

## Ocular biometric indices in Vietnamese 46 to 65 years of age

### Índices biométricos oculares en vietnamitas de 46 a 65 años de edad

Hien Thi Thu Nguyen<sup>1\*</sup> <https://orcid.org/0000-0002-6658-7962>

Khoa Xuan Ngo<sup>2</sup> <https://orcid.org/0000-0003-1718-7644>

Luan Thanh Nguyen<sup>3</sup> <https://orcid.org/0000-0002-0858-4106>

Luong Van Hoang<sup>4</sup> <https://orcid.org/0000-0002-2657-4411>

<sup>1</sup>Vietnam National Institute of Ophthalmology. Hanoi, Vietnam.

<sup>2</sup>Hanoi Medical University. Hanoi, Vietnam.

<sup>3</sup>Haiduong Medical Technology University. Haiduong, Vietnam.

<sup>4</sup>Vietnam Military Medical University. Hanoi, Vietnam.

\*Author for correspondence. Email: [thuhienvnio@gmail.com](mailto:thuhienvnio@gmail.com)

#### ABSTRACT

**Introduction:** Ocular axial length, anterior chamber depth and central corneal thickness are three important ocular biometric indices. These measurements are useful to show changes in the Vietnamese population with presbyopia.

**Objectives:** To determine the ocular biometric indices, ocular axial length, anterior chamber depth and central corneal thickness, in Vietnamese population and evaluate the correlation between these indices.

**Methods:** A cross-sectional study was carried out in a Vietnamese population, aged 46 to 65 years. Data on ocular axial length, anterior chamber depth and central corneal thickness were collected. The Student's t test and ANOVA were used to compare the means of the indices, grouped by age and sex. The relationship between the ocular biometric indices was tested using Pearson's correlation, with a significance level of  $p < 0.05$ .

**Results:** 390 eyes of 195 people were analyzed. The mean length of the ocular axis was  $23.13 \pm 0.66$  mm, the depth of the anterior chamber,  $3.15 \pm 0.36$  mm, and the central corneal thickness,  $529.15 \pm 30.57$   $\mu$ m. The three biometric indices decreased with age and were higher in men ( $p < 0.05$ ). The length of the ocular axis had a positive relationship with the depth of the anterior chamber ( $r = 0.411$  and  $p < 0.001$ ) and the central corneal thickness ( $r = 0.141$  and  $p < 0.001$ ). There was no relationship between anterior chamber depth and central corneal thickness ( $r = 0.039$  and  $p = 0.44$ ).

**Conclusion:** Three ocular biometric indices decreased with age and were higher in men. The length of the ocular axis was related to the depth of the anterior chamber and the thickness of the central cornea.

**Keywords:** ocular axial length; anterior chamber depth; central corneal thickness.

## RESUMEN

**Introducción:** La longitud axial ocular, la profundidad de la cámara anterior y el grosor corneal central, son tres índices biométricos oculares importantes. Estas medidas son útiles para mostrar los cambios en la población vietnamita con presbicia.

**Objetivos:** Determinar los índices biométricos oculares, longitud axial ocular, profundidad de la cámara anterior y espesor corneal central, en población vietnamita y evaluar la correlación entre ellos y con la edad y el sexo.

**Métodos:** Se realizó un estudio transversal en población vietnamita, con edad de 46 a 65 años. Se recogieron los datos de longitud axial ocular, profundidad de la cámara anterior y grosor corneal central. Se utilizaron la prueba t de Student y ANOVA para comparar las medias de los índices, agrupados por edad y sexo. La relación entre los índices biométricos oculares fue probada mediante la correlación de Pearson, con un nivel de significación de  $p < 0,05$ .

