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Research On Anthropometric Indexes Of Ocular In Vietnamese Citizens Aged From 46 To 65

Nguyen Thi Thu Hien[1] , Ngo Xuan Khoa[2] , Hoang Van Hong[2] , Nguyen Thanh Luan[3] , Nguyen Thai Ha Duong[2] , Nguyen Thi Tho[4] , Ngo Huong Giang[5]

[1]National Institute Of Ophthalmology, Vietnam

[2]Ha Noi Medical University, Vietnam

[3]Hai Duong Medical Technical University, Vietnam

[4]Thai Binh University of Medicine and Pharmacy

[5]HUS High School for Gifted Students

Corresponding author: Ngo Xuan Khoa, 1 Ton That Tung, Kim Lien, Dong Da, Hanoi 116001

Abstract

Background There are three main ocular indexes - ocular axial length, anterior chamber depth, and central corneal thickness. The measures of those three anthropometric parameters can help in ocular disease diagnostics. So, **the main aim** of the research was to determine the measurements of ocular axial length, the anterior chamber depth and central corneal thickness in Vietnamese people with the age of 46 to 65. Assess several relevant factors in mentioned ophthalmic anthropometry.

Methods: A prospective cross – section study was conducted in Vietnameses people aged from 46 to 65 in Vietnam National Institute of Ophthalmology. Were measured data about axial length, anterior chamber depth, and central corneal thickness. Independent Sample T-Test and ANOVA test were used for comparison in groups. Were fixed the correlations between anthropometric ocular indices, age, and gender in help of Pearson Correlation, $p < 0.05$.

Results: Have been recruited 390 eyes from 195 people in the experiment. The average ocular axial length was 23.13±0.66 mm, anterior chamber depth was in 3.15±0.36 mm, and central corneal thickness was fixed at 529.15±30.57 µm. All three biometric indices decreased with age and were higher in males ($p<0.05$). The axial length had positive correlation with anterior chamber depth ($r=0.411$, $p<0.001$) and central corneal thickness ($r=0.141$, $p<0.001$) . There was no correlation between anterior chamber depth and central corneal thickness ($r=0.039$; $p=0.44$).

Conclusion: Was fixed, three anthropometric ocular indices relative to age and gender. Moreover, the axial length is correlated with anterior chamber depth and central corneal thickness.

Keywords: anthropometric ocular indices, anterior chamber depth, central corneal thickness, ocular axial length, Vietnam.

1. Introduction

Ocular axial length (AL), anterior chamber depth (ACD) and central corneal thickness (CCT) are three major antropometric ocular indices in ophthalmology. Determining these indices provides important ophthalmologic information in diagnosis and treatment of ocular diseases. The main reason for myopic and hyperopia was the alteration of AL. Many researches have shown in eye with myopia that the higher the ACD is, the more AL and ACD are bigger. In contrast, eyes with hyperopia usually have short ACD and AL and higher risk of glaucoma than normal and myopic. Eyes with ACD have less than 2.8 mm are at higher risk of angle closure glaucoma than ACD of 3.0 mm by 42.5 times. In surgical treatment of myopic, CCT plays an important role in choosing either refractive surgery by Laser Excimer in surface of cornea or intraocular refractive surgery [1-2].

Many relevant studies about distribution of ophthalmologic indices have been reported at many countries such as China, USA and Australia [3-5]. The results of these studies have established a reference database for diagnosis and treatment. However, because these indices could be affected by race and heredity, therefore, it is impossible to have the same standard applied for all countries [6]. Therefore, it is necessary to carry out studies in different countries to gain appropriate database suitable for different morphologic features.

In Vietnam, there have been several anthropometric studies of ocular, however it has been enough for ages. In practice, clinical ophthalmology in previous lectures and researches used to use foreign indices to compare with disorder cases, however, there have been many anthropometric ocular showing the difference in results of different ethics. Epidemiology in Vietnam includes ocular diseases, in which prevention and diagnosis are related to AL, ACD and CCT, such as cataract, refractive error or glaucoma. The insufficiency of database and anthropometric ocular indices causes difficulty in diagnosis. Therefore, more studies need to be conducted to complete a database of normal anthropometric ocular in ages, which could be used to compare pathological cases.

