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RESEARCH ARTICLE

PERIPAPILLARY RETINAL NERVE FIBER LAYER THICKNESS IN MYOPIA USING OPTICAL COHERENCE TOMOGRAPHY

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Abstract

This is a observational cross sectional study conducted in tertiary care hospital in the department of ophthalmology to evaluate the effect of myopia on peripapillary retinal nerve fiber layer thickness in various quadrants and clock hour positions using optical coherence tomography ,with a sample size of 100 myopic eyes.Out of 100, 30 were males and there is significant decrease in peripapillary retinal nerve fibre layer thickness in high myopics when compared to low and moderate myopics and also decrease retinal fibre layer thickness in all quadrants except temporal quadrant.

Introduction:-

The prevalence of myopia has been increasing over the past decades, with a projected half of the world population estimated to be myopic by 2050.Myopics are 2-3 times higher risk of developing glaucoma than emmotropic eyes. Optical coherence tomography (OCT) is widely used for pre perimetric diagnosis of glaucoma. Although in glaucoma RNFL thickness decreases but in myopia it may vary. The morphological appearance of the optic nerve head in myopia renders the clinical diagnosis and monitoring of glaucoma progression in myopic eyes challenging, especially as these eyes may have concomitant visual field defects mimicking those seen in glaucoma.

Methodology:-

It is a observational cross sectional study conducted in Government Regional Eye Hospital, Visakhapatnam, study period from January 2019 to June 2019 with sample size of 100 myopic eyes.

Inclusion Criteria

Patients attending government regional eye hospital, visakhapatnam with myopia were Included.100 myopic eyes

ruling out exclusion criteria were included.

Exclusion Criteria

1. Patients diagnosed with glaucoma or IOP >21mm hg or disc changes and other optic neuropathies.
2. Neurological diseases like parkinson's , alzheimer's disease, multiple sclerosis can also effect RNFL thickness
3. Patients with hazy media

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Procedure

1. All the 100 myopic patients were subjected to visual acuity by snellens,refraction and slit lamp examination for anterior segment were done.
2. Indirect ophthalmoscopy was done after instilling mydriatic drops.
3. IOP was measured with goldmann applanation and those whose IOP>21mmhg and visual field changes were excluded.
4. Myopic eyes were classified into three groups based on refractive error —
5. Group 1: myopia up to -3 D (Diopter, D)
6. Group 2: myopia of- 3to-6 D and Group 3: Myopia >- 6 D.
7. OCT scan was done to measure peri-papillary RNFL thickness using spectral domain optical coherence tomography (cirrus 4000HD OCT, version 7.0.1.290).
8. 200X200 cube optic disc scans were obtained after fixing a fixed diameter (1.73mm) on the disc.
9. Scans with signal strength less than 6 were discarded.
10. 360 degree average thickness and in the four sectors superior, inferior, nasal, temporal quadrants with clock hours positions were noted.
11. Clock hour positions were followed acccording to right eye as 12'o clock superiorly,6'o clock inferiorly,3'o clock nasally ,9'o clock as temporally.
12. Data was collected and analysed using one way analysis of variance (ANOVA).

Results:-

In 100 myopic eyes:

1. Group 1 had 40 eyes, Group 2 had 38 eyes and group 3 had 22 eyes.
2. 30 percent were males in group 1 and 40 percent in group 2 and 30 percent in group 3 were males.
3. Mean refractive error (in spherical equivalent) in group 1 was -1.55 ,-4.5 in group and -8.5 in group 3 were noted.

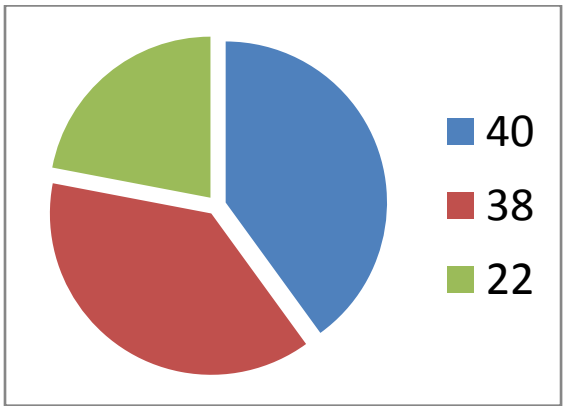


Figure 1:- Pie chart showing number of eyes in each group.

