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ORIGINAL ARTICLE

Comparison of Retinal Nerve Fiber Layer Thickness Between Mild to Moderately Myopic Eyes with Normal Eyes

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ABSTRACT

Aim: To access the difference between the mean thickness of the retinal nerve fiber layer (RNFL) in myopic eyes (down to -6.00 D) and the normal eye.

Study Design: An Observational and Descriptive study.

Place duration: In the department of Ophthalmology, Al Shifa Trust Eye Hospital, Rawalpindi for six-months duration from June 2020 to November 2020.

Methods: In this study, the mean comparison of RNFL among 70 myopic eyes (down to -6.00 D) and 70 normal eyes of the same age was done. 15-45 years was the patients' age range. A comprehensive eye exam was performed and thickness of RNFL was evaluated by optical coherence tomography. Data analysis was done with t-test for independent samples using SPSS 21.0; p <0.05 as the significant value.

Results: The RNFL mean variation between both groups was 5.901 µm (SE: 1.930). The mean RNFL thickness in the group of people with myopia was 96.31 ± 11.121 µm with (SE: 1.310) and mean age was 28.32 ± 7.452 years. The mean thickness of RNFL was 94.210 ± 9.521 µm in the right eye and 99.175 ± 11.142 µm in the left eye. The RNFL mean score of thickness for eyes with myopia distributed normally as p <0.04. The RNFL mean score of thickness for normal group was (102.81 ± 11.48 µm) with (SE: 1.40), and the mean thickness of RNFL evaluated in healthy eyes did not show a normal distribution as P <0.20. This study outcomes exhibited a statistically substantial variance between the mean thickness of RNFL assessed in myopic and normal eyes (p <0.003).

Conclusion: There is a significant variation in mean thickness of RNFL between normal and myopic eyes as assessed by optical coherence tomography. Appropriate understanding of data of RNFL in eyes with myopia is suggested to evade glaucoma misdiagnosis.

Keywords: Optical coherence tomography, Myopia and Thickness of the Retinal Nerve Fiber Layer.

INTRODUCTION

Myopia has become the most important health issue in Asia[1]. The augmented incidence of myopia in cities of east Asia is expected to be related with increased educational pressure and other lifestyle changes that reduce the amount of time children spend outside[2]. The incidence of myopia has increased in recent years and it is assessed that in 2060, about fifty percent of the people will be near-sighted globally[3]. This disorder is particularly communal in Asia, where the incidence is predictable to about 90%. Myopia is associated with high jeopardy of various eye conditions, and for the major one is glaucoma[4-5]. It is much communal in Chinese, Asian and urban children. In the east and south-east, rates of myopia are high, especially in young adults. Myopia is a threat to vision when choroidal neovascularization occurs, which is considered an important risk factor for vision loss in pathological myopia[6]. The RNFL thickness evaluation without examination of the refractive error of the eye or the optical condition can result in the glaucoma misdiagnosis, particularly in eyes with myopia. Disc lesions in myopia can make it problematic to differentiate optic neuropathy due to glaucoma from myopia-associated retinal and optic nerve anomalies, which can complicate both the treatment and diagnosis of glaucoma[7-8]. The retinal nerve fibers thickness to the disc is assessed by Optical coherence tomography with non-contact method. The measurements of OCT are significant and have an important role in diagnosing various eye disorders and evaluating the outcomes and prognosis of surgical procedure. It is important to distinguish between myopia and glaucoma-induced RNFL thinning, as myopia results in reduction of thickness of RNFL[9-10]. The rationale for this study was to access the difference between the mean thickness of the retinal nerve fiber layer (RNFL) in myopic eyes (down to -6.00 D) and the normal eye.

METHODS

This comparative and cross-sectional study was held in the department of Ophthalmology, Al Shifa Trust Eye Hospital, Rawalpindi for six-months duration from June 2020 to November 2020. In this study, the mean comparison of RNFL among 70 myopic eyes (down to -6.00 D) and 70 normal eyes of the same age was done. Group 1 included normal, group 2 eyes with myopia below 6.00 dioptres. 15-45 years was the patients age range. Subjects with any systemic ailment, uncooperative subjects, any organic eye pathology, high myopia greater than -6.00D, any other refractive error and glaucomatous eyes were omitted.

If the patient has -0.5D to ≤ -3D of myopia, it will be labeled as Mild myopia and moderate myopia from -3D to <-6D. The mean thickness of the RNFL was determined conferring to the ISNT rule; Thicker inferior quadrant with 126 ± 15.8 µm of RNFL, superior quadrant has 117.2 ± 16.13 µm of RNFL, nasal quadrant has 75 ± 13.9 µm of RNFL and 70.6 ± 10.8 µm of thickness in the temporal quadrant. Data analysis was done with t-test for independent samples using SPSS 21.0; p <0.05 as the significant value. The ethical committee approved the study and informed consent was taken from contributors and a complete ophthalmological examination was held with comprehensive history. The retinoscopy and autorefraction were executed to confirm the total number of refractive errors. The thickness of RNFL was evaluated by optical coherence tomography. Quantitative variables (age) are expressed as mean ± S.D. The ratio of the mean thickness of the RNFL between the two groups of "normal and myopic" eyes was analyzed by an independent t-test for the sample with 0.05 of a P value considered as significant.