**Resultados:** Se analizaron 390 ojos de 195 personas. La longitud media del eje ocular fue  $23,13 \pm 0,66$  mm, la profundidad de la cámara anterior,  $3,15 \pm 0,36$  mm, el grosor corneal central,  $529,15 \pm 30,57$   $\mu$ m. Los tres índices biométricos disminuyeron con la edad y fueron mayores en los hombres ( $p < 0,05$ ). La longitud del eje ocular tuvo relación positiva con la profundidad de la cámara anterior ( $r = 0,411$  y  $p < 0,001$ ) y el espesor corneal central ( $r = 0,141$  y  $p < 0,001$ ). No hubo relación entre la profundidad de la cámara anterior y el grosor corneal central ( $r = 0,039$  y  $p = 0,44$ ).

**Conclusión:** Los tres índices biométricos oculares disminuyeron con la edad y fueron mayores en los hombres. La longitud del eje ocular se relacionó con la profundidad de la cámara anterior y el grosor de la córnea central.

**Palabras clave:** longitud axial ocular; profundidad cámara anterior; grosor corneal central.

Recibido: 26/04/2021

Aprobado: 13/07/2021

## INTRODUCTION

Ocular axial length (AL), anterior chamber depth (ACD), and central corneal thickness (CCT) are the 3 main ocular biometric indices. The determination of these indices provides important ophthalmological information in the diagnosis and treatment of eye diseases. According to *Young*,<sup>(1)</sup> the main alteration in myopia and hyperopia is the alteration of the AL. Many investigations have shown, in myopic eyes, that the higher the ACD, the higher the AL. In contrast, hyperopia tends to have small ACD and AL, and a higher risk of glaucoma than normal and myopic eyes. Eyes with a ACD smaller than 2.8 mm have a 42.5-fold higher risk of angle-closure glaucoma than a ACD of 3.0 mm. In the surgical treatment of myopia, CCT plays an important role in choosing excimer laser refractive surgery or intraocular refractive surgery.<sup>(1)</sup> In cataract eyes with indication for surgery, AL is an important index to calculate the power of artificial lens.<sup>(2)</sup>

Studies on the distribution of ophthalmological indices have been published in several countries, such as China, the United States, and Australia.<sup>(3,4)</sup> The results of these studies have established a reference database for diagnosis and treatment. These indices can be affected by race or heredity; therefore, it is impossible for the same standard to apply for all countries. Therefore, it is necessary to carry out studies in different countries, to obtain a base of data appropriate to different morphological characteristics. With the improvement of technology, the IOL Master machine can measure biometric indices accurately and safely because it does not directly contact the corneal surface.<sup>(5)</sup>

---

<http://scielo.sld.cu>

<http://www.revmedmilitar.sld.cu>

Bajo licencia Creative Commons

Clinical ophthalmologists have used foreign indices to compare cases with some disorders, however, there have been many ocular measurements that show differences between ethnic groups. In the epidemiology of eye diseases in Vietnam, there are those in which prevention and diagnosis are related to AL, ACD and CCT, such as cataracts, refractive errors and glaucoma. In addition, the cataract, refractive or glaucoma surgery can change the AL, ACD and CCT.<sup>(6,7)</sup> The absence of a database of ocular biometric indices gives rise to difficulties in diagnosis. Therefore, more studies are needed to complete a database of measurements of normal ocular biometric indices at different ages, which could be used to compare pathological cases.

This study was carried out in order to determine, in the Vietnamese population, the ocular biometric indices, AL, ACD and CCT, and to evaluate the correlation between them and with age and sex.

## METHODS

A cross-sectional study was carried out at the National Ophthalmology Institute of Vietnam, during the period of one year, starting in September 2017. 390 eyes were included, of 195 participants, Vietnamese (living in Vietnam), aged 46 to 65 years, who voluntarily agreed to participate in the study.

People with eye injuries, previous eye surgery, corneal scar, severe cataracts, acute eye diseases, myopia above 6 diopters or hyperopia above 5 diopters were excluded.

Each patient underwent an eye examination. Self-refraction (with a Nidek autorefractor), slit lamp examination, and fundus examination were measured; to rule out any eye disease or high refractive error. The examination was performed by specialists in ophthalmology. The Carl Zeiss Meditec IOL Master 700 equipment was used to evaluate AL, ACD and CCT.

