

THE EFFECTS OF GENDER, AGE, EYE, AND GROWTH-RELATED FACTORS ON CORNEAL EPITHELIAL AND STROMA THICKNESS IN SCHOOL-AGED-CHILDREN**Bekmurodova Orzigul Kamolovna**

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Abstract: Data on corneal epithelium and stroma thickness related to sex, age, eye, and growth parameters of school-age children are limited. In this retrospective study, oct (HUVITZ HOCT-1F, South Korea) corneal epithelial thickness and myopic stroma were measured in 50 men and 60 women (average age 14.12 ± 2.18 years) in the Bukhara region. Regression analysis was used to Decipher the relationship between gender, age, fracture status, axial length, anterior chamber depth, and simple and multiple corneal fracture strength. Age and the thickness of the central angle were positively related to the thickness of the corneal epithelium and negatively related to body weight. In the multiple regression analysis, corneal epithelial thickness was affected by gender and central corneal thickness (CCT), while interstitial thickness was affected by age and gender. The corneal epithelial and stroma thickness was significantly larger in men than in women and was affected by growth. The thickness of the corneal epithelium and stroma was not associated with the severity of myopia, corneal fracture force, or axial length

Keywords: Corneal epithelial thickness, corneal interstitial thickness, corneal thickness measurement, myopia, keratoconus, anterior segment optical coherence tomography

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Introduction

Corneal thickness measurement plays a supporting role in various clinical decisions and provides basic references such as determining a patient's suitability for refractive surgery, diagnosing keratoconus or corneal edema, and evaluating intraocular pressure in glaucoma patients [1-4]. Recent advances in imaging topographic epithelial thickness using optical coherence tomography have attracted more and more attention, and these are the development of a large number of basic therapeutic applications that allow rapid measurement of corneal epithelial thickness with good reproducibility, but without contact during daily routines. Previous studies have reported good reproducibility of corneal and epithelial thickness measurements in normal eyes and eyes after refractive surgery for myopia using oct (Huvitz Host-1f, Korea) [5-7].

As for the plasticity of the epithelium, the thickness profile can have various clinical effects. For example, the thickness of the epithelium is adapted to reduce interstitial irregularities in diseases such as keratoconus. Therefore, the ability to analyze the thickness and shape of the corneal epithelium

and stroma separately may be useful for early diagnosis of the disease [8-10]. In addition, the thickness profile of the epithelium and the knowledge of how it changes 10 months after surgery contribute positively to refractive outcomes and are useful in the planning of refractive surgery. Central epithelial hyperplasia has been associated with myopia regression after laser refractive surgery, and epithelial remodeling has been proposed as a therapeutic strategy [13-16]. In addition, the thickness profile of the corneal epithelium helps to change the design of the lens, because the thinning of the central epithelium is associated with the magnitude of the correction of myopia required for orthokeratology, and orthokeratology October in school-aged children corrects myopia by reshaping the epithelium [19,20]. As a result, the corneal epithelial thickness map from normal children provides references to determine abnormal values, assess suitability, and predict responses to orthokeratology.

In the evaluation, the density, effect, face, gender, age, and fracture status of corneal epithelium and pigment were examined extensively. The effects of sex are well documented, but the results on the effects of age on the thickness of the corneal epithelium are not consistent [21-24]. In addition, the effect of refractive errors on the thickness of the cornea, especially the thickness of the epithelium, has not been determined until October. Epithelial thickness profiles are usually widely available, but data on school-age children are limited [30].

This study aims to investigate the effects of gender, age, fracture, corneal fracture strength, and various eye and growth-related measurements on corneal epithelium and stroma thickness in children. This study provides a normative database for school-age children and helps us understand for the first time the changes in corneal epithelium and stroma thickness with age.

Result and Discussion

110 school children from the Bukhara region were included in this retrospective cohort study. from 2021-11 to 2024-4, annual health checks are being evaluated at the main eye center of contact lenses for eyeglass prescriptions and corneal thickness measurements. Based on the data obtained from the full ophthalmic examination, including slit lamp examination, intraocular pressure, corneal thickness, significant fractures, topography, and fundus examination, 4 patients with eye lesions such as corneal opacity, corneal dystrophy, keratoconus, and contact lens wear history were excluded from glaucoma and anterior eye surgery in the last 52 weeks. As a result, the study analyzed 110 children. Corneal epithelium and total thickness data were obtained using the Revue Fourier domain optical coherence tomography OCT (HUVITZ H OCT-1F, Korea) with a corneal adapter module at a wavelength of 830 nm. The system generates a map of the thickness of the corneal epithelium using an automatic algorithm divided into a central zone with a diameter of 2 mm, eight distribution zones between 2 mm and 5 mm rings in the ring, eight Decurrent zones between 5 mm and 6 mm rings in the ring. The decurrent zone is divided into two Decurrent zones in the corneal epithelium. and 17 sectors. The thickness of the stroma was calculated by subtracting the thickness of the epithelium from the thickness of the cornea in each region.

