Study Of Corneal Thickness in Indian Myopic Patient

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INTRODUCTION:

The cornea is responsible for approximately 2/3 of optical refraction and its role in myopia has been intensely studied over the years. Changes in the anterior segment associated with the myopia are still under debate. [6] Carney et.al among others found that myopic cornea has a steeper central corneal curvature, while Chang et.al (1) found no correlation between the central corneal curvature and thickness. The myopic eye is known to be longer than the normal emmetropic eye(2) Von Bahr et.al among others looked for a connection between Central Corneal thickness and myopia. Measurements were taken with different types of pachymetry with different set-ups and with inconclusive result (table 1). The purpose of this study is to determine if the Central Corneal thickness differs in emmetropic eyes and myopic eyes using ultrasonic pachymeter. The precision (standard deviation,SD) of manual optical pachymetry is 8 mm, with intraobserver errors of 5–6 micrometre and interobserver errors of 20 micrometre (Olsen et al. 1980). Ultrasound pachymetry has better precision (Tam & Rootman 2003), but results may vary due to applanation force and differences between types of instruments (Salz et al. 1983). The Orbscan system is an automatic and non-contact optical pachymeter and topograph with a precision similar to that of manual optical pachymetry (Yaylali et al.1997). The apparatus used in this study was an ultrasound pachymeter. (Bo¨hnke et al. (1999) reported a precision of about 1 micrometre (SD), an intrasession reproducibility around 0.9–1.2 micrometre and a high intersession reproducibility. The purpose of this study was to determine whether CCT differs in emmetropia and high myopia using the US pachymeter. Documented differences between these groups might contribute to the ongoing discussion on the aetiology and pathogenesis of myopia.

Material and Methods

All subjects were Indians and aged between 20 and 60 years. Subjects with previous eye surgery, glaucoma,

diabetes mellitus or other acute or chronic diseases possibly affecting the corneal thickness were excluded. The emmetropic group included 50 subjects, all with normal visual acuity and refraction (self-reported to be from 0 to 1.0 D spheq).The group consisted of volunteers sourced from hospital staff, students and patients' relatives. The myopic group was recruited from subjects referred. Only eyes with a minimum of >1 D in spherical equivalent refraction and a maximum of 3 D corneal astigmatism were accepted. The refractive criteria were set to ensure that myopic eyes were included in the group and that cases with subclinical keratoconus were excluded. On this basis, the study included highly myopic subjects with an average subjective refraction of -8.93 D (ranging from -1 to -18 D, SD =2.0 D) in spherical equivalent and an average astigmatism of - 0.81 D cylinder. Central

corneal thickness and axial length were measured in both eyes, without touching or medicating the

eyes, but data from only one eye from each subject was included. The data pertained to the right eye in 99 subjects, but to the left eye in six subjects. This was due to previous retinal detachment in the right eye in one case, a previous severe trauma in the right eye in one case, the fact that the right eye did not fulfill the refractive criteria in three cases, and because the right eye was under topical anaesthetic in one case. Table 2 summarizes data characterizing the two groups, the only statistically significant difference being the axial length, which was 3 mm longer in the myopic group.

Results

The mean CCT for the emmetropic group was 532 micrometre (SD= 32.1 micrometre, range 459.9–606.0 micrometre), and for the myopic group 528.3 micrometre (SD= 34.6 micrometre, range 452.2–599.5 micrometre). The difference of 7.9 micrometre was not statistically significant different from zero ($p > 0.05$). The F-test showed no statistical difference between the variances from the two groups. The mean CCT for the 24 myopic subjects wearing glasses was 523.4 micrometre (SD = 36.19 micrometre) and the mean CCT for the 24 myopic subjects normally wearing contact lenses was 531.9 micrometre (SD = 33.93 micrometre). This difference of 8.5 micrometre was not significantly different from zero ($p > 0.05$). There was no statistically significant difference between the CCT values of the right (534.3 micrometre, SD = 33.6 micrometre) and left eyes (534.4 micrometre, SD = 33.3 micrometre) nor was there any statistically significant difference between the CCT values from men (534.9 micrometre, SD = 30.9 micrometre) and women (532.0 micrometre, SD = 37.4 micrometre).

Discussion

This study showed no statistically significant difference between mean Central corneal thickness of myopics and emmetropics, which is similar to other study results (Table 1). The results from this study showed a difference of 7.9 micrometre in mean CCT (the myopic being the thinner), this is around a quarter of what would be expected from pure stretching of the ocular tunics (see appendix for mathematical reflections). If a stretching mechanism really is active, the thinning seems to be confined to the sclera. The mean CCT of the two subgroups was not significantly different. The inconclusive results of previous studies (Table 1) might be explained by any of the following: pachymeters with low reproducibility; inexperienced observers; no consideration of diurnal variation; the influence of contact lenses; genetic difference in CCT; different criteria for exclusion; lack of highly myopic subjects, and too small a sample size. The advantages of this study are: the fact that only highly myopic subjects with limited astigmatism were included, and the minimized influence of confounders.

TABLE 1:

AUTHOR AND YEAR	COUNTRY	METHOD	NO. OF SUBJECTS		RESULT CCT AND MYOPIC
			TOTAL	MYOPICS	
EGPS 2007	EUROPE	US	854	UNKNOWN	NO CORRELATION
FAM et.al 2006	SINGAPORE	ORBSCAN	714	714	NO CORRELATION
OLIVEIRA et.al 2006	USA	US	140	140	NO CORRELATION
AGHAIAN et.al 2004	USA	US	801	UNKNOWN	NO CORRELATION

KUNERT et.al 2003	INDIA	US/ORBSCAN	615	615	THICKER CCT IN HIGH MYOPE
SRIVANNABOON 2002	THIALAND	ORBSCAN	280	280	THICKER CCT IN HIGH MYOPE
CHANG et.al 2001	TAIWAN	US	216	UNKNOWN	THINNER CCT IN HIGH MYOPE
LIU AND PFLUGFELDER 2000	CHINA	ORBSCAN	30	30	NO CORRELATION

TABLE 2:

	myopics	emmetropics	p-value
Age	40(SD=8.8)	39(SD=8.6)	>0.05
Height	1.73(SD=9.6)	1.73(SD=9.3)	>0.05
Weight	63(SD=2.9)	63(SD=3.1)	>0.05
Sex (males/females)	20/30	22/28	>0.05
CCT	528.3	536.2	>0.05

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