The Distribution of Ocular Biometry in Iranian School Children

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Abstract

***Purpose*:** To determine the distribution of axial length (AL), vitreous chamber depth (VCD), anterior chamber depth (ACD), lens thickness (LT), lens power (LP), radius of curvature (CR), and white-to-white corneal diameter (WTW) in the 14-20 year age range

***Methods*:** In a cross-sectional study, sampling was done from Aligoodarz high schools using multistage simple cluster sampling. For all students, visual acuity and non-cycloplegic refraction tests were performed. Biometric components were measured using Allegro Biograph (WaveLight AG, Erlangen, Germany).

***Results*:** In this report, data from 434 cases was used in the analysis; of these 222 (51.2%) were females. Mean and 95% confidence intervals of AL, VCD, ACD, LT, LP, CR, and WTW in the studied sample were 23.4 mm (23.32 to 23.48), 16.82 mm (16.74 to 16.9), 3.14 mm (3.12 to 3.16), 3.44 mm (3.42 to 3.46), 22.65 diopter (22.47 to 22.83), 7.74 mm (7.72 to 7.76), and 12.26 mm (12.22 to 12.3), respectively. In the multiple regression model, AL, VCD, ACD, CR, and WTW was significantly higher in boys while mean LT and LP were significantly higher in girls. The distributions of AL, ACD, LT, and CR were significantly different from normal. The distributions of AL, LT, and CR were leptokurtic, unlike ACD which had a platykurtic distribution pattern.

***Conclusion*:** In this report, we describe the normal ranges of ocular biometric components in a sample population of 14-20 year old Iranians. ACD in this study was shorter and WTW was larger than previous studies and other components were in the midrange. More studies throughout Iran are needed to verify a shorter ACD and larger WTW. All components of ocular biometry showed significant inter-gender differences.

***Keywords*:** Ocular Biometry, High School Children, Iran

Iranian Journal of Ophthalmology 2014;26(2):72-81 © 2014 by the Iranian Society of Ophthalmology

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Received: April 5, 2014
Accepted: September 7, 2014

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Financial disclosures: None

Introduction

Ocular biometric components, specially axial length (AL) and corneal radius of curvature (CR), not only have an important role in causing refractive errors, but it is also essential for ophthalmologists to have knowledge about them before certain ocular surgeries.[1-7] Previous studies have found that ocular biometrics are affected by race, genetics, and environmental factors.[8-11]

Myopia and astigmatism are prevalent in East Asian countries while hyperopia is more prevalent in European and American countries.[12-18] The most important cause of such diversity in the distribution of refractive errors is the ethnic variation that exists in terms of ocular biometrics.

A study by Ip et al[11] demonstrated that East Asian children with longer ALs were more myopic and European Caucasians with shorter ALs were more hyperopic. Overall, these differences have caused reports to show varying normal ranges for ocular biometric components in different populations and races around the world. Also, due to the differences in each geographic area, diagnostic and therapeutic decisions should be based on normal values of the biometric components measured in the same area. During the last decade, several studies in Iran have investigated refractive errors[19-23]; however, the distribution of some of the components of the ocular biometrics in the Iranian teenage population is unknown to us. Studies indicate that the eye is still growing between the ages of 6 and 14 years,[24,25] and changes in certain components appear to stop after the age of 14 years.

Thus, knowledge of normal ranges of biometric components in this age group can help in the diagnosis and treatment of eye conditions, specially refractive errors.

The aim of presenting this report is to describe the distribution of AL, anterior chamber depth (ACD), lens power (LP), corneal CR, lens thickness (LT) and vitreous chamber depth (VCD) by age and gender in the 14-20 year age range.

Methods

The present study was conducted cross-sectionally in November 2011. The target population was high school students in Aligoudarz which is a city in Lorestan province in the west of Iran. We used multistage simple cluster sampling to select samples from Aligoudarz high schools, using classes and education years as clusters.

The target sample size for this study was 400. Two educational institutions (one of the three boys' centers, and one of the two girls' centers which accommodated at least 200 rural and urban students) were randomly selected. Then, two classes were randomly selected from each grade in each school. All students enrolled in these classes were invited. If a certain class was not able to participate, for any reason, another class of the same grade was selected instead. A total of 16 classes were targeted as the sampling clusters.

