International Journal of Research in Health and Allied Sciences
Journal home page: www.ijrhas.com

Official Publication of "Society for Scientific Research and Studies" [Regd.]

ISSN: 2455-7803

Original Research

Assessment of RNFL thickness among females with myopia

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***ABSTRACT*:**
Background: Myopia is characterized by blurring of objects viewed at a distance, and is commonly the result of abnormal elongation of the eyeball – which causes the refractive image formed by the cornea and the lens to fall in front of the photoreceptors of the retina. Imaging modalities such as optical coherence tomography (OCT) can aid in the diagnostic dilemma by measuring retinal nerve fiber layer (RNFL) thickness, which differs significantly between glaucoma patients and controls. Hence; the present study was undertaken for assessing RNFL thickness in myopic patients using Spectral Domain OCT (SD-OCT). **Materials & methods:** A total of 20 high myopic patients and 20 low myopic patients were enrolled in the present study. Complete demographic and clinical details of all the patients were recorded. All patients were subjected to a comprehensive ocular examination. Visual acuity was measured using Snellen chart, read at a distance of 6m. Axial length and anterior chamber depth was measured. OCT- RNFL was done to measure retinal nerve fibre layer thickness. The data was collected and entered into the patient proforma. SPSS software was used for assessment of level of significance. **Results:** Mean RNFL average thickness among the patients with high myopia and low myopia group was 88.45 and 99.58 respectively. Significant results were obtained while comparing the mean RNFL average thickness among the patients of the severe myopia group and low myopia group. **Conclusion:** From the above results, the authors concluded that mean RNFL thickness is significantly reduced among patients with increasing grades of myopia.
Key words: RNFL, Females, Myopia

Received: 24 November, 2020 Accepted: 20 December, 2020

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This article may be cited as: Chauhan S, Vohra P. Assessment of RNFL thickness among females with myopia. Int J Res Health Allied Sci 2021; 7(1): 51-53.

INTRODUCTION

Myopia is characterized by blurring of objects viewed at a distance, and is commonly the result of abnormal elongation of the eyeball – which causes the refractive image formed by the cornea and the lens to fall in front of the photoreceptors of the retina. The underlying biological cause of myopia is unknown, and there is no widely accepted means of prevention or cure.[1, 2]

The pathophysiology of myopia is multifactorial and is not yet completely understood. There are proofs that multiple genetic variations and environmental and lifestyle factors play an important role in the etiology of this disease. Family linkage analysis, genome-wide association studies, and next-generation sequencing studies as well as a high correlation among monozygotic twins compared to dizygotic twins show that myopia has a genetic component.[3]

The exact pathogenic mechanisms of myopia remain unclear. Recent evidence suggests that myopia is likely to result from the combined and interacting effects of hereditary and environmental factors. Many factors have been documented for having possible associations with risks for developing myopia, such as parental myopia, gender, ethnicity, education, occupation, income, near-work load, outdoor activities, lens opacity, and ocular dimensions.[4]

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. Imaging modalities such as optical coherence tomography (OCT) can aid in the diagnostic dilemma by measuring retinal nerve fiber

layer (RNFL) thickness, which differs significantly between glaucoma patients and controls. However, myopic patients may have RNFL abnormalities which may complicate this interpretation.[5] Hence; the present study was undertaken for assessing RNFL thickness in myopic patients using Spectral Domain OCT (SD-OCT).

MATERIALS & METHODS

The present study was undertaken with the aim of assessing the RNFL thickness in myopic patients. A total of 20 high myopic patients and 20 low myopic patients were enrolled in the present study. Complete demographic and clinical details of all the patients were recorded. Patients with history of any other systemic illness, or any known drug allergy were excluded from the present study.

Inclusion Criteria:

- Patients with myopia more than -0.5D.
- Patients between 18-40 years of age.

All patients were subjected to a comprehensive ocular examination. Visual acuity was measured using Snellen chart, read at a distance of 6m. Axial length and anterior chamber depth was measured. OCT-RNFL was done to measure retinal nerve fibre layer thickness. The data was collected and entered into the patient proforma. SPSS software was used for assessment of level of significance.

RESULTS

In the present study, mean age of the patients with high myopia and low myopia was 43.5 years and 47.6 years respectively. Mean RNFL average thickness among the patients with high myopia and low myopia group was 88.45 and 99.58 respectively. Significant results were obtained while comparing the mean RNFL average thickness among the patients of the severe myopia group and low myopia group.

