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Original Article

Comparing Retinal Nerve Fibre Layer Thickness in Primary Open Angle Glaucoma and Normal Eyes

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ABSTRACT

Purpose: To compare peripapillary Retinal Nerve Fibre Layer thickness in POAG and normal eyes.
Materials and Methods: Patients diagnosed as POAG and normal subjects were included in the study. After getting informed consent, detailed history was taken. All subjects had a complete ophthalmologic examination including thorough slit lamp examination, Gonioscopy, dilated fundus examination, intra ocular pressure measurement using Goldmann Applanation tonometry. Glaucomatous eyes and normal subjects were designated based on inclusion and exclusion criteria. OCT RNFL thickness were obtained for all these eyes. Peripapillary RNFL thickness (average and for superior, inferior, nasal and temporal) was obtained. Visual field examination using Humphrey Field Analyser was done in all selected eyes. Peripapillary RNFL thickness is compared among normal and glaucomatous eyes for average value and for superior, inferior, nasal and temporal values.
Results: Average peripapillary RNFL thickness in normal control group were found to be 98.8±6.4mm while in glaucomatous eyes were found to be 74.2±16.6mm. Mean RNFL thickness in superior quadrant in normal eyes were 122.2±8.2mm and in glaucomatous eyes were 92.1±26.7mm.Mean RNFL thickness in inferior quadrant in normal eyes were 131±15.2mm and in glaucomatous eyes were 91.5±26.8mm.Mean peripapillary RNFL thickness in nasal quadrant in normal and glaucomatous eyes were respectively 76.8±7.9mm and 59±13.3mm. In temporal quadrant, mean peripapillary RNFL thickness in normal and glaucomatous eyes were respectively 64.7±11.3mm and 53.9±12.4mm. In all these four quadrants mean peripapillary RNFL thickness on glaucomatous eyes were found to be decreased than normal control group.
Conclusion: OCT peripapillary RNFL thickness measurement serves as an accurate and sensitive diagnostic modality for diagnosis of primary open angle glaucoma. OCT demonstrates significant RNFL thinning in POAG patients.

Key Words: *Retinal Nerve; Fibre Layer, Glaucoma, POAG*

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INTRODUCTION

POAG is defined as 'multifactorial optic neuropathy with a characteristic atrophy of optic nerve and loss of ganglion cells with characteristic field defects and open anterior chamber angles in the absence of other known causes for the disease' [1].

In glaucoma, there happens irreversible loss of retinal ganglion cells and thinning of retinal nerve fibre layer. It is asymptomatic in early stages. So early diagnosis and detection of progression of glaucoma is a major challenge in ophthalmology [2]. Significant loss of ganglion cell occur before identifiable cupping and visual field defects [3]. OCT (Optical Coherence Tomography) is a non invasive method of determining RNFL (Retinal Nerve Fibre Layer) thickness. OCT measurements correlate well with real measurements of RNFL [4]. RNFL loss occurs before optic nerve head and visual field damage. OCT RNFL help in early detection of glaucoma [4].

OBJECTIVES

To compare Retinal Nerve Fibre Layer thickness using Optical Coherence Tomographyin Primary Open Angle Glaucoma and normal eyes

INCLUSION CRITERIA:

- POAG patients – Patients diagnosed with POAG
- Age less than 70 years
- Open angles
- Normal Subjects – Patients withno h/o glaucoma, IOP<21 mm Hg, No visual field defects

EXCLUSION CRITERIA:

- Closed angles on Gonioscopy
- Secondary glaucoma
- H/o ocular surgery or retinal disease.

MATERIALS AND METHODS

Patients diagnosed as POAG and normal subjects were included in the study. After getting informed consent, detailed history was taken. All subjects had a complete ophthalmologic examination including thorough slit lamp examination, Gonioscopy, dilated fundus examination, intra ocular pressure measurement using Goldmann Applanation tonometry. Glaucomatous eyes and normal subjects were designated based on inclusion and exclusion criteria. OCT RNFL thickness were obtained for all these eyes. Peripapillary RNFL thickness (average and for superior, inferior, nasal and temporal) was obtained. Visual field examination using Humphrey Field Analyser was done in all selected eyes. Peripapillary RNFL thickness is compared among normal and glaucomatous eyes for average value and for superior, inferior, nasal and temporal values.

