ASSOCIATION BETWEEN CENTRAL CORNEAL THICKNESS AND RETINAL NERVE FIBER LAYER THICKNESS IN EARLY PRIMARY OPEN ANGLE GLAUCOMA

Dr Savita Meena*	Senior Resident Department of Ophthalmology, S M S Medical College, Jaipur *Corresponding Author
Dr Siddharth Maanju	Junior Resident Department of Ophthalmology, S M S Medical College, Jaipur
Dr Vivek Jain	Senior Professor Department of Ophthalmology, S M S Medical College, Jaipur
Dr M K Jharwal	HOD & Senior Professor Department of Ophthalmology, S M S Medical College, Jaipur

ABSTRACT **PURPOSE:** To investigate the relationship between central corneal thickness and RNFL thickness in early primary open angle glaucoma **METHODS-** A prospective observational study consisting of 40 early POAG eyes and 40 normal eyes. All study participants underwent a full ophthalmic examination followed by visual field testing with standard automated perimetry and SD-OCT for peripapillary RNFL thickness. Early POAG cases were selected as per Hodapp–Parrish–Anderson Classification. The correlation between average RNFL and VFMD evaluated by spearman correlation coefficient.**RESULT-** The mean average RNFL in case group and control group was 89.12± 5.51 and 102.45±2.36 micrometre respectively this difference was statistically significant (p = 0.001). The mean CCT in case group and control group was 502± 10.33 and 530.35±11.0 micrometre respectively and this difference was statistically significant (p=0.001). A strong statistically significant positive correlation was found between average RNFL and CCT (r =0.794 and p-value 0.001).**CONCLUSION-** There is a statistically significant positive correlation between average RNFL and CCT in early POAG in our study.

KEYWORDS : Early POAG, CCT, RNFL, Correlation

INTRODUCTION

Glaucoma, multifactorial chronic progressive optic neuropathy, has always been one of the leading causes of blindness. Structural changes in primary open-angle glaucoma (POAG) occur in the optic nerve head as well as peripapillary retinal nerve fiber layer (RNFL). While it has been assumed that structural loss of the RNFL anticipates functional visual field loss, the relationship between structure and function in glaucoma is not yet fully understood and remains the subject of intense research[1]. There are various associated risk factors in the pathogenesis of glaucoma. Among them elevated intraocular pressure is the only major risk factor which is modifiable[2]. In recent studies, Central Corneal Thickness (CCT) has been put forward as an important risk factor for development and severity of POAG[3].

Central corneal thickness is an important part of glaucoma evaluation and its role in assessment of risk, diagnosis and progression of POAG needs further evaluation. This study would help to emphasis the role of CCT measurements and in evaluating its importance in early diagnosis and treatment of POAG and prevent the progression by identifying risk factor timely.

METHOD

The study was conducted in medical college. A hospital based prospective observational study. After approval of research review board. A convenient sampling technique was used to enrol patients in the study. 80 patients were selected for the study. The study was conducted in the following two groups of patients- Case group of early POAG cases and Control group of healthy adults. Each group consist of 40 patients (n=40/group).

INCLUSION CRITERIA-

Subjects were healthy volunteers and early open-angle glaucoma patients of age 40 years or older. Control group - No history or evidence of ocular pathology, No history or evidence of ocular surgery or laser, IOP of 21 mmHg or less, Normal appearance of optic nerve head, No abnormality in visual field. Case group- Intra ocular pressure >21 mmHG on more than two occasion, Optic disc changes-Cup disc asymmetry >0.2 between both eyes, A localised notch or thinning of neuro retinal rim or pallor of neuro retinal rim, an enlarged cup disc ratio, superficial disc haemorrhages, vascular sign suggestive of an acquired cupping such as baring of circumlinear vessels and overpass of central vessels, peripapillary atrophy. Early primary angle glaucoma cases are classified on the basis of Hodapp-Parrish-Anderson criteria.

EXCLUSION CRITERIA- Patient with intraocular pathology, Intraocular operation except uncomplicated cataract surgery at least one-year prior, Ocular trauma.

