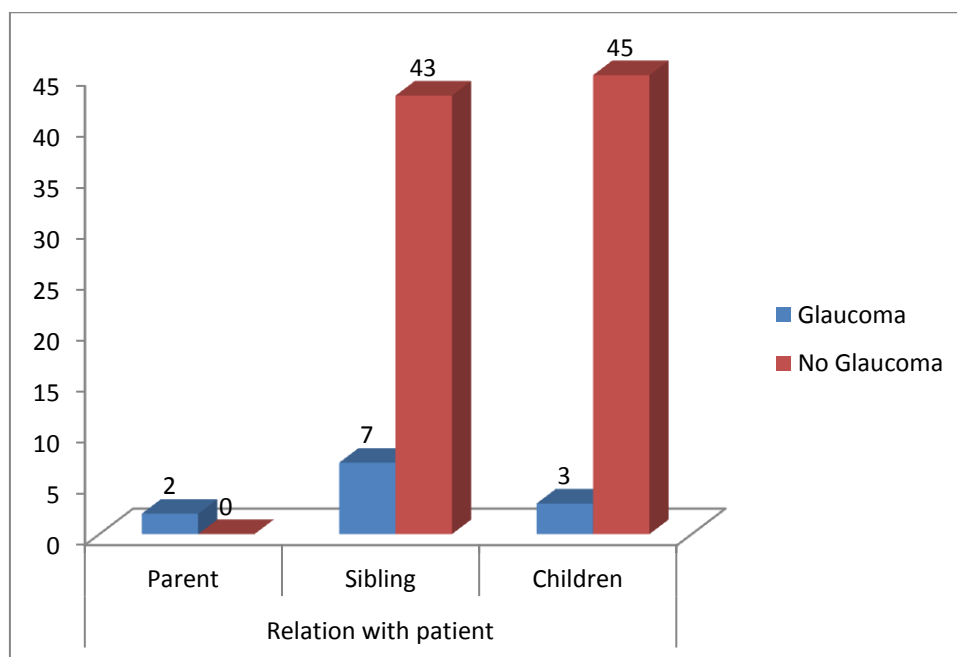
**Age Distribution Right Eye**

Diagnosis Right Eye		Age group				Total
		40-49	50-59	60-69	70-79	
Severe Thinning, Glaucoma	Count	0	1	0	0	1
	% within Age group	0.0%	4.8%	0.0%	0.0%	1.0%
Moderate Thinning, Glaucoma	Count	1	0	1	1	3
	% within Age group	1.3%	0.0%	100.0%	100.0%	3.0%
Early Thinning, Glaucoma	Count	2	3	0	0	5
	% within Age group	2.6%	14.3%	0.0%	0.0%	5.0%
Borderline Thinning, Glaucoma Suspect	Count	2	1	0	0	3
	% within Age group	2.6%	4.8%	0.0%	0.0%	3.0%
No Thinning, No Glaucoma	Count	72	16	0	0	88
	% within Age group	93.5%	76.2%	0.0%	0.0%	88.0%

**Age Distribution Left Eye**

Diagnosis Left Eye		Age group				Total
		40-49	50-59	60-69	70-79	
Severe Thinning, Glaucoma	Count	0	0	0	1	1
	% within Age group	0.0%	0.0%	0.0%	100.0%	1.0%
Moderate Thinning, Glaucoma	Count	0	2	1	0	3
	% within Age group	0.0%	9.5%	100.0%	0.0%	3.0%
Early Thinning, Glaucoma	Count	4	3	0	0	7
	% within Age group	5.2%	14.3%	0.0%	0.0%	7.0%
Borderline Thinning, Glaucoma Suspect	Count	1	0	0	0	1
	% within Age group	1.3%	0.0%	0.0%	0.0%	1.0%
No Thinning, No Glaucoma	Count	72	16	0	0	88
	% within Age group	93.5%	76.2%	0.0%	0.0%	88.0%

Glaucoma was found in all the parents screened whereas 14% of siblings and 6.3% of children showed glaucoma.



### Discussion

Our study is an observational study in which first degree relatives of primary open angle glaucoma patients were screened for glaucoma. 100 family members of known Primary Open Angle Glaucoma patients were screened. The age group selected was 40-70 years with mean age of  $46.14 \pm 5.571$  years.

The composition of our study population was 100 (43 Female & 57 Male) family members in which 50 were siblings, 48 children and 2 parents. In our study, 12 members showed Overall Average RNFL Thinning on Optical Coherence Tomography and they were regarded as having Glaucoma. No thinning was found in 88 members and hence they were regarded as normal or non glaucomatous. There was no difference in laterality among the glaucomatous and non-glaucomatous eyes as all the 12 cases showing glaucoma were bilateral. However, the degree of thinning of RNFL was different in right and left eye showing the asymmetrical nature of glaucoma. Borderline thinning was seen 3 eyes, early thinning in 5 eyes, moderate thinning in 3 eyes and severe thinning in 1 eye in right eye whereas left eye showed borderline thinning in 1 eye, early thinning in 7 eyes, moderate thinning in 3 eyes and severe thinning in 1 eye. 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>. In our Study there was no significant sexual preponderance as the prevalence of glaucoma was 11.6% and 12.3% in females and males respectively which is statistically insignificant. No sex predisposition was found in most of the studies<sup>7</sup>. On the contrary, few studies have reported that males are more prone to glaucomatous optic neuropathy<sup>8</sup>. The prevalence in our study was 100% in parents, 14% in siblings and 6.3% in children. The prevalence rate increases with increasing age showing a

prevalence of 6.5% in the age group of 40-49 years, 23.8% in the age group of 50-59 years and 100% in the age groups of 60-69 years and 70-79 years. The overall prevalence of POAG in first degree relatives was 12% which is in accordance with the studies conducted in Shinghai, China that showed 12.6% prevalence among first degree relatives<sup>9</sup>.

### Conclusion

Primary open angle glaucoma is more common in family members of Primary open angle glaucoma patients.

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