The sample size was calculated using the formula:

$$n = Z_{1-\alpha/2}^2 \frac{s^2}{(X.E)^2}$$

Where:

n: sample size.

---

<http://scielo.sld.cu>

<http://www.revmedmilitar.sld.cu>

Bajo licencia Creative Commons 

s: standard deviation ( $s = 0.368$ ) ( $s = SE \times \sqrt{n} = 0.005 \times \sqrt{4869} = 0.348$ , SE is the standard error of the mean and this n is the sample size of *Hashemi's* research.<sup>(8)</sup>)

$\alpha$ : level of significance ( $\alpha = 0.05$ )

$$Z_{1-\alpha/2}^2 = 1,962$$

$\varepsilon$ : expected error ( $\varepsilon = 0.02$ )

X: mean value (2.62 in *Hashemi's* research<sup>(8)</sup>)

With these values, the calculated size was 171.4. Finally 195 subjects were included.

To compare the means of AL, ACD and CCT, the t test was used for independent samples, between gender groups. The ANOVA test was used to compare the difference in means of AL, ACD and CCT between age groups. Pearson's correlation was applied to analyze the correlation between AL, ACD and CCT, with a significance level of  $p < 0.05$ . The data were analyzed using SPSS v. 20.0.

This study strictly obeys the tenets of Declaration of Helsinki and was approved by Hanoi Medical University Ethics Committee. Informed consents were collected from participants for their anonymous information, to be reported in the study.

## RESULTS

Of the participants, 101 were women (51.8%) and 94 men (48.2%). The mean age was  $56.43 \pm 5.74$ . The AL, ACD and CCT averages were  $23.13 \pm 0.66$  mm,  $3.15 \pm 0.36$  mm and  $529.15 \pm 30.57$   $\mu$ m, respectively. The AL decreased with age, this difference was statistically significant (ANOVA test,  $p < 0.05$ ). The AL was higher in men; this difference was statistically significant (t test,  $p < 0.001$ ). The ACD decreased with age, this difference was statistically significant (ANOVA test,  $p < 0.001$ ). The ACD was higher in men; this difference was statistically significant (t test,  $p < 0.001$ ). The CCT decreased with age; the difference was statistically significant (ANOVA test,  $p < 0.05$ ). The CCT was higher in men; this difference was statistically significant (t test,  $p < 0.001$ ) (table 1 and table 2).

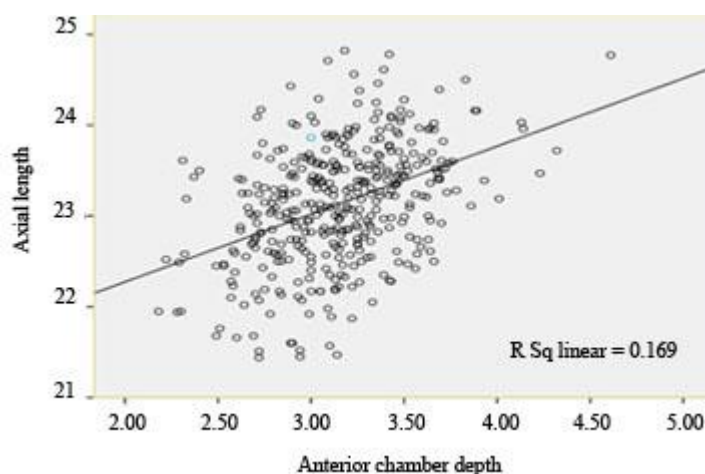
**Table 1 - Average AL, ACD, CCT and relation with age**

Biometric indices	n =390	Age				p (ANOVA test)
		46 – 50 n = 78	51 – 55 n = 88	56 – 60 n = 120	61 -65 n = 104	
AL (mm)	23.13 ± 0.66	23.26 ± 0.69	23.23 ± 0.71	23.06 ± 0.63	23.05 ± 0.61	p < 0.05
ACD (mm)	3.15 ± 0.36	3.25 ± 0.33	3.23 ± 0.45	3.12 ± 0.33	3.04 ± 0.33	p < 0.001
CCT (µm)	529.15 ± 30.57	535.63 ± 27.52	533.2 ± 29.32	526.39 ± 35.35	524.59 ± 26.22	p < 0.05