After selecting students, the importance of the study was explained to them, and those who were willing to participate in the study, had a participation form completed, had an interview, and their demographics were recorded.

Examinations

After the interview, students were guided to the examination room where all examinations were conducted. First, a skilled technician determined non-cycloplegic refraction using a autorefractometer TOPCON RM8800 (Topcon Corporation, Tokyo, Japan) and its results were refined using retinoscopy for diagnosis of spasm of accommodation and psodomyopia with HEINE BETA 200 (HEINE Optotechnic Germany) and MSD (MSD Meniscus Trial Lenses, Italy). Then, if the student had spectacles, their visual acuity was first tested with the previous glasses using a Snellen E-chart at six meters. If the student had no glasses, their uncorrected visual acuity (UCVA) was measured. In the next stage, biometry was done using the Allegro Biograph (WaveLight AG, Erlangen, Germany). Biometry was done for both eyes of all participating students. LP was calculated according to the Bennett method[26] using the spherical equivalent (SE) base on subjective retinoscopy, keratometry, AL, ACD, and LT. For the calculation of the A and B constants of this formula, a Q value of 0.36 was used[26] and a lens equivalent index of 1.427 was used, as proposed by Mutti for children's lenses.[27]

Since VCD is not measured directly with the Biograph, ACD, LT, and corneal thickness (mm) values were deducted from AL to calculate VCD.

Statistical analysis

In this report, we determined the mean and 95% confidence intervals for each ocular biometry index by age and gender. In this report, we used 25%, 50%, 75%, 95%, and 99% percentiles to show the distribution of these variables. Also, to find the data distribution difference from normal distribution, we used the Kolmogorov–Smirnov test, and determined distribution indices such as Interquartile Range, Kurtosis, and Skewness for these variables. To examine statistical relationships, we used simple and multiple linear regression tests. We used the independent samples *t*-test to compare the indices between two gender groups, and the analysis of variance to detect differences among age groups.

Ethical issues

A written informed consent was obtained from the parents of school children who participated in our study. The protocol of this study was approved by the review board of Noor Ophthalmology Research Center.

Results

A total of 438 cases were examined in this study; of these, four did not have biometry data, and eventually, analyses were done with data from 434 people. Of the participants, 222 (51.2%) were female. Mean and standard deviation of the age in these subjects was 16±1.3 years (14 to 20 years).

Results of this study showed a high correlation between the two eyes in terms of AL (Pearson correlation=0.965), ACD (Pearson correlation=0.965), LT (Pearson correlation=0.955), white-to-white corneal diameter (WTW) (Pearson correlation=0.930), VCD (Pearson correlation=0.942), and CR, (Pearson correlation=0.833), and thus, only results of the right eye were analyzed.

Mean, standard deviation, and 95% confidence intervals of the studied biometric components are presented in table 1 by gender. Comparison of the assessed indices in this study between genders indicated that mean AL, VCD, ACD, CR, and WTW readings were significantly higher in boys, while mean LP and LT was significantly higher among girls (Table 1). Figure 1 illustrates the distribution of AL, VCD, ACD, LT, LP, CR, and WTW in the studied population. As demonstrated in table 2, the distributions of AL, ACD, LT, and CR were significantly different from normal distribution. According to the normal distribution indices in table 2, the distributions of AL, LT, and CR were leptokurtic, unlike ACD which showed a platykurtic distribution pattern. Table 2 contains 5%, 25%, 50%, 75%, 95%, and 99% percentiles of biometric components.

Table 3 summarizes the mean, standard deviation, and 95% confidence intervals for AL, VCD, ACD, LT, LP, CR, and WTW in different age groups in this study; according to the results of this study, only WTW was significantly different among age groups (p=0.023). Table 4 shows the mean, standard deviation, and 95% confidence intervals for biometric components in this study by place of residence.

Table 5 shows the results of multiple linear regression tests; according to results of this model, after entering age, place of residence, and gender into the multiple model, only gender correlated significantly with biometric components.

The prevalence of myopia significantly increased with age in the multiple logistic regression model; the prevalence of myopia showed an increasing trend from 21.8% in 14 year olds to 37.1% in the 18 year old age group (p<0.001, OR=1.26).

