



GENDER DOES NOT IMPACT CENTRAL CORNEAL THICKNESS

Ophthalmology

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ABSTRACT

Background: There are fewer studies on impact of gender on central corneal thickness (CCT) in Indian population.**Objective:** Study the impact of gender on central corneal thickness.**Method:** Study was conducted in 250 normal Indian subjects (500 eyes) of either sex to compare the normal data of central corneal thickness in normal adult Indian male and female population for reference for future studies by using pentacam.**Results:** The mean value of CCT of normal adult Indian males and females is $543.9 \pm 1.477 \mu\text{m}$ and $541.3 \pm 1.974 \mu\text{m}$ respectively. The CCT value in males is slightly higher than females but the difference in CCT values is statistically insignificant.**Conclusion:** Thus gender does not impact central corneal thickness.

KEYWORDS

Central corneal thickness, Pentacam, Eye, Male, Female, Gender

INTRODUCTION

The rotating Scheimpflug principle used by pentacam enables the acquisition of cross-sectional images of the anterior segment of the eye in only 1 or 2 seconds, depending on the preselected settings.¹ Pentacam has been reported to provide repeatable values of the central and mid-periphery corneal thickness, with similar values for central thickness as obtained with ultrasound pachymetry in normal eyes.²⁻⁴

Corneal thickness is available for entire cornea, limbus to limbus and can be assessed with pentacam. It is automatically reported in concentric circles of 1.0 mm increments, although corneal thickness can be measured at any point on the cornea by manually placing the cursor at that point.⁵

MATERIALS AND METHODS

OCULUS Pentacam, sterile cotton/gauzes, spirit, black cloth were required. After obtaining the written informed consent, participants were examined using the OCULUS Pentacam. Subjects were examined in sitting position. The study was conducted in 250 Indian participants (500 eyes) attending Ophthalmology OPD in NIMS Medical College and Hospital, Jaipur. Both eyes of each participants, were scanned by same observer. All participants underwent a complete ophthalmological and optometric examination, including visual acuity evaluation, slit lamp examination and ocular fundus examination. Testing was done with natural pupils under same conditions in ambient lighting.

The machine was used in automatic release mode to rule out confounding operated related variables. The imaging device was automatically calibrated prior to the start of each new set of measurements. Participants were made to sit comfortably on examination stool. Participants were instructed to keep both eyes open and look directly at black fixation target for 2 seconds. The chin was placed at chin rest and forehead was placed on forehead rest. A black cloth was placed on subject's head to omit any light. The eyes were randomly examined. In order to avoid the documented daily changes in corneal thickness and other parameters, all measurements were conducted between 9:00 am to 2:00 pm and at least 4 hours after waking. It was ensured that all participants had at least 6 hours of overnight sleep. Three readings of CCT were taken and their mean was taken. The study included 250 normal subjects (500 eyes) in the age group of 19 to 50 years of both sexes without any ocular pathology over a period of one year. The mean age of subjects was 34.16 ± 8.319 years. There were 111 female subjects (222 eyes) and 139 male subjects (278 eyes). The anterior segment parameter recorded by Pentacam was CCT.

The statistical analysis was done by using unpaired student's 't' test for comparison of anterior segment parameters of eye. The p value ≤ 0.05 was considered statistically significant, p value ≥ 0.05 was considered as not statistically significant and p value < 0.0001 was considered as very highly significant.

RESULTS

Table 1. Minimum, Maximum, Median, Mean, SD, SEM, Lower and Upper 95% CI of CCT values of 111 females (222 eyes) and 139 males (278 eyes).

	CCT in females	CCT in males
Minimum	450	461
Maximum	602	600
Median	544	544
Mean	541.3	543.9
SD	29.42	24.63
SEM	1.974	1.477
Lower 95% CI of mean	537.4	540.9
Upper 95% CI of mean	545.2	546.8
Mean $\pm$ SEM of CCT (μm)	541.3 ± 1.974	543.9 ± 1.477

The mean difference of CCT of both eyes amongst females and males was not significant (p 0.2894) (Table 1).