RESULTS

Table 1: Comparison of AVG RNFL thickness among normal and glaucomatous eyes

Group	Mean	SD	N	T	P
Glaucomatous field loss	74.2	16.6	20	6.18	p<0.01
Normal control with normal field	98.8	6.4	20		

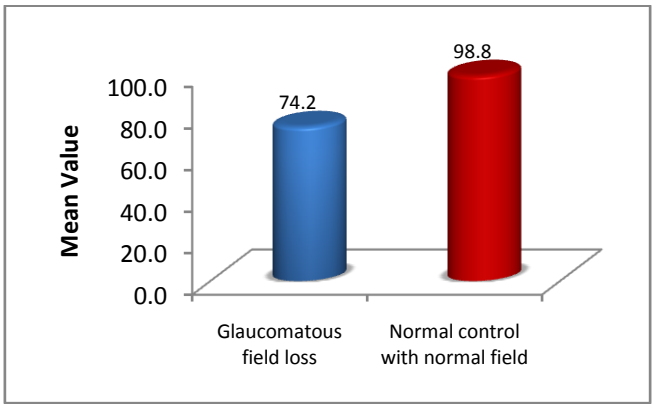

Figure 1: Comparison of AVG RNFL thickness among normal and glaucomatous eyes

Table 2: Comparison of superior RNFL thickness among normal and glaucomatous eyes

Group	Mean	SD	N	t	p
Glaucomatous field loss	92.1	26.7	20	4.82	p<0.01
Normal control with normal field	122.2	8.2	20		

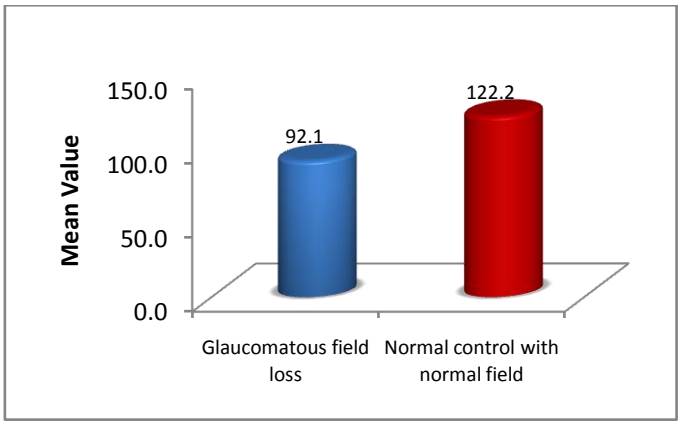

Figure 2: Comparison of superior RNFL thickness among normal and glaucomatous eyes

Table 3 Comparison of inferior RNFL thickness among normal and glaucomatous eyes

Group	Mean	SD	N	t	p
Glaucomatous field loss	91.5	26.8	20	5.72	p<0.01
Normal control with normal field	131.0	15.2	20		

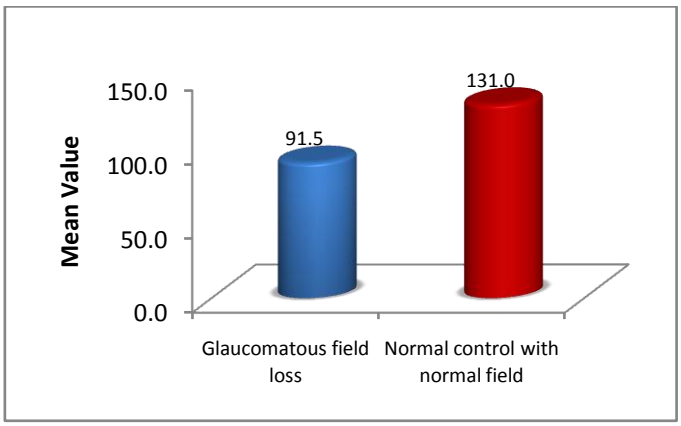

Figure 3: Comparison of inferior RNFL thickness among normal and glaucomatous eyes

Table 4: Comparison of nasal RNFL thickness among normal and glaucomatous eyes

Group	Mean	SD	N	t	p
Glaucomatous field loss	59.0	13.3	20	5.14	p<0.01
Normal control with normal field	76.8	7.9	20		