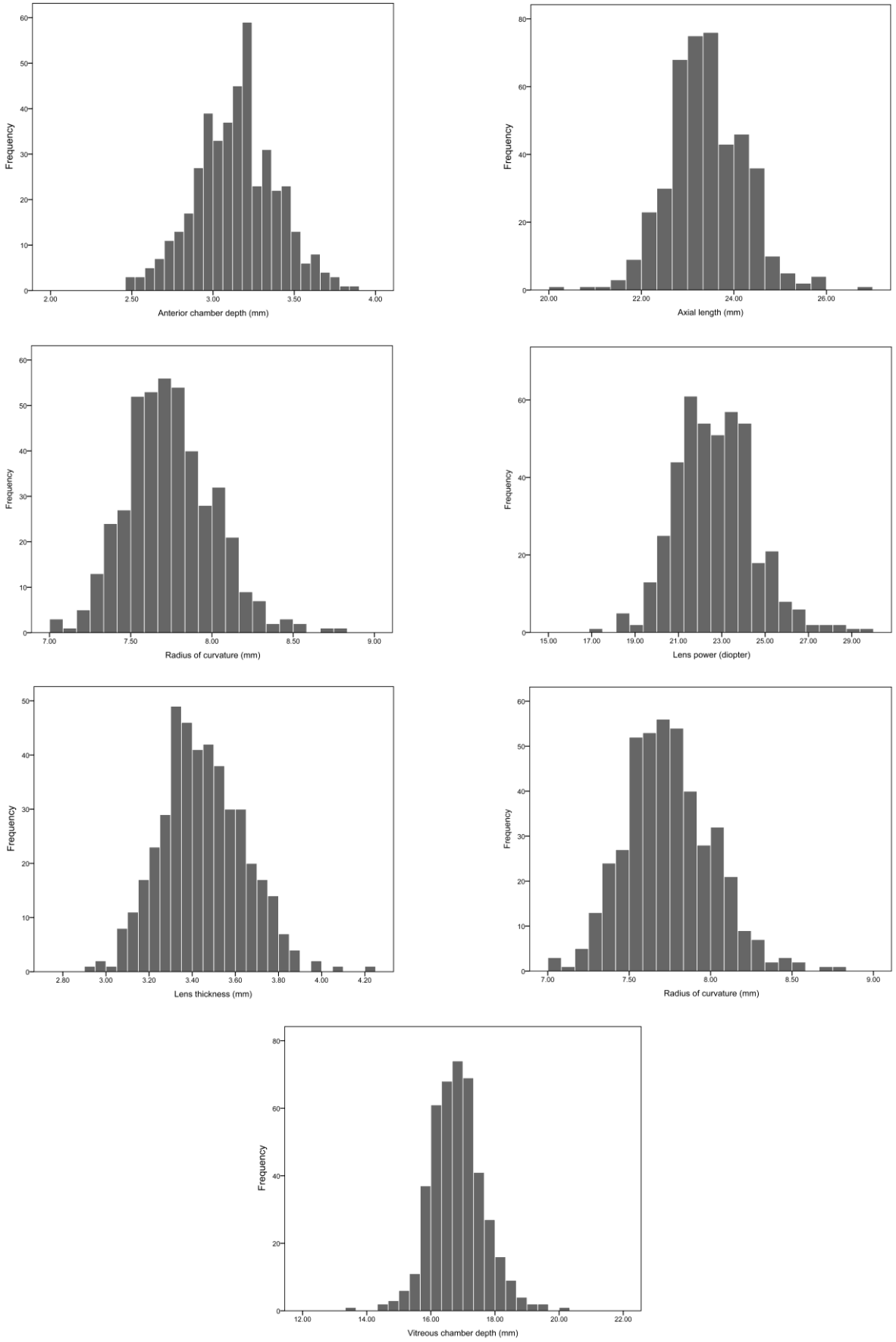

Figure 1. The distribution of ocular biometrics in 14-20-year old schoolchildren

Table 1. The mean and 95% confidence interval of axial length, vitreous chamber depth, anterior chamber depth, lens thickness, lens power, corneal radius of curvature and white-to-white of high school students by gender