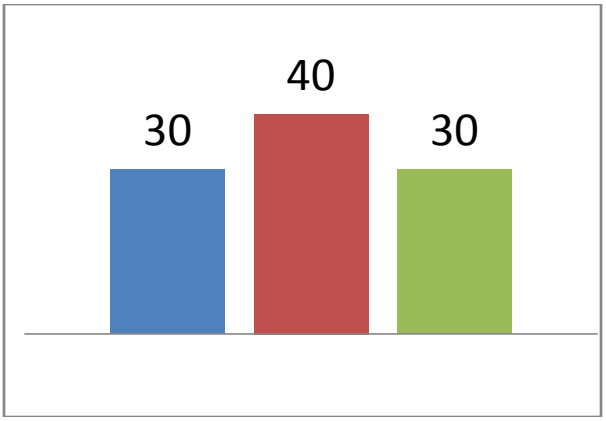


Figure 2:-Bar diagram showing number of males in each group.

Group 1	Group 2	Group 3
-1.55	-4.5	-8.5

Table 1:-showing mean spherical equivalent in each group.

4.360 degree average peripapillary RNFL thickness decreases as the degree of myopia increases which is significant in all quadrants except in temporal quadrant.
5.In a similar way thickness is decreased in all clock hour positions except 4,8,9,10'o clock positions.
6. No significant difference was noted between groups 1 and 2 in peripapillary RNFL thickness compared with group 3.

Figure 3:- Showing : RNFL thickness in low, moderate and high myopia in 4 quadrants and clock hours.

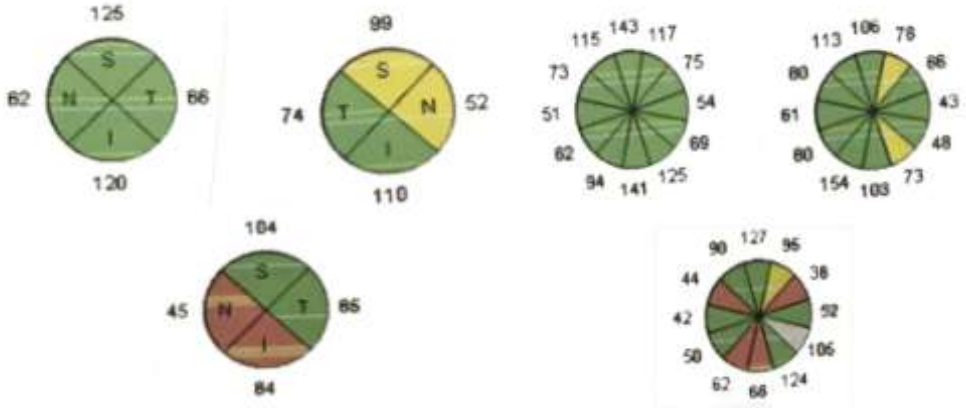
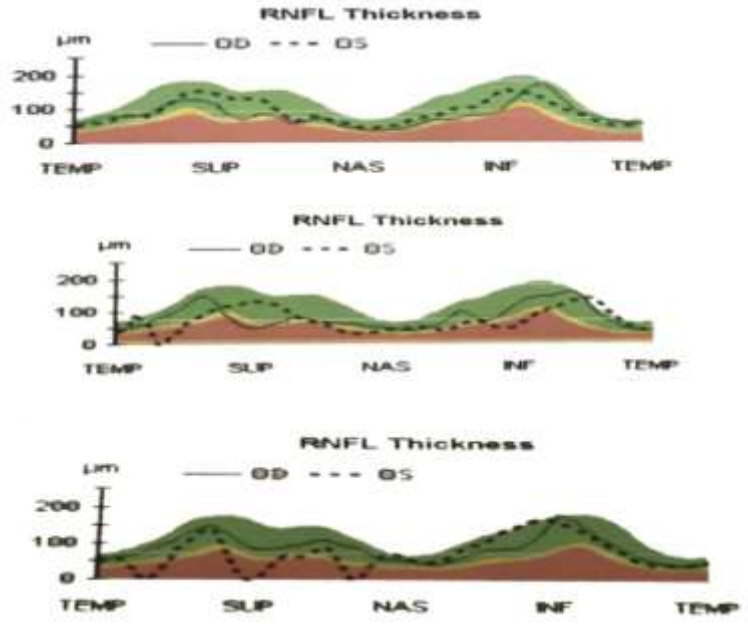