DISCUSSION

Zhao et al reported that the CCT in Mongolian male and female was 536.33 ± 24.27 and $552.50 \pm 29.92 \mu\text{m}$, while in Han male and female was 554.48 ± 35.03 and $546.27 \pm 29.88 \mu\text{m}$. The values of CCT by pentacam on comparing different genders and nationalities were (Mongolian) M-F 0.149, (Han) M-F 0.076, (M) Mongolian-Han 0.083 and (F) Mongolian-Han 0.291. Zhao et al reported that CCT values of Mongolian females were higher than those of males ($p < 0.05$).⁶

Central corneal thickness varied among children from various ethnic groups. African American children found to have thinner CCT values than Caucasians or Hispanics.⁷ Most authors agree that CCT is not influenced by gender.⁷⁻⁹ Although Tong et al have reported a small, albeit statistically significant interaction of gender and CCT, with boys having thicker corneas than girls.¹⁰ The mean corneal thickness of the group under study was of $521.70 \pm 3.92 \mu\text{m}$, with males having slight, but not statistically significant thicker corneas than females.¹¹

Suzuki et al studied corneal thickness in normal 7313 (2848 men and 4465 women) Japanese population. Average CCT was $517.5 \pm 29.8 \mu\text{m}$ and was greater in men ($521.5 \pm 30.3 \mu\text{m}$) than in women ($514.4 \pm 29.0 \mu\text{m}$).¹²

Torres et al studied CCT in Northwestern American Indian/Alaskan natives (AI/AN) and compared it to White and African Americans. Average AI/AN CCT was $554.8 \pm 33.9 \mu\text{m}$. AI/AN CCT was found to be thicker than African Americans (528.5 ± 33.2) but similar to Whites (551.9 ± 28.3). CCT was greater in AI/AN females than males (557.6 ± 33.3 vs 550.1 ± 34.5 , $p = 0.03$). Thus CCT measurements for Northwest AI/AN population were similar to those of Whites but thicker than those of African Americans.¹³

Sardiwalla et al compared CCT in university of KwaZulu-Natal students of black and Indian ethnicity in 200 persons (100 black and 100 Indian) of both genders aged 18-25 years. The mean CCT value was $519.5 \pm 38.6 \mu\text{m}$ and CCT was higher in Indians ($526.5 \pm 37.2 \mu\text{m}$) than in blacks ($512.4 \pm 38.9 \mu\text{m}$) ($p = 0.01$). It was higher in females ($522.3 \mu\text{m}$) than in males ($516.7 \mu\text{m}$), but the difference was insignificant ($p = 0.07$). The mean CCT was higher in Indian males

(520.1 μm) than in black males (513.2 μm), but the difference was insignificant ($p=0.39$). However, it was significantly higher in Indian females (533 μm) than in black females (511.6 μm) ($p=0.003$).¹⁴

Iyamu and Eze studied relationship between CCT in adult Nigerians in 95 subjects (56 males and 39 females) aged between 20-69 years. The average values of $550.1 \pm 33.1\mu\text{m}$ were obtained for CCT. Female subjects had significantly steeper corneas than their male counterparts.¹⁵

Mercieca et al compared CCT in sub-Saharan cohort to African Americans and Afro-Caribbeans. The mean CCT of all participants was 532.00 μm . Men had a significantly higher CCT than women ($p=0.035$). Thus CCT values in African populations were less than those of whites. Men have thicker corneas than women.¹⁶

Iyamu et al studied CCT in adult Nigerian population in 95 subjects (56 males and 39 females) aged 20-69 years. The average CCT was $547.0 \pm 29.5\mu\text{m}$. CCT was not affected by gender.¹⁷ We included 250 normal subjects (500 eyes) in the age group of 19 to 50 years of both sexes without any ocular pathology over a period of one year in our study. The mean age of subjects was 34.16 ± 8.319 years. There were 111 female subjects (222 eyes) and 139 male subjects (278 eyes). The anterior segment parameter recorded by Pentacam was CCT. The mean values of 500 eyes of CCT, was $542.7 \pm 26.87\mu\text{m}$.

We studied the CCT with relation to gender and we observed no statistically significant difference between the two genders. In the present study, CCT value of males is $543.9 \pm 1.477\mu\text{m}$ (mean $\pm$ SEM) and $541.3 \pm 1.974\mu\text{m}$ in females which is slightly higher in males but the difference is statistically insignificant ($p=0.2894$) (Table 1). Perez-Cambrodi et al observed that CCT of males was slightly but not statistically thicker in males.⁽¹¹⁾ The findings of all the above studies are similar to present study. However, Hwang et al observed in Korean population that men had 4.1 μm higher CCT than women ($p=0.001$).¹⁸

CONCLUSION

The mean value of CCT of normal adult Indian males is $543.9 \pm 1.477\mu\text{m}$ and $541.3 \pm 1.974\mu\text{m}$ in females, which is slightly higher in males but the difference is statistically insignificant. Thus gender does not impact central corneal thickness.

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