	Total	Male	Female	
Ocular biometrics	**Mean±SD (95%CI)**	**Mean±SD (95%CI)**	**Mean±SD (95%CI)**	**p***
AL (mm)	23.4±0.84 (23.32 to 23.48)	23.76±0.82 (23.64 to 23.88)	23.06±0.71 (22.96 to 23.16)	<0.001
VCD (mm)	16.82±0.83 (16.74 to 16.9)	17.15±0.80 (17.05 to 17.25)	16.51±0.72 (16.41 to 16.61)	<0.001
ACD (mm)	3.14±0.25 (3.12 to 3.16)	3.19±0.24 (3.15 to 3.23)	3.08±0.24 (3.04 to 3.12)	<0.001
LT (mm)	3.44±0.19 (3.42 to 3.46)	3.42±0.18 (3.40 to 3.44)	3.47±0.20 (3.45 to 3.49)	0.004
LP (diopter)	22.65±1.83 (22.47 to 22.83)	22.15±1.86 (21.90 to 22.40)	23.14±1.67 (22.92 to 23.36)	<0.001
CR (mm)	7.74±0.27 (7.72 to 7.76)	7.83±0.27 (7.79 to 7.87)	7.66±0.24 (7.62 to 7.70)	<0.001
WTW (mm)	12.26±0.42 (12.22 to 12.3)	12.37±0.42 (12.31 to 12.43)	12.17±0.39 (12.11 to 12.23)	<0.001

AL: Axial length, VCD: Vitreous chamber depth, ACD: Anterior chamber depth, LT: Lens thickness, LP: Lens power, CR: Corneal radius, WTW: white to white corneal diameter, * p-value calculated by independent *t*-test

Table 2. The percentiles, Skewness, Kurtosis and interquartile range of axial length, vitreous chamber depth, anterior chamber depth, lens thickness, crystalline lens power, corneal radius of curvature and white-to-white in this study by gender

		Percentile						Normal distribution indices			
Gender	**Ocular component**	**5**	**25**	**50**	**75**	**95**	**99**	**IQR**	**Skewness**	**Kurtosis**	**KS**
Male	AL (mm)	22.44	23.30	23.70	24.28	25.02	25.94	0.99	0.062	1.542	0.094
	VCD (mm)	16.04	16.68	17.13	17.58	18.55	19.40	0.91	0.258	1.783	0.053
	ACD (mm)	2.82	3.04	3.20	3.36	3.60	3.73	0.32	-0.015	-0.089	0.200
	LT (mm)	3.11	3.30	3.41	3.54	3.74	3.86	0.24	0.069	-0.136	0.054
	LP (diopter)	19.55	20.96	21.93	23.28	25.28	26.74	2.33	0.061	1.973	0.200
	CR (mm)	7.40	7.65	7.81	8.02	8.28	8.52	0.37	0.398	0.272	0.200
	WTW (mm)	11.67	12.07	12.36	12.65	13.02	13.25	0.59	-0.045	-0.415	0.200
Female	AL (mm)	22.00	22.68	23.02	23.45	24.39	24.84	0.730	0.045	1.136	0.023
	VCD (mm)	15.51	16.04	16.46	16.89	17.90	18.41	0.850	-0.008	1.738	0.200
	ACD (mm)	2.68	2.93	3.10	3.21	3.47	3.63	0.280	-0.028	0.054	0.028
	LT (mm)	3.15	3.33	3.46	3.60	3.79	3.97	0.270	0.449	0.511	0.200
	LP (diopter)	20.61	21.89	23.09	24.03	26.25	27.92	2.140	0.609	0.933	0.200
	CR (mm)	7.28	7.51	7.65	7.79	8.07	8.23	0.300	0.259	0.638	0.200
	WTW (mm)	11.46	11.91	12.18	12.47	12.78	13.01	0.570	-0.218	-0.052	0.200

AL: Axial length, VCD: Vitreous chamber depth, ACD: Anterior chamber depth, LT: Lens thickness, LP: Lens power, CR: Corneal radius, WTW: white to white corneal diameter, IQR: Interquartile range, KS: Kolmogorov-Smirnova

Table 3. The mean and 95% confidence interval of axial length, vitreous chamber depth, anterior chamber depth, lens thickness, crystalline lens power, corneal radius of curvature and white-to-white of high school students by age group