**Table 2 – Average AL, ACD, CCT and relation with gender**

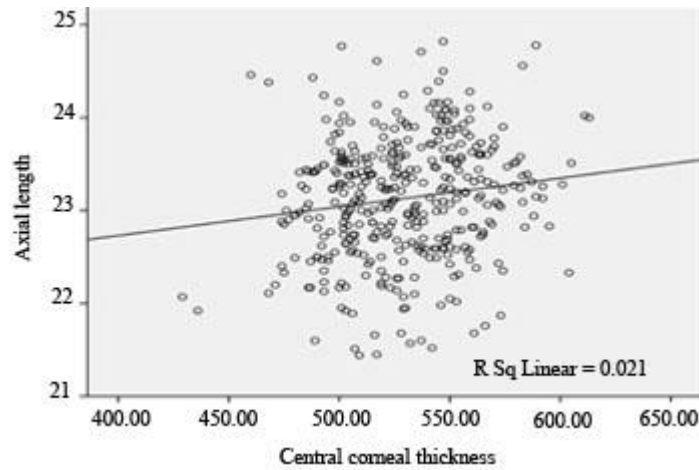
Índices biométricos	n =390	Sexo			p (prueba t)
		Masculino n = 188	Femenino n = 202		
AO (mm)	23,13 ± 0,66	23,37 ± 0,60	22,90 ± 0,62	p < 0,001	
PCA (mm)	3,15 ± 0,36	3,21 ± 0,36	3,08 ± 0,35	p < 0,001	
GCC (µm)	529,15 ± 30,57	538,36 ± 31,15	520,58 ± 27,43	p < 0,001	

Regarding the correlation between AL and ACD (Fig. 1), it was significant ( $r = 0.411$ ;  $p < 0.001$ ). The higher the AL, the higher the ACD.



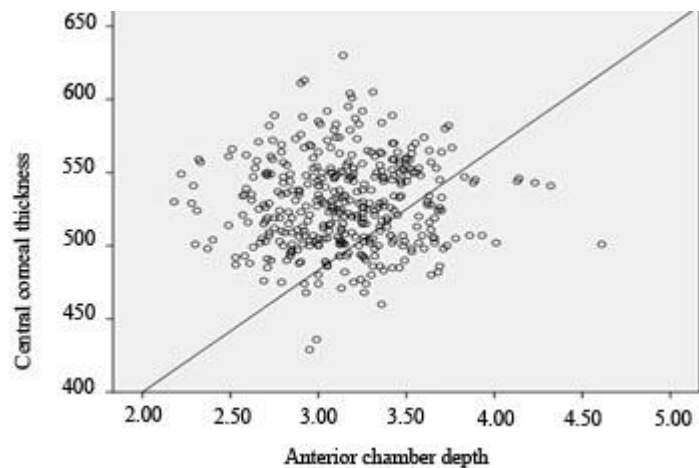
**Fig. 1 - Correlation between AL and ACD.**

Regarding the correlation between AL and CCT (Fig. 2),  $r = 0.141$ ,  $p < 0.001$ . The higher the AL, the higher the CCT.



**Fig. 2** - Correlation between AL and CCT.

There was no correlation between ACD and CCT ( $r = 0.039$ ;  $p = 0.44$ ) (Fig. 3).



**Fig. 3** – Correlation between ACD and CCT.

## DISCUSSION

In recent medical literature, changes in AL, ACD, and CCT are related to age and sex.<sup>(8,9,10,11,12)</sup> After age 40, the eye begins to degenerate and presents presbyopia. AL, ACD and CCT decrease with age, in people over 40 years. The direct relationship between these indices and age was proven by studies by

<http://scielo.sld.cu>

<http://www.revmedmilitar.sld.cu>

*Lee*,<sup>(13)</sup> and *Wu*,<sup>(14)</sup> in addition, the AL, ACD and CCT are higher in people with greater height and weight.