RESULTS

The RNFL mean variation between both groups was 5.901 µm (SE: 1.930). The mean RNFL thickness in the group of people with myopia was 96.31 ± 11.121 µm with (SE: 1.310) and mean age was 28.32 ± 7.452 years. The mean thickness of RNFL was 94.210 ± 9.521 µm in the right eye and 99.175 ± 11.142 µm in the left eye. Table 1. The data normal distribution was tested with the Kolmogorov-Smirnov and Shapiro-Wilk test. The mean thickness

score of RNFL in eyes with myopia had a normal distribution as P <0.05.

Table-1: shows the Normality Tests in myopic eyes

Mean RNFL thickness	Kolomogorov-Simirnov			Shapiro-wilk		
	Statics	df	Sig.	Statics	df	Sig.
	0.128	62	0.04	0.980	58	0.094

The RNFL mean score of thickness for eyes with myopia distributed normally as p <0.04. The RNFL mean score of thickness for normal group was (102.81 ± 11.48 µm) with (SE: 1.40), and the mean thickness of RNFL evaluated in healthy eyes did not show a normal distribution as P <0.20.

Table 2: shows the myopic eyes descriptive analysis

	Mean	Descriptive analysis	Statistic 95.38	Std. Error
		Lower Bound		1.43
Mean RNFL Thickness	95% Confidence Interval for Mean		91.62	
			99.1	
	5% Trimmed Mean	Upper Bound	96.50	
	Median		96	
	Variance		102.28	
	Std. Deviation		11.28	
	Minimum		77	
	Maximum		123	
	Range		48	
	Interquartile Range		15	
	Skewness		0.550	0.325
	Kurtosis		0.330	0.621

The outcomes exhibited that age has weak positive association with the mean thickness of RNFL in eyes with myopia (r = 1.90, p <1.67, n = 70). The moderate positive association of age was noted (r = 0.370, P = 0.01, n = 70) with the mean thickness of RNFL in normal eyes.

Table 3: shows the normal eyes descriptive analysis

	Mean	Descriptive analysis	Statistic 102.41	Std. Error
		Lower Bound		1.501
Mean RNFL Thickness	95% Confidence Interval for Mean		95.27	
		Upper Bound	106.2	
	5% Trimmed Mean		100.61	
	Median		102.98	
	Variance		117.71	
	Std. Deviation		9.25	
	Minimum		82	
	Maximum		129	
	Range		45	
	Interquartile Range		14	
	Skewness		0.225	0.310
	Kurtosis		0.595	0.601

Table-4: shows the T test for group statistics.

Mean RNFL thickness					
	Refractive Status	N	Mean	Std. Deviation	Std. Error Mean
	Normal	70	102.64	10.95	1.402
	Myopia	70	93.66	10.68	1.256

DISCUSSION

This cross-sectional study outcomes showed a significant variation in the mean thickness of RNFL between the myopic and normal groups[11-12]. Myopia has a subordinate RNFL, and myopia is -- correspondingly a risk factor for developing POAG. Myopia is not a simple error in refraction, but an ailment that threatens your eyesight[13]. The incidence of myopia has increased in recent years and it is assessed that in 2060, about fifty percent of the people will be near-sighted globally. Near sightedness is a serious challenge for ophthalmologists because myopic discs often have large, oblique, deep cups and a thinner neuroretinal rim and among these cases diagnosing glaucoma is difficult[14]. The malformations and optic disc changes in eyes with myopia can cause glaucoma to progress[15]. One current study of cohort exhibited that myopia can affect the thickness profiles of GCIPL (inner plexus of the ganglion cells) and RNFL significantly, and the size of the optic nerve disc has a substantial consequence on the thickness of RNFL[16]. Although the present study has not done with comprehensive assessment of the retina and optic nerve head, the mean thickness of RNFL was assessed in all 4 quadrants. It presented that an average RNFL thinning was observed in eyes with myopia. Atta Allah et al. Institute that myopia affects the thickness distribution of the RNFL. In subjects with advanced myopia, there is a fluctuating pattern of characteristic distribution of thinning in RNFL[17-18]. High myopia was omitted from this analysis and we assessed eyes with low moderate myopia. Kelly D and colleagues concluded that measurements of OCT and assessment of the RNFL thickness in high myopic patients should be performed with caution to avoid the misdiagnosis of glaucoma. An ELM tai y et al study proposed that refractive error status should be carefully assessed when assessing or evaluating the OCT report of myopic individuals, as the thickness change of retinal nerve fiber layer decreases with increasing myopia. Others have suggested that high myopia eyes have a remarkable reduction in RNFL thickness within two years compared to those that are emmetropic[19-20]. One study found that the thickness of the retina increases in hyperopia and declines in eyes with myopia. A substantial variation was observed when the eyes with myopia and hyperopia were compared with the normal group. It was found that the myopic changes were more substantial (p = 0.001) than the hypermetropia (p = 0.031).

Ganglion cell thickness (GCL) studies have shown a greater GCL thinning in people with high myopia than in people with moderate and low myopia[23-24].

CONCLUSION

There is a significant variation in mean thickness of RNFL between normal and myopic eyes as assessed by optical coherence tomography. Appropriate understanding of data of RNFL in eyes with myopia is suggested to evade glaucoma misdiagnosis.

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