Age (years)	**14 (n=55)**	**15 (n=126)**	**16 (n=99)**	**17 (n=93)**	**≥18 (n=61)**	**p***
Ocular component	**Mean±SD (95%CI)**	**Mean±SD (95%CI)**	**Mean±SD (95%CI)**	**Mean±SD (95%CI)**	**Mean±SD (95%CI)**	
AL (mm)	23.48±0.9 (23.24 to 23.72)	23.48±0.84 (23.34 to 23.62)	23.27±0.79 (23.11 to 23.43)	23.41±0.88 (23.23 to 23.59)	23.38±0.82 (23.18 to 23.58)	0.374
VCD (mm)	16.88±0.85 (16.66 to 17.1)	16.89±0.83 (16.75 to 17.03)	16.69±0.75 (16.53 to 16.85)	16.86±0.88 (16.68 to 17.04)	16.8±0.84 (16.58 to 17.02)	0.450
ACD (mm)	3.19±0.21 (3.13 to 3.25)	3.15±0.25 (3.11 to 3.19)	3.14±0.27 (3.08 to 3.2)	3.13±0.24 (3.09 to 3.17)	3.08±0.24 (3.02 to 3.14)	0.226
LT (mm)	3.42±0.18 (3.38 to 3.46)	3.45±0.21 (3.41 to 3.49)	3.44±0.18 (3.4 to 3.48)	3.42±0.19 (3.38 to 3.46)	3.5±0.19 (3.46 to 3.54)	0.129
LP (diopter)	22.53±1.96 (22 to 23.06)	22.71±1.86 (22.38 to 23.04)	22.71±1.85 (22.34 to 23.08)	22.47±1.65 (22.14 to 22.8)	22.85±1.89 (22.38 to 23.32)	0.726
CR (mm)	7.8±0.29 (7.72 to 7.88)	7.77±0.26 (7.73 to 7.81)	7.71±0.28 (7.65 to 7.77)	7.73±0.27 (7.67 to 7.79)	7.72±0.27 (7.66 to 7.78)	0.201
WTW (mm)	12.4±0.37 (12.3 to 12.5)	12.31±0.44 (12.23 to 12.39)	12.21±0.42 (12.13 to 12.29)	12.21±0.4 (12.13 to 12.29)	12.22±0.42 (12.12 to 12.32)	0.023**

AL: Axial length, VCD: Vitreous chamber depth, ACD: Anterior chamber depth, LT: Lens thickness, LP: Lens power, CR: Corneal radius, WTW: white to white corneal diameter,
* p-value calculated by ANOVA, ** The p-value was statically significant

Table 4. The mean and 95% confidence interval of axial length, vitreous chamber depth, anterior chamber depth, lens thickness, crystalline lens power, corneal radius of curvature and white-to-white of high school students by place of residence

Ocular component	Rural (n=177) Mean±SD (95%CI)	Urban (n=146) Mean±SD (95%CI)	P*
AL (mm)	23.2±0.77 (23.08 to 23.32)	23.54±0.85 (23.44 to 23.64)	<0.001
VCD (mm)	16.62±0.76 (16.5 to 16.74)	16.96±0.84 (16.86 to 17.06)	<0.001
ACD (mm)	3.12±0.25 (3.08 to 3.16)	3.15±0.24 (3.11 to 3.19)	0.280
LT (mm)	3.45±0.20 (3.41 to 3.49)	3.43±0.19 (3.41 to 3.45)	0.253
LP (diopter)	22.84±1.67 (22.59 to 23.09)	22.49±1.92 (22.25 to 22.73)	0.056
CR (mm)	7.69±0.26 (7.65 to 7.73)	7.77±0.28 (7.73 to 7.81)	0.002
WTW (mm)	12.2±0.39 (12.14 to 12.26)	12.31±0.44 (12.25 to 12.37)	0.012

AL: Axial length, VCD: Vitreous chamber depth, ACD: Anterior chamber depth, LT: Lens thickness, LP: Lens power, CR: Corneal radius, WTW: white to white corneal diameter
* p-value calculated by independent *t*-test.