In this study, all three biometric indices (AL, ACD, and CCT) decreased with age. The decrease in AL leads to imbalance and hyperopia. The results showed a negative correlation between age and AL; therefore, older people are at higher risk for hyperopia. ACD decreased with age, especially in those older than 50 years, who increase the risk of angle-closure glaucoma. *Praveen*<sup>(15)</sup> hypothesized that the main cause of the decrease in ACD was the thickening of the lens, due to degeneration because of age. The same results were reported by *Shufelt*,<sup>(4)</sup> *Hashemi*<sup>(8)</sup> (50 - 54 years: AL - 23.16 mm; ACD - 2.66 mm; 55 - 59 years: AL 23.07 mm, ACD - 2, 60 mm; 60 - 64 years: AL - 23.04 mm, ACD 2.52 mm), *Kadhim*<sup>(16)</sup> (age 40 - 49: CCT 538.67  $\mu\text{m}$ ; age 50-59: CCT - 537.39  $\mu\text{m}$ ; age > 60: CCT - 528.75  $\mu\text{m}$  ). *Gudmundsdottir*<sup>(17)</sup> showed that AL decreases with age, in a 5-year cohort study, in 846 people over 50 years of age, in Iceland. This increase in age may be due to degeneration, which decreases ACD, *Praveen* reports.<sup>(15)</sup> *Hahn et al*<sup>(18)</sup> assume that decreased keratocytes, along with age, cause a decrease in CCT.

The AL, ACD, and CCT in this study were higher in men. Some authors hypothesized that the corneal curvature in men is greater than in women, leading to a greater distance from the central cornea to the posterior foramen.<sup>(3,4,10)</sup> Published studies also show higher levels of AL, ACD and CCT in men: *Warrier*<sup>(10)</sup> (male: AL - 23.12 mm, ACD - 2.86 mm; female: AL - 22.54 mm, ACD - 2.79 mm), *Shufelt*<sup>(4)</sup> (male: AL - 23.65mm, ACD - 3.48 mm; Female: AO - 23.18 mm, ACD -3.36 mm), *He*<sup>(3)</sup> (Male: AL - 23.38 mm, ACD - 3.15 mm; female: AL - 22.83 mm, ACD - 3.08 mm), *Hashemi*<sup>(8)</sup> (male: AL - 23.41 mm, ACD - 2.87 mm; female: AL - 22.95 mm, ACD - 2.77 mm), *Chen*<sup>(19)</sup> (male: CCT - 534.1  $\mu\text{m}$ ; female: 528.3  $\mu\text{m}$ ), *Kadhim*,<sup>(16)</sup> (male: CCT - 545.7  $\mu\text{m}$ ; female: 541.9  $\mu\text{m}$  ). The AL, ACD and CCT, had a positive correlation with height and weight.<sup>(13,14)</sup> The height and mean weight of women are lower than that of men of the same age; that could be the reason for the difference between men and women. In this study, the anterior chamber in women was shallower compared to men, which may increase the risk of angle-closure glaucoma in women. The results were consistent with the research by *Do Thi Thai Ha*,<sup>(20)</sup> whose result showed that in Vietnam, the prevalence of glaucoma in women is higher than in men. These results showed a positive relationship between AL and ACD ( $r = 0.411$ ;  $p < 0.001$ ). Many studies have been done on this correlation. *Chen*<sup>(19)</sup> reported a positive correlation between AL and ACD ( $r = 0.651$ ;  $p < 0.001$ ). It is recognized that ACD is higher with higher AL. *Aprioku*<sup>(21)</sup> noted that for every millimeter increase in AL, there was a 0.07mm rise in ACD ( $r = 0.253$ ,  $p = 0.000$ ) and the value are

---

<http://scielo.sld.cu>

<http://www.revmedmilitar.sld.cu>



higher in males. *Sedaghat*<sup>(22)</sup> found that men have an average longer AL ( $23.7\pm 2.4\text{mm}$  vs.  $22.9\pm 2.1\text{mm}$ ;  $p<0.001$ ) and deeper ACD compared to women ( $2.93\pm 0.45\text{mm}$  vs.  $2.82\pm 0.42\text{mm}$ ,  $p=0.002$ ).