Table 1: Comparison of RNFL among low and high myopic patients

RNFL Average thickness	High myopia	Low myopia
Mean	88.45	99.58
SD	8.12	10.52
t-value	-1.455	
p- value	0.00 (Significant)	

DISCUSSION

Myopia (near-sightedness) is the most common refractive vision disorder in children. It is characterized by blurring of objects viewed at a distance, and is commonly the result of abnormal elongation of the eyeball – which causes the refractive image formed by the cornea and the lens to fall in front of the photoreceptors of the retina.[6-9] Hence; the present study was undertaken for assessing RNFL thickness in myopic patients using Spectral Domain OCT (SD-OCT).

In the present study, mean age of the patients with high myopia and low myopia was 43.5 years and 47.6 years respectively. Wang G et al evaluated the effect of myopia on retinal nerve fibre layer (RNFL) thickness measurement by using spectral domain optical coherence tomography (Cirrus HD OCT) and scanning laser polarimetry with enhanced corneal compensator (GDx ECC). One hundred and forty-nine eyes of 149 myopic subjects were recruited and subdivided into three groups according to their refractive errors: high myopia group (spherical equivalent (SE)≤−6 D); moderate group (−3 D≥SE>−6 D); low group (−0.5 D≥SE>−3 D). RNFL thickness was measured by Cirrus High Definition (HD) OCT and GDx ECC. Average RNFL thickness measured with Cirrus OCT correlated significantly with axial length and SE. No significant correlation was detected between axial length /SE and RNFL thickness measured with GDx ECC. Average RNFL thickness measured with Cirrus HD OCT decreases as the degree of myopia increases while no such correlation was detected in GDx ECC.[10] Hwang YH et al investigated the correlation between myopic optic disc tilt and the characteristics of peripapillary retinal nerve fiber layer (RNFL) thickness measured by Cirrus HD spectral-domain optical coherence tomography. A total of 255 eyes of 255 healthy young male participants with various degrees of refractive errors underwent ophthalmic examinations, including refractive error, axial length, and optic disc area measurement. The degree of horizontal/vertical optic disc tilt was evaluated by cross-sectional images obtained by the Cirrus HD OCT. The average, superior, nasal, inferior, and temporal quadrant thickness and superior/inferior peak locations of the peripapillary RNFL were also measured with the Cirrus HD OCT. On the univariate analysis, eyes with more temporally tilted optic discs (horizontal tilt) had higher myopia, greater axial length, a thinner average, superior, nasal, and inferior RNFL, thicker temporal RNFL, and more temporally positioned superior/inferior peak locations (all P values <0.001). The degree of inferior optic disc tilt (vertical tilt) was associated with high myopia and a more temporally positioned inferior peak location (all P values <0.05). On multivariate analysis, eyes with more temporally tilted optic discs had a thicker temporal RNFL and more temporally positioned superior/inferior peak locations.[11]

In the present study, Mean RNFL average thickness among the patients with high myopia and low myopia group was 88.45 and 99.58 respectively. Significant results were obtained while comparing the mean RNFL average thickness among the patients of the severe myopia group and low myopia group. Salih PA conducted a study to investigate the influence of myopia on peripapillary retinal nerve fiber layer (RNFL) thickness using Cirrus optical coherence tomography (OCT) in normal eyes. Ninety-eight eyes of normal participants with various degrees of myopia were recruited in this study. The RNFL thickness was measured with high-definition (HD), spectral-domain

Cirrus OCT. The association between RNFL thickness and its spherical equivalent was evaluated with linear regression analysis. Results showed that the RNFL thickness was 119.2±16.8 μm, 117.1±16.8 μm, 75.9±16.1 μm, and 64.9±9.8 μm in the superior, inferior, temporal, and nasal quadrants, respectively, with an average thickness of 94.3±8.6 μm. The mean RNFL thickness was thinner in highly and moderately myopic eyes compared with low myopic eyes. A significant linear correlation was found between the spherical equivalent and the RNFL thickness in the superior and inferior quadrants, and the average RNFL thickness.[12] Wang X et al determined the characteristics of RNFL thickness changes in patients with both primary open-angle glaucoma (POAG) and high myopia (HM). Twenty-two eyes with POAG and HM (spherical equivalent (SE) between -6.0 and -12.0 D) were evaluated, and 22 eyes with HM were used for comparison. Characteristic retinal nerve fiber layer (RNFL) thickness profiles in patients with POAG and HM were examined using optical coherence tomography (OCT). RNFL thickness was significantly lower in all but the nasal quadrant in patients with POAG and HM, compared to patients with only HM.[13]

CONCLUSION

From the above results, the authors concluded that mean RNFL thickness is significantly reduced among patients with increasing grades of myopia.

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