Figure 4:- RNFL thickness in low, moderate and high myopia.



Discussion:-

1. In our study, the 360-degree average peri-papillary RNFL thickness was found to decrease as degree of myopia increased, and the decrease was significant in high myopia group than in low and moderate myopia groups.
2. Peripapillary RNFL thickness decreased in superior, inferior, and nasal quadrants in eyes with myopia >- 6 D but the decrease was not significant in temporal quadrant.

3. Correspondingly, significant decrease in peri-papillary RNFL thickness was noted in eyes with high myopia in 1, 2, 3, 5, 6, 7, 11, and 12 o'clock hour positions, with an insignificant change in 4, 8, 9, and 10 o'clock hour positions.
4. Amongst studies with SD-OCT, similar results were noted by Kang et al., [1] Wang et al., [2] and Savini et al.who noted that peripapillary RNFL thickness decreases with increase in the degree of myopia.
5. Savini et al. also noted decrease in RNFL thickness in all quadrants with weakest correlation of decrease in temporal quadrant.

Figure 5:- Showing high myopic fundus.

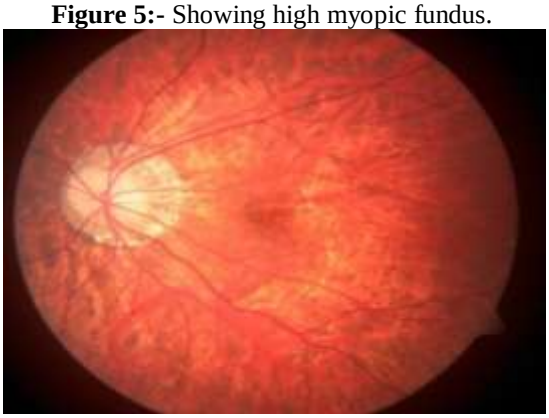
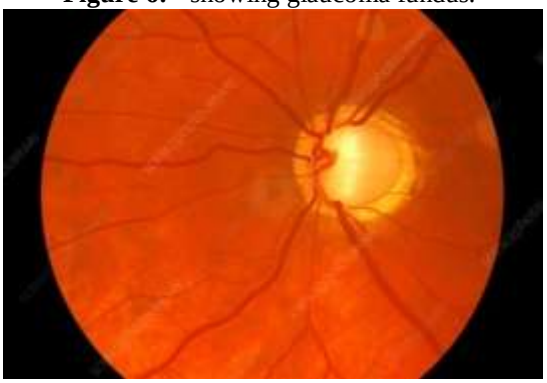


Figure 6:- showing glaucoma fundus.



This might be due to dragging of retina towards temporal horizon and compression of bundles originating from opposite hemisphere at the horizontal raphe, causing thinning of RNFL thickness in all quadrants except temporal[4].

The RNFL defects in glaucoma were most frequently found at the inferotemporal meridian.

The limitations of our study include the relatively small number of eyes in each of the myopia categories, not including emmetropes or hypermetropes in the study and not considering correction for magnification factor for increased axial length.

Conclusion:-

The subjects with highly myopic eyes have significant decrease in peripapillary RNFL thickness when compared to low and moderate myopic eyes.

There is significant decrease in peripapillary RNFL thickness in all quadrants except temporal quadrant in high myopic eyes than low and moderate myopic eyes.

Decrease in average peripapillary RNFL thickness in all clock hour positions except 4,8, 9, 10'o clock hour positions.

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