In this study, there was a weak positive correlation between AL and CCT ( $r = 0.141$ ;  $p < 0.005$ ). *Hwang's*<sup>(23)</sup> study about Koreans over 40 years of age show the same results. However, studies by *Chen*<sup>(19)</sup> in Taiwanese people over 40 years of age, show no correlations. No correlation was found between ACD and CCT ( $p = 0.44$ ;  $r = 0.039$ ). *Chen*<sup>(19)</sup> shows the same result ( $p > 0.05$ ).

The 3 ocular biometric indices studied decreased with age and were higher in men. The length of the ocular axis was related to the depth of the anterior chamber and the thickness of the central cornea.

## BIBLIOGRAPHIC REFERENCES

1. Young TL. Complex Trait Genetics of Refractive Error. Arch Ophthalmol. 2007 [access: 02/03/2021]; 125(1): 38-48. Available at: <https://jamanetwork.com/journals/jamaophthalmology/article-abstract/419014>
2. Connell BJ, Kane JX. Comparison of the Kane formula with existing formulas for intraocular lens power selection. BMJ Open Ophthalmology. 2019 [access:02/02/2021]; 4: e000251. Available at: <https://bmjophth.bmj.com/content/bmjophth/4/1/e000251.full.pdf>
3. He M, Huang W, Li Y, Zheng Y, Yin Q, Foster PJ. Refractive error and biometry in older Chinese adults: the Liwan eye study. Investigative ophthalmology & visual science. 2009 [access: 02/03/2021]; 50(11): 5130-6. Available at: <https://iovs.arvojournals.org/article.aspx?articleid=2164735>
4. Shufelt C, Fraser-Bell S, Ying-Lai M, Torres M, Varma R. Refractive error, ocular biometry, and lens opalescence in an adult population: the Los Angeles Latino Eye Study. Investigative ophthalmology & visual science. 2005 [access: 02/04/2021]; 46(12): 4450-60. Available at: <https://iovs.arvojournals.org/article.aspx?articleid=2124301>
5. Huang J, Lu W, Savini G, Chen H, Wang C, Yu X, et al. Comparison between a New Optical Biometry Device and an Anterior Segment Optical Coherence Tomographer for Measuring Central Corneal Thickness and Anterior Chamber Depth. Journal of Ophthalmology. 2016 [access: 02/05/2021]; 2016: 6347236. Available at: <https://downloads.hindawi.com/journals/joph/2016/6347236.pdf>