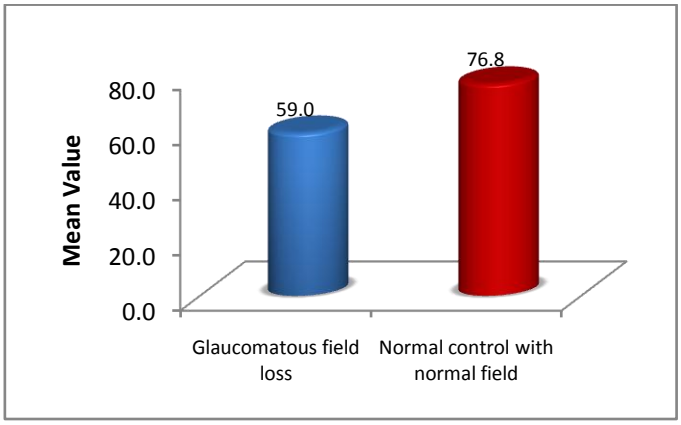

Figure 4: Comparison of nasal RNFL thickness among normal and glaucomatous eyes

Table 5: Comparison of temporal RNFL thickness among normal and glaucomatous eyes

Group	Mean	SD	N	t	p
Glaucomatous field loss	53.9	12.4	20	2.88**	0.006
Normal control with normal field	64.7	11.3	20		

**: - Significant at 0.01 level

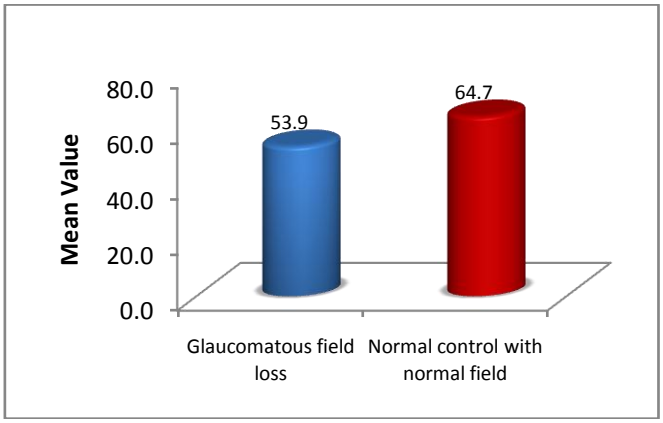

Figure 5: Comparison of temporal RNFL thickness among normal and glaucomatous eyes

DISCUSSION

A total of 20 glaucomatous eyes and 20 non glaucomatous eyes were examined in our study. Average peripapillary RNFL thickness in normal control group were found to be 98.8±6.4mm while in glaucomatous eyes were found to be 74.2±16.6mm. There is a significant reduction on peripapillary RNFL thickness in glaucomatous eyes. It was found to be statistically significant with p value less than 0.01.

In a study conducted by Pravda Chaturvedi et al, concluded that RNFL thickness is an established way to diagnose open angle glaucoma [5].

Mean RNFL thickness in superior quadrant in normal eyes were 122.2±8.2mm and in glaucomatous eyes were 92.1±26.7mm. Mean RNFL thickness in inferior quadrant in normal eyes were 131±15.2mm and in glaucomatous eyes were 91.5±26.8mm.Mean peripapillary RNFL thickness in nasal quadrant in normal and glaucomatous eyes were respectively 76.8±7.9mm and 59±13.3mm. In temporal quadrant, mean peripapillary RNFL thickness in normal and glaucomatous eyes were respectively 64.7±11.3mm and 53.9±12.4mm. In all these four quadrants mean peripapillary RNFL thickness on glaucomatous eyes were found to be decreased than normal control group. It was statistically significant in all these cases with p value less than 0.01

CONCLUSION

This study concludes that OCT peripapillary RNFL thickness measurement serves as an accurate and sensitive diagnostic modality for diagnosis of primary open angle glaucoma. OCT demonstrates significant RNFL thinning in patients with glaucomatous field loss. It can also be used for assessing progression of glaucoma.OCT is more simple and less time consuming compared to visual field analysis using Humphrey field analyser. Visual field testing requires active patient participation and is difficult to be done in old age patients and those with low cognitive and intellectual ability. OCT is a better option in these cases since it only requires a steady fixation from patient and no active participation.

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