Table 5. The associations between ocular biometry and the studied variables in multiple linear regressions

	AL	VCD	ACD	LT	LP	CR	WTW
Coef (p-value)							
Gender	-0.68 (<0.001)*	0.61 (<0.001)*	-0.12 (<0.001)*	0.06 (0.008)*	1.08 (<0.001)*	-0.16 (<0.001)*	-0.18 (<0.001)*
Age (year)	0 (0.94)	0.06 (0.471)	-0.03 (0.215)	0.01 (0.787)	0.14 (0.469)	0.01 (0.835)	0.02 (0.732)
Residence (urban/rural)	0.03 (0.69)	0.00 (0.925)	-0.02 (0.083)	0.01 (0.135)	-0.02 (0.768)	-0.01 (0.233)	-0.03 (0.045)*

AL: Axial length, VCD: Vitreous chamber depth, ACD: Anterior chamber depth, LT: Lens thickness, LP: Lens power, CR: Corneal radius, WTW: white to white corneal diameter
* The p-value was statically significant.

Discussion

In this report, we described the distribution of ocular biometrics in adolescence years in an Iranian population. Knowledge of normal values of biometric components in this age group can help identify biometric causes of myopia. Mean AL in this study was 23.4 mm and 95% of the study sample had AL between 23.3 to 23.5 mm, also, as demonstrated, the distribution of AL was leptokurtic. These findings indicate that the variation range in AL in the 14-20 year age group is not wide and only 1% of this population have AL more than 25.7 mm. Table 6 summarizes the results of other studies, in 5-30 year age groups, where AL ranges between 22.61 mm and 24.09 mm. One of the most important reasons for these changes is the age range. As demonstrated in table 6, the shortest AL is in relation to the 5.5 to 8.4 year old age group while 17 to 30 year olds have the longest AL. Overall, AL in our sample of students was in the mid range, while people of East Asian origin have the longest AL, and Europeans have the shortest AL. These findings are consistent with refractive error results from different studies. As we know today, the prevalence of myopia is high in East Asian countries and highest prevalence race have been observed in some American and European countries. Racial differences in refractive errors have been described in previous studies. Since previous studies have shown that refractive errors are in the mid range in Iranian students, our findings in terms of AL were not unexpected. Although AL was in the midrange in this study, as demonstrated in Table 6, the ACD was shorter compared to other studies. Interestingly, the ACD in the Tehran Eye Study[28] was shorter in all age groups compared to other studies, and the observation was repeated in the study of elderly people in Shahroud.[29] Although the LT in studies in Madrid[30] and Jordan[1] were reported to be thicker compared to our study, the overall LT in our study was in the midrange, thus, our findings show that the

VCD has a larger share of the AL in our studied population compared to other studies; VCD readings in our study confirm this matter. Since previous studies have shown that Iranians have shorter ACD, the factors of race and genetics must be considered in explaining longer VCD. Previous animal studies have shown that AL, specially VCD, is affected by genetic variants.[31]

It must be noted that in this study testing was not done under cyclopegia, and residual accommodation might have impacted measurements. Since accommodation involves increased LT and decreased ACD, the smaller ACD could be attributed to using non-cylcoplegic measurement results. The effect of accommodation should also be noted when comparing results of LT and VCD. Since non-cylcplegic SE was used in calculating the LP, this variable might have been slightly affected as well. It should be taken into consideration that the LP measurement is not the same as a phakometry measurement by independent means such as a videophakometer.

Corneal CR in our study was not very different from that in other studies. Previous studies had demonstrated that inter-ethnic differences in CR are not significant; even laboratory genetic studies of normal eyes found no significant relationship between CR and genetics. This observation, along with our findings in terms of AL and ACD indicate that although cornea contributes most to the refractive power of the eye, ethnic variations in refractive errors are due to variations of AL.

Mean corneal diameter was 12.26 mm in this study and 11.81 mm in the 14-19 year old age group of Tehran Eye Study; this indicates a larger corneal diameter in our studied sample compared to residents of Tehran. The instrument used in Tehran Eye Study was Orbscan II, so this difference may be merely due to different instruments used in these studies.[32]

The corneal diameter reported in different studies ranges between 11.5 mm and 12.5 mm.[32-34] Based on the 75%, 95%, and 99% percentiles of corneal diameter in this study, more than 25% of the sample in this study had a corneal diameter more than 12.5 mm. These findings indicate that available definitions for macrocornea and microcornea cannot be applied to all studies, and regional data and the measurement method are needed to define accurate cutoff points for these corneal conditions.

According to our findings, AL, ACD and VCD were longer, the cornea was flatter and WTW was larger in boys. On the other hand girls had higher LP and thicker lenses compared to boys. In agreement with our findings, other studies have demonstrated larger AL and ACD in