In order to contribute to provide more database of ocular anthropometry in Vietnamese people, we carried out this study to determine the measurements of ocular AL, ACD and CCT in Vietnamese people aged of 46 to 65. And to assess several relevant factors in mentioned ophthalmic anthropometry.

2. Materials and Methods

The prospective cross-section study have been carried out in Vietnam National Institute of Ophthalmology from 2017 to September, 2018. In the current study, we recruited 390 eyes from 195 participants were Vietnamese people living in Vietnam, aged from 46 to 65 and agreed to participate in study. People with: eye injuries, previous eye surgery, scar on cornea, severe cataract, acute eye diseases, myopic above 6D and hyperopia above 5D were excluded from the study.

Each patient underwent a through eye examination process, auto-refraction measurement (Nidek autorefractor), slit – lamp, fundus examination were carried out by registered ophthalmologists to rule out any ocular diseases and high refractive error. IOL Master 700 by Carl Zeiss Meditec was employed to evaluate the AL, ACD and CCT.

Independent Sample T test and ANOVA test were used to compare means of groups. Pearson correlation was applied to analyze the correlation between age, gender with AL, ACD, CCT and between AL, ACD and CCT (level of significance, $p<0.05$). Data was analyzed by SPSS version 20.0.

3. Results

We recruited 390 eyes from 195 people for the current study. The participants were 101 females accounted for 51.8%, 94 males accounted for 48.2%, were in the 46 – 65 age group. The average age was 56.43±5.74.

The average AL, ACD and CCT were 23.13±0.66 mm, 3.15±0.36 mm and 529.15±30.57µm, respectively (Table 1).

The AL decreased with ages, this difference was statistically significant (ANOVA test $p<0.05$). The AL was higher in male, 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 male, 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 male, this difference was statistically significant (T-test $p<0.001$).

The correlation between AL and ACD was studied (Figure 1). There was a significant correlation between the AL and ACD ($r=0.411$ and $p<0.001$), which implied the equation (1):

$y = 0.747*x + 20.780,$

(1)

Where, y is stands for AL;

x is stands for ACD.

This means that the more the AL was, the more the ACD was.

The correlation between AL and CCT was studied (Figure 2). There was a the correlation between the AL and CCT ($r = 0,141$ and $p<0,001$), which implied the equation $y = 0.003*x + 21.495$. In which, y stands for AL and x stands for CCT. This means that the more the AL was, the more the CCT was.

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

4. Discussion

To the best of our knowledge, the present study provides the first comprehensive assessment of the ocular antropometric in Vietnamese with age from 46 to 65. The studies carried out in other countries showed different results in 3 indices (Table 2)

The first reason of value difference in AL, ACD and CCT was the difference in samples ages. The AL and ACD decreased with age in people above 40 years old, this had been affirmed by previous studies. Moreover, as comparing results of Chinese and Iranian people to German and American, those of Asians were smaller than those of Western people and Oceanian in the same age. This difference could be explained by race and heredity [6]. The direct relationship between these measurements and ages or weight had been proved by studies by Wong [10], Lee [14], Wu [15], AL, ACD and CCT was higher in people having bigger height and weight.

In this study, all three biometric indices AL, ACD and CCT decreased with age. The same results had been reported by Shufelt [4], Hashemi [9], Tan [16], and Kadhim [17]. Gudmundsdottir [18] had proved that the AL decreased along with age in a 5-year cohort study in 846 above 50 years old Icelander people. This increase might be due to the degeneration which decreases ACD, reported by Praveen [19]. Hahn et al. assumed that the decrease of keratoacytes in parenchyma along with age caused the decrease of CCT with age [20] (Table 3).