<http://scielo.sld.cu>

<http://www.revmedmilitar.sld.cu>

6. Khalid M, Ameen SS, Ayub N, Mehboob MA. Effects of anterior chamber depth and axial length on corneal endothelial cell density after phacoemulsification. *Pak J Med Sci*. 2019 [access:02/05/2021]; 35(1):200-4. Available at:  
[https://applications.emro.who.int/imemrf/Pak\\_J\\_Med\\_Sci/Pak\\_J\\_Med\\_Sci\\_2019\\_35\\_1\\_200\\_204.pdf](https://applications.emro.who.int/imemrf/Pak_J_Med_Sci/Pak_J_Med_Sci_2019_35_1_200_204.pdf)
7. Kaup S, Shivalli S, Divyalakshmi KS. Central corneal thickness changes in bevel-up versus bevel-down phacoemulsification cataract surgery: study protocol for randomised, triple-blind, parallel group trial. *BMJ Open* 2016 [access:02/03/2021]; 6: e012024. Available at:  
<https://bmjopen.bmj.com/content/bmjopen/6/9/e012024.full.pdf>
8. Hashemi H, Khabazkhoob M, Miraftab M, Emamian MH, Shariati M, Abdolahinia T, et al. The distribution of axial length, anterior chamber depth, lens thickness, and vitreous chamber depth in an adult population of Shahroud, Iran. *BMC ophthalmology*. 2012 [access: 02/06/2021]; 12(1):50. Available at: <https://bmcophthalmol.biomedcentral.com/track/pdf/10.1186/1471-2415-12-50.pdf>
9. Zocher MT, Rozema JJ, Oertel N, Dawczynski J, Wiedemann P, Rauscher FG, et al. Biometry and visual function of a healthy cohort in Leipzig, Germany. *BMC ophthalmology*. 2016 [access: 01/30/2021]; 16(1): 79. Available at: <https://pubmed.ncbi.nlm.nih.gov/27268271>
10. Warriar S, Wu HM, Newland HS, Muecke J, Selva D, Aung T, et al. Ocular biometry and determinants of refractive error in rural Myanmar: the Meiktila Eye Study. *British Journal of Ophthalmology*. 2008 [access: 02/05/2021]; 92(12): 1591-4. Available at:  
<https://pubmed.ncbi.nlm.nih.gov/18927224>
11. Grace MR, Wang M, Jiang X. Ocular Determinants of Refractive Error and Its Age- and Sex-Related Variations in the Chinese American Eye Study. *JAMA Ophthalmol*. 2017 [access:02/04/2021]; 135(7):724-732. Available at:  
<https://jamanetwork.com/journals/jamaophthalmology/fullarticle/2627938>
12. Gessesse GW, Debela AS, Anbesse DH. Ocular Biometry and Their Correlations with Ocular and Anthropometric Measurements Among Ethiopian Adults. *Clinical Ophthalmology*. 2020 [access:02/03/2021]; 14: 3363–3369. Available at:  
<https://www.dovepress.com/getfile.php?fileID=62637>
13. Lee KE, Klein BEK, Klein R, Quandt Z, Wong TY. Association of age, stature, and education with ocular dimensions in an older white population. *Archives of Ophthalmology*. 2009 [access: 01/30/2021]; 127(1): 88-93. Available at: <https://pubmed.ncbi.nlm.nih.gov/19139346>

<http://scielo.sld.cu>

<http://www.revmedmilitar.sld.cu>

14. Wu HM, Gupta A, Newland HS, Selva D, Aung T, Casson RJ. Association between stature, ocular biometry and refraction in an adult population in rural Myanmar: the Meiktila eye study. *Clinical & experimental ophthalmology*. 2007 [access: 02/03/2021]; 35(9): 834-9. Available at: <https://pubmed.ncbi.nlm.nih.gov/18173412>
15. Praveen MR, Vasavada AR, Shah SK, Shah CB, Patel UP, Dixit NV, et al. Lens thickness of Indian eyes: impact of isolated lens opacity, age, axial length, and influence on anterior chamber depth. *Eye*. 2009 [access: 02/05/2021]; 23(7): 1542. Available at: <https://pubmed.ncbi.nlm.nih.gov/18949009>
16. Kadhim YJ, Farhood QK. Central corneal thickness of Iraqi population in relation to age, gender, refractive errors, and corneal curvature: a hospital-based cross-sectional study. *Clinical Ophthalmology (Auckland, NZ)*. 2016 [access: 02/04/2021]; 10: 2369-76. Available at: <https://www.dovepress.com/getfile.php?fileID=33774>
17. Gudmundsdottir E, Arnarsson A, Jonasson F. Five-year refractive changes in an adult population: Reykjavik Eye Study. *Ophthalmology*. 2005 [access: 02/06/2021]; 112(4): 672-7. Available at: <https://pubmed.ncbi.nlm.nih.gov/15808261>
18. Hahn S, Azen S, Ying-Lai M, Varma V, Los Angeles Latino Eye Study Group. Central corneal thickness in Latinos. *Investigative ophthalmology & visual science*. 2003 [access: 02/05/2021]; 44(4): 1508-12. Available at: <https://pubmed.ncbi.nlm.nih.gov/12657586>
19. Chen MJ, Liu UT, Tsai CC, Chen YC, Chou CK, Lee SM. Relationship between central corneal thickness, refractive error, corneal curvature, anterior chamber depth and axial length. *Journal of the Chinese Medical Association*. 2009 [access: 02/05/2021]; 72(3): 133-7. Available at: <https://www.sciencedirect.com/science/article/pii/S1726490109700383>
20. Kho Tàng Kiến Thức Y Học. Khảo sát tình trạng glôcôm trên những mắt có lõm đĩa thị nghi ngờ bệnh glôcôm tại Bệnh viện Mắt Trung Ương. *Luận Văn Y Học*; 2018. [access: 02/05/2021]. Available at: <https://luanvanyhoc.com/khao-sat-tinh-trang-glocom-tren-nhung-mat-co-lom-dia-thi-nghi-ngo-benh-glocom-tai-benh-vien-mat-trung-uong>
21. Aprioku IN and Ejimadu CS. Analysis of Ocular Axial Length and Anterior Chamber Depth in Port Harcourt, Nigeria. *World Journal of Ophthalmology & Vision Research*. 2019 [access:02/05/2021]; 2(2): 1-7. Available at: <https://irispublishers.com/wjovr/pdf/WJOVR.MS.ID.000535.pdf>
22. Sedaghat MR, Azimi A, Arasteh P, Tehranian N, Bamdad S. The Relationship between Anterior Chamber Depth, Axial Length and Intraocular Lens Power among Candidates for Cataract Surgery.