The research protocol has been approved by the Institutional Review Committee of our Institute (CR320133) and all procedures comply with the rules of the Helsinki Declaration.

Corneal thickness and eye measurements showed a high correlation between the right eye and the left eye, and all measurement data for each subject's right eye reduced the increased risk

of Type 1 errors, statistical analysis, IBM SPSS Statistics for Windows. We used the Student t-test to recently compare continuous variables between boys and girls. We used the Student t-test to Decently compare continuous variables between boys and girls. Simple linear regression was used to Decipher the potential relationships between age, gender, refractive error (spherical equivalent fracture), axial length, mean corneal refractive power (mean K), corneal epithelium, and interstitial thickness. Multiple linear regression analysis was performed to examine the relationship between the factors determined during a single regression analysis and the Decongestant corneal epithelium and interstitial thickness.

The relationship between eye and growth-related factors was investigated using Pearson correlation analysis. Statistical significance was defined as p-value <0.05.

3.1. Thickness profile of corneal epithelium and stroma

The study analyzed 110 right eyes of children in the Bukhara region (50 male and 60 female) with an average of $110 \pm 14.12 \pm 2.18$ years (between 6 and 17 years). There was a statistically significant difference between the age of the average child and men and women, but the difference is small, so a comparison between men and women is acceptable. Decapitation is not a significant difference between men and women. In our cohort, the average K (corneal rupture density) was higher, and the corneal epithelial and stroma thickness was less in women compared to men.

The interstitial thickness difference was not statistically significant, but the axial length was greater in men than in women, and corneal thickness was found in age, mean K, weight, and height measurements, and a similar pattern was found in the subanalysis of 165 children. ACD and WTW were similar. Body growth measurements were similar in boys and girls in this subgroup. The Decapitation situation between boys and girls has not changed. The difference in the thickness of the average corneal epithelium in boys and girls was small, but 6.0 was a consistent finding with a diameter of 17 mm in cross-determination. The corneal epithelium between boys and girls was decapitated.

By simple regression analysis, corneal epithelial thickness showed a positive correlation with gender, age, central corneal thickness (CCT), height, and body weight, while it showed a negative linear relationship with body weight. Multiple regression shows that gender, body weight, body weight, and CCT are important factors affecting the thickness of the corneal epithelium in the central 2 mm region (Table 3). Gender, body weight, body weight, and CCT in the paracentric region, gender, and body weight were important factors affecting epithelial thickness in the central perianal region (Table 4). Older age, male sex, and smaller body weight were associated with greater corneal stroma thickness in the central, paracentric, and central peripheral regions.

3.2. The relevance of eye measurements

The severity of myopia was correlated with greater axial length and AKD,

And age. The average corneal strength was inversely proportional to the axial length and weight, regardless of age (Table 5). The average corneal strength by weight was inversely proportional to CCT and epithelial/stromal thickness, and was proportional to axial length and AKD.

Our study presents a corneal epithelial thickness profile for children aged 6-17 years.

The thickness of the corneal epithelium showed a terrain profile similar to that of adults, and boys had thicker epithelium than girls. The thickness of the corneal epithelium was affected by gender and cct, and the thickness of the stroma was affected by age, gender, and body weight. The

thickness of the corneal epithelium and stroma was not associated with the severity of myopia, corneal fracture strength, or axial length.

Conclusion

Many demographic, ethnic, and ophthalmic factors potentially affect the cornea thickness [31-34]. While some studies did not report an association between age [22,27] and CCT, other studies showed a deceleration with age [31-34]. Similarly, gender differences are not always defined, but in most cases

Researchers reported that the cornea of men is thicker than that of adult women [28,33]. This difference can be attributed to endocrine differences between men and women [35,36]. Recently, the availability of corneal epithelial imaging using fd-OCTT has made in vivo epithelial mapping possible. However, few reports have investigated the factors that may affect the thickness of the corneal epithelium. Age-related decreases in the thickness of the corneal epithelium, especially in the peripheral and marginal regions of adults, have been reported, but there was no significant difference in the center [23,24]. In our previous study, we reported that while gender correlated with epithelial thickness, the severity of myopia was negatively related to interstitial thickness [29].