The ocular AL, ACD in this study were higher in male. Table 4 had shown the higher AL, ACD in male. The AL, ACD and CCT had positive correlation with height and weight [14-15]. Meanwhile, mean height and weight in women were lower than those in men at the same age, it could be the reason of the difference between male and female.

Our result that the positive correlation between AL and ACD ($r=0.411$, $p<0.001$). There had been many studies about the correlation between these. Chen et al. [21] indicated a positive correlation between AL and ACD in 2009 ($r=0.651$, $p<0.001$). We had regconized that ACD is higher with longer AL.

In this study the weak positive correlation between AL and CCT ($r=0.141$, $p<0.005$). Studies by Hwang [12] in over-40-year-old Korean also showed the same results. However, studies by Chen [21] in over-40-year-old Taiwanese did not show the correlation between AL and CCT. We had not recognize any correlation between ACD and CCT (p=0.44, r=0.039). And the same results were published by Chen et al. (p>0.05) [21].

5. Conclussion

In our study, it is the first time that anthropometric indices of AL, ACD and CCT were determined in Vietnamese people with the age of 46 to 65. As comparing to international studies, the AL in Vietnamese people was similar to studies on Asians and smaller than that in Western people and Oceanian. Three of incides decreased with age and are higher in male, compared to female. The AL had a positive correlation with ACD and CCT.

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Table 1. The average AL, ACD, CCT and correlation with age, gender.

				Age				Gender	
	n=390	46-50 n=78	51-55 n=88	56-60 n=120	61-65 n=104	p (ANOVA test)	Male n=188	Female n=202	p (T-test)
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	23.37± 0,60	22.90 ±0.62	p <0.001
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	3.21± 0.36	3.08 ±0.35	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	538.36 ±31.15	520.58 ±27.43	p <0.001

Table 2. The AL, ACD, CCT in studies

Authors	Age (y.o)	Place	AL (mm)	ACD (mm)	CCT (µm)
Shufelt [4]	>40	America	23.38	3.41	
Zocher [7]	20-69	Germany	23.80	3.20	
Warrier [8]	>40	Myanmar	22.76	2.82	
Hashemi [9]	40-64	Iran	23.13	3.13	
Wong [10]	40-81	Singapore	23.23	2.90	
Hashemi [11]	40-64	Iran			528.5
Hwang [12]	> 40	Korea			530.9
Chua [13]	> 40	China/ Singapore			552.3
	> 40	Malaysia Singapore			540.9
	> 40	India/ Singapore			540.4
Nguyen Thanh Luan	46-65	Vietnam	23.13	3.13	529.15

Table 3. Relation of AL, ACD and CCT with age in studies

Authors	Age	Place	AL (mm)	ACD (mm)	CCT
Warrier [8]	40-49	Myanmar	22.75	3.03	
	50-59	Myanmar	22.74	2.84	
	60-69	Myanmar	22.75	2.76	

Authors	Age	Place	AL (mm)	ACD (mm)	CCT
Fotedar [5]	59-64	Australia	23.60	3.20	
	65-74	Australia	23.44	3.13	
Wong [10]	40-49	Singapore	23.54	3.0	
	50-59	Singapore	23.37	2.92	
Hashemi [9]	50-54	Iran	23.16	2.66	
	55-59	Iran	23.07	2.60	
	60-64	Iran	23.04	2.52	
Tan [16]	40-49	Singapore			558.16
	50-59	Singapore			551.93
	60-69	Singapore			546.04
Kadhim [17]	40-49	Iraq			538.67
	50-59	Iraq			537.39
	>60	Iraq			528.75
Nguyen Thanh Luan	46-50	Vietnam	23.26	3.25	535.63
	51-55	Vietnam	23.23	3.23	535.20
	56-60	Vietnam	23.06	3.12	526.39
	61-65	Vietnam	23.05	3.04	524.59

