A COMPARATIVE STUDY OF THICKNESS CHANGES IN THE MACULA AND NERVE FIBER LAYER IN HIGH MYOPIC EYES IN COMPARISON TO THE NORMAL POPULATION WITHOUT REFRACTIVE ERRORS USING OPTICAL COHERENCE TOMOGRAPHY

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Introduction

Myopia has emerged as a significant and rapidly escalating public health concern globally. Pathologic myopia refers to a severe form of myopia characterized by progressive and excessive axial elongation of the eyeball, leading to structural complications in the posterior segment. It is associated with a range of degenerative changes affecting the sclera, optic disc, choroid, bruch's membrane, retinal pigment epithelium, and the neural retina. Pathologic myopia has been identified as one of the leading causes of visual impairment and low vision in numerous developed nations, underscoring its clinical and societal burden.

The cut-off value of high axial myopia is refractive error of – 6 Diopter and more, axial length of 26 mm and more. Optical coherence tomography has been widely used for assessing retina and optic nerve by providing quantitative and qualitative assessment of macula and retinal nerve fiber layer.

Aim of the work

Our study aims to compare central macular thickness and peripapillary retinal nerve fiber layer thickness between high myopic population and emmetropic poulation using optical coherence tomography.

Patients and Methods

The study was conducted as a comparative cross sectional study between 100 myopic eyes classified as the study group and 100 emmetropic eyes classified as the control group. Seen at Damanhour Eye Center, El behiera, Egypt between July 2023 and August 2024. Eyes included in our study are categorized into two groups based on cycloplegic refraction and axial length
• Cases with cycloplegic refraction ≥ -6 D and AL ≥ 26 mm as the high myopic group.
• Cases with cycloplegic refraction within ±1 D and AL (22-24) mm as the emmetropic group.
Exclusion criteria
• Those with a history of severe ocular trauma, intraocular or refractive surgery, or any ocular or neurologic disease that could have affected the optic nerve head or RNFL.
• Those with any pathologic ocular condition that could cause a visual disturbance.
• Those with glaucoma or an (IOP) > 21 mm Hg in either eye.
Following pupillary dilation at least 5mm with 0.5% cyclopantolate solution, optical coherence tomography was used to examine the eyes. Subjects underwent OCT testing of both macula and peripapillary NFL using spectral domain Hiedelberg High Definition OCT (HRA, Hiedelberg Engineering GmbH, Dossenheim, Germany).

Results

The study included 200 eyes; of them 93 were males and 107 females.
The mean age of the studied cases was 37.97 ± 5.05, while the mean age of the control group was 37.13 ± 6.24.
100 eyes as the study group with mean SE -12.43 ± 4.14, mean AL 27.0 ± 0.64 mm and 100 eyes as the control group with mean SE -0.25 ± 0.59, AL 23.01 ± 0.66 mm.

Table (1): Comparison between the two studied groups according to central macular thickness

Central macular thickness (µm)	Study (n = 100)	Control (n = 100)	U	P
Min. – Max.	205.0 – 343.0	195.0 – 300.0		
Mean ± SD.	263.57 ± 25.89	261.7 ± 22.26	4954.50	0.911
Median (IQR)	265.50 (250 – 274.5)	265.5 (250 – 274.0)		

The mean CMT in the study group and control group was 263.57 ± 25.89, 261.7 ± 22.26 respectively and after analysis of data shown in **table (1)**, The p value for comparison between both groups was 0.911 indicating statistically insignificant difference between both groups with higher CMT in the high myopic eyes .
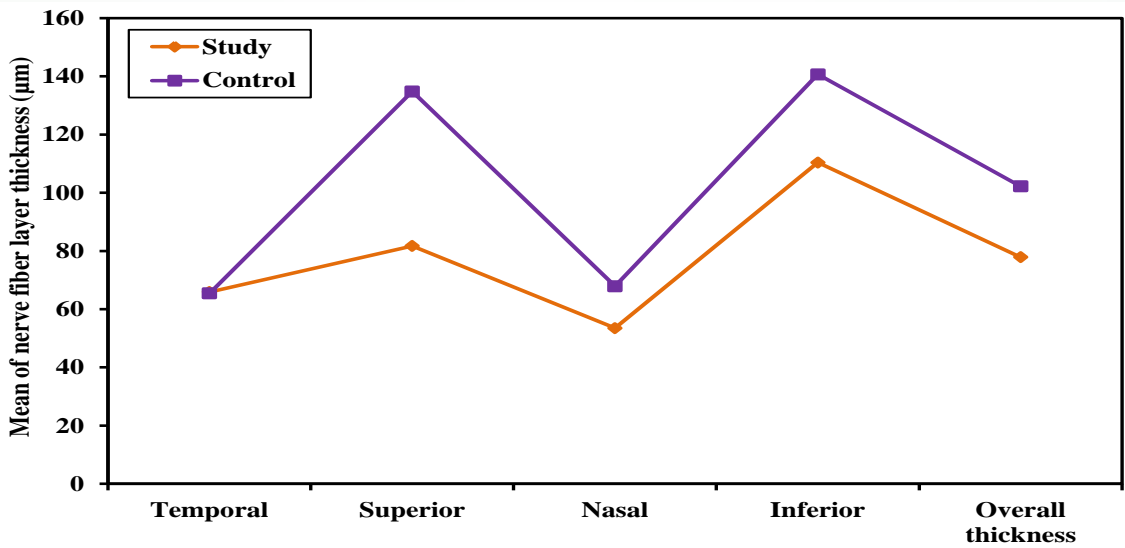

Figure (1):Comparison between the two studied groups according to nerve fiber layer thickness (µm)

The mean average pRNFL thickness in the study group and control group was 77.87 ± 19.34, 102.2 ± 10.99 respectively and after analysis of data shown in Figure (1), the p value for comparison between both groups was <0.001 which indicates statistically significant difference between the both groups
So the average pRNFL thickness is significantly decreased in the high myopic eyes in comparison to emmetropic eyes.
Upon analysis of pRNFL thickness across the four quadrants, statistically significant differences were observed between the high myopic and emmetropic groups.
Specifically, the differences in pRNFL thickness in the high myopic group were significant in the superior, inferior, and nasal quadrants (P < 0.001), whereas the temporal quadrant did not demonstrate a statistically significant difference (P = 0.640).
Among the quadrants, thinning of the pRNFL was least pronounced in the temporal region, but on the contrary it shows insignificant increase in thickness. The nasal quadrant followed by the inferior quadrants showing more thinning, and the most substantial thinning observed in the superior quadrant.

Conclusion

• In the highly myopic eyes thickness of the central fovea is increased, while the thickness of the RNFL decreased in the average thickness, superior, inferior, nasal quadrants except for the temporal RNFL which is insignificantly increased. Therefore, more attention is required to accurately interpret OCT results in patients with high degrees of myopia.
• The Central macular thickness was insignificantly higher in high myopes as compared to emmetropes which may be confused with retinoschisis / retinal edema.
• Our data emphasizes the importance of OCT imaging in high myopic patients to detect changes in the macula and optic disc accurately at an early stage.