The thickness of the corneal epithelium is increasingly observed in children, as it shows structural and functional changes under various conditions [19,30]. This study is the first to investigate the corneal epithelium and stroma thickness in Korean children. In general, the thickness profile of the terrestrial corneal epithelium was similar to that of adults: the thickness of the upper and lateral upper skin was lower than the thickness of the lower and nasal epithelium, respectively, as described in previous reports [5,23]. Interestingly, the thickness of the stroma showed the opposite regional difference: the upper stroma is thicker than the lower stroma. Men showed thicker keratin, especially epithelium, than women. According to recent publications. [30] In school-aged children, thicker central keratinocytes have been reported to be associated with male sex and advanced age, but not with corneal curvature radius, axial length, or fracture. Previous studies have reported that the age, gender, and radius of corneal curvature are associated with the thickness of the paracentric and pericardial epithelium.

Our group has previously monitored changes in corneal epithelial thickness during orthokeratology follow-up for myopia correction in school-aged children [19]. The study found that the thickness of the corneal epithelium increases with age, a finding similar to another study [30]. After controlling for sex, the linear relationship between age and the thickness of the corneal epithelium remained — the thickness of the Decongestant corneal epithelium. Age dependence and sex differences in the thickness of the corneal epithelium influenced the study on the effects of growth. When the multiple regression analysis included body weight and corneal diameter, the effect of age on epithelial thickness was small. The thickness of the corneal epithelium was related to the size of the male, the size of the body weight and height, the size of the corneal diameter, and the size of the thickness of the central angle. As a result, it was found that the linear relationship between the age and thickness of the corneal epithelium is linked to the linear relationship with general Decongestant removal. Ocular factors such as refractive error, mean K, AKD, and axial length were not associated with corneal epithelial or interstitial thickness. Thick corneal stroma seemed to be associated with age, masculinity, and small corneal diameter. Gender differences in corneal epithelial and stroma thickness were consistent and remained significant even after growth-related variables were controlled for. Therefore, it is necessary to take into account gender differences, even on a small scale. It is worth noting that the thickness of the epithelium is a more pronounced gender difference than the thickness of the stroma. Our findings

support previous reports that gonadal hormones can affect the growth of eye tissue [35]. Unlike previous findings, there was no relationship between the thickness of the epithelium and the strength of the cornea. This difference cannot be explained and this needs to be investigated further.

We compared our current results with our previous publications to understand age-related changes in epithelial thickness [23]. The difference in average central epithelial thickness between children and adults [23] may not be surprising given the increase in epithelial thickness associated with growth in children. In the centric and intermediate peripheral regions, the corneal epithelium in children was thinner than in young adults (18-29 years) and thicker than in the elderly (60-80 years). The corneal epithelium thickened in childhood and remained stable in early adulthood, but seemed to thin out in old age, especially in the environment.

Among the strengths of this study are the study of the relationship between corneal substrate thickness and growth-related variables and the measurement of eyes. This study aims to investigate the relationship between the thickness of the corneal substrate and the thickness of the Decongestant cornea. It is estimated that men have a greater axial length than women, and the average corneal force is lower. In our study Decrees that the degree of myopia between boys and girls may not be representative of children generally, but our data provide insight into the relationship between the eyes and growth-related parameters. It has been reported that it is inversely proportional to the power ($r = -0.18$ and -0.11 , respectively) [37]. In another study, we found that there is a negative relationship between corneal force and axial length [38]. The average corneal strength was inversely proportional to the axial length and weight, but the axial length did not linearly correlate with the thickness of the corneal epithelium or cct. In this study, the lack of correlation between refractive error and average corneal strength (CCT) may be due to differences in the age of the participants and sample size.

Our data relate to many thermal measurements. Mean corneal strength, CCT, and epithelial/stromal thickness were inversely proportional to axial length and AKD. The clinical effects of different body weight/weight measurements need to be studied further. In general, our data show that corneal strength tends to decrease as axial length increases during childhood growth.

There are some limitations to our research. Firstly, this was a retrospective study involving only a limited number of months with refractive errors of $+0.75$ to $-6D$ for spherical error and $+0.5$ to $-1.75D$ for cylindrical error. The study analyzed hospital-based data, so the subjects' refractive errors were mainly mild to moderate myopia. This is not unexpected given the large population of short-sighted subjects of Central Asian ethnic groups, but we are aware that our results may not be representative of children in general. the 12-month Deceleration may be due to the lack of correlation between interstitial thickness and the severity of myopia, this limited refractive error. Secondly, the thickness of the corneal epithelium measured by fd-OCT includes the thickness of the tear film, which may overestimate its true value. This technical problem has been described before [23,24], but the high repeatability, invasiveness, and easy acquisition of measurements make this device very useful in clinics and can be especially advantageous for children

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