Table 4. Relation of AL, ACD and CCT with gender in studies

Country	Age	AL (mm)		ACD (mm)		CCT (μm)	
		Male	Female	Male	Female	Male	Female
Warrier [8]	>40	23.12	22.54	2.86	2.79		
Shufelt [4]	>40	23.65	23.18	3.48	3.36		
He [3]	>50	23.38	22.83	3.15	3.08		

Hashemi [9]	40-64	23.41	22.95	2.87	2.77		
Kadhim [17]	20-75					545.70	541.9
Hwang [12]	>40					534.1	528.3
Chen [21]	40-80					555	553
Nguyen Thanh Luan	46-65	23.37	22.9	3.2	3.08	538.4	520.6

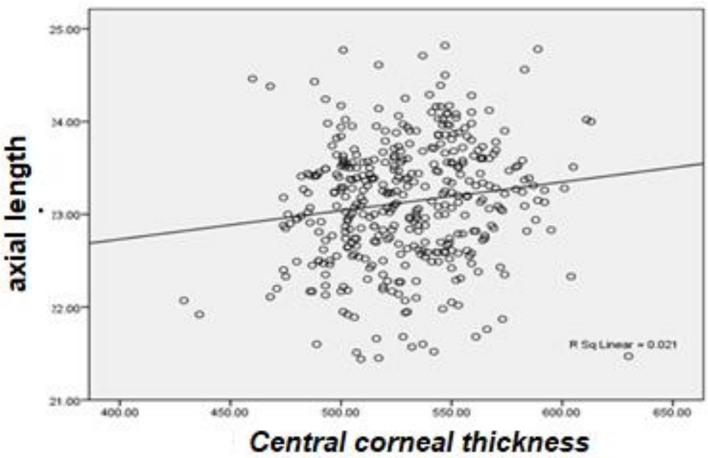

Figure 1. Correlation between AL and ACD

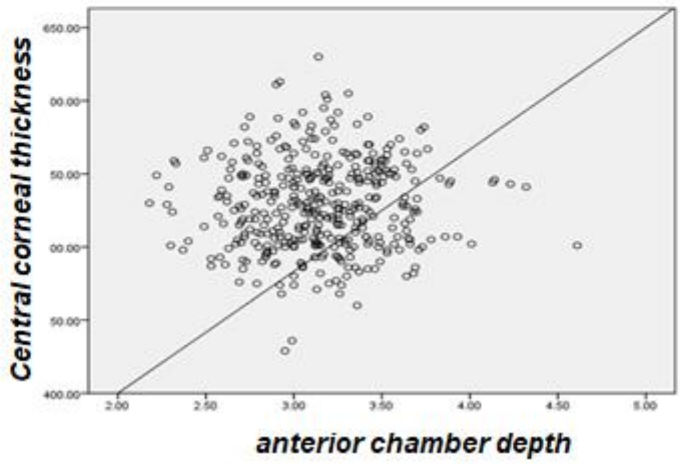

Figure 2. Correlation between AL and CCT

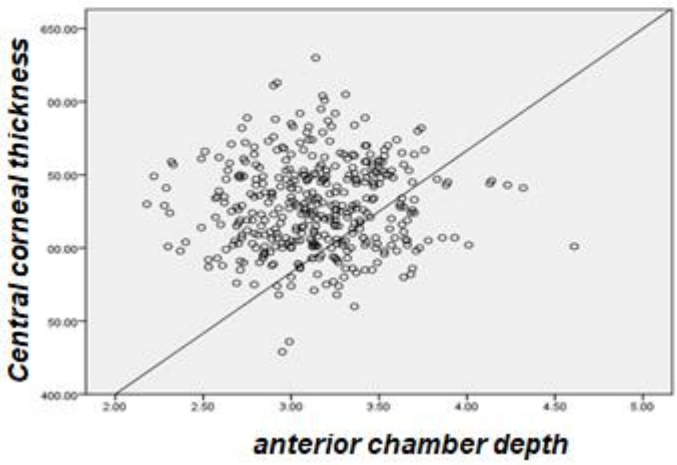

Figure 3. Correlation of ACD and CCT