<http://scielo.sld.cu>

<http://www.revmedmilitar.sld.cu>

Electronic Physician. 2016 [access:02/04/2021]; 8(10): 3127-31. Available at:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5133039/pdf/epj-08-3127.pdf>

23. Hwang YH, Kim HK, Sohn YH. Central Corneal Thickness in a Korean Population: The Namil Study Central Corneal Thickness in a Korean Population. Investigative ophthalmology & visual science. 2012 [access: 02/05/2021]; 53(11): 6851-5. Available at:

<https://iovs.arvojournals.org/article.aspx?articleid=2127129>

### Conflict of interest

Los autores plantean que no tienen conflictos de interés

### Authorship contribution

Conceptualization: *Hien Thi Thu Nguyen, Khoa Xuan Ngo, Luan Thanh Nguyen, Luong Van Hoang.*

Data curation: *Hien Thi Thu Nguyen, Khoa Xuan Ngo, Luan Thanh Nguyen, Luong Van Hoang.*

Formal analysis: *Hien Thi Thu Nguyen, Khoa Xuan Ngo, Luan Thanh Nguyen, Luong Van Hoang.*

Acquisition of funds: *Hien Thi Thu Nguyen, Khoa Xuan Ngo, Luan Thanh Nguyen, Luong Van Hoang.*

Research: *Hien Thi Thu Nguyen, Khoa Xuan Ngo, Luan Thanh Nguyen, Luong Van Hoang.*

Methodology: *Hien Thi Thu Nguyen, Khoa Xuan Ngo, Luan Thanh Nguyen, Luong Van Hoang.*

Project administration: *Hien Thi Thu Nguyen, Khoa Xuan Ngo, Luan Thanh Nguyen, Luong Van Hoang.*

Resources: *Hien Thi Thu Nguyen, Khoa Xuan Ngo, Luan Thanh Nguyen, Luong Van Hoang.*

Supervision: *Hien Thi Thu Nguyen, Khoa Xuan Ngo, Luan Thanh Nguyen, Luong Van Hoang.*

Validation: *Hien Thi Thu Nguyen, Khoa Xuan Ngo, Luan Thanh Nguyen, Luong Van Hoang.*

Display: *Hien Thi Thu Nguyen, Khoa Xuan Ngo, Luan Thanh Nguyen, Luong Van Hoang.*

Drafting - original draft: *Hien Thi Thu Nguyen, Khoa Xuan Ngo, Luan Thanh Nguyen, Luong Van Hoang.*

Drafting - revision and editing: *Hien Thi Thu Nguyen, Khoa Xuan Ngo, Luan Thanh Nguyen, Luong Van Hoang.*