All patients underwent full ophthalmological evaluation and Investigations- Visual field examination using Humphrey field analyser by using program SITA standard 24-2 fields. Mean deviation was considered in calculating results. CCT was measured using specular microscope and noted to give a correction value for actual IOP. Optical Coherence Tomography - Spectral domain OCT

STATISTICAL ANALYSIS-Data analysis was done using licensed SPSS software. Univariate analyses were done initially and the results were presented with the help of tables, text, bar-diagrams and pie-charts. Descriptive statistics were used to calculate frequencies of categorical variables, and measures of central tendencies and dispersion were used to describe continuous variables. Independent t-test and ANOVA test were used to compare the continuous variable. Data are presented as mean (standard deviation) or number or proportions. A p-value <0.05 was considered statistically significant.

RESULT

The mean CCT in case and control group was 502.05±10.33 micrometre and 530.35±11.0 micrometre respectively and this difference was statistically significant (table 1).

TABEL 1

| GROUP	Mean	Std. Deviation	Median	Minimum	Maximum	p-value
Case	502.050	10.33280	501.0000	483.00	521.00	
Control	530.350	11.00012	528.5000	511.00	551.00	0.001
Total	516.200	17.75387	517.0000	483.00	551.00	

The mean average RNFL in case group and control group was 89.12± 5.51 and 102.45±2.36 micrometre respectively and this difference was statistically significant.

A statistically significant positive correlation between average RNFL and CCT -r =0.794 and p-value 0.001 (table 2 and chart 1)

TABLE 2

Parameter Spearman	Spearman correlation coefficient (r)	p-value
CCT	0.794	0.001

CHART 1
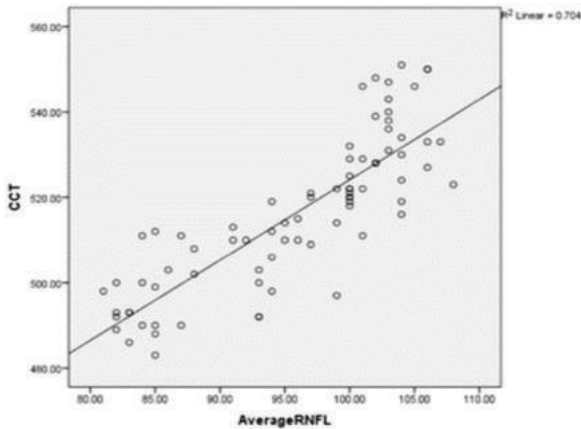
DISCUSSION

In this hospital based observational study, 80 participants were including for the analysis. They were divided in two groups, case group comprising of 40 participants with early primary open angle glaucoma and control group comprising 40 normal participants.

In current study, mean CCT in case group and control group was 502 ± 10.33 and 530.35 ± 11.0 micrometre respectively and this difference was statistically significant (p=0.001). The mean average RNFL in case group and control group was 89.12 ± 5.51 and 102.45 ± 2.36 micrometre respectively this difference was statistically significant (p = 0.001).

A strong statistically significant positive correlation was found between average RNFL and CCT in our study. Similarly, in the study by Wangsupadilok et al found that there were significant correlations between CCT and MD ($r = 0.532$, $p < 0.001$), PSD ($r = -0.288$, $p = 0.05$), cup-to-disc ratio ($r = -0.478$, $p = 0.001$), and average RNFL thickness ($r = 0.487$, $p = 0.001$)[4].

In conclusion in our study, we found a statistically significant positive correlation between peripapillary retinal nerve fiber layer thickness and visual field changes in early primary open angle glaucoma cases.

.

REFERENCE

1. Reznicek, L., Seidensticker, F., Mann, T., Hübert, I., Buerger, A., Haritoglou, C et al. Correlation between peripapillary retinal nerve fiber layer thickness and fundus autofluorescence in primary open-angle glaucoma. Clinical ophthalmology (Auckland, N.Z.). 2013;7:1883–1888. https://doi.org/ 10.2147/ OPTH.S49112.
2. Jost B. Jonas, Andrea Stroux, Isabel Velten,Central Corneal Thickness Correlated with Glaucoma Damage and Rate of Progression. Invest Ophthalmol Vis Sci. 2005; 46:1269–1274.
3. Herndon LW, Weizer JS, Stinnett SS. Central corneal thickness as a risk factor for advanced glaucoma damage. Arch Ophthalmol2004;122:17–21.
4. Wangsupadilok B, Orapiriyakul L. Correlation between central corneal thickness and visual field defect, cup to disc ratio and retinal nerve fiber layer thickness in primary open-angle glaucoma patients. J Med Assoc Thai. 2014 Jul;97(7):751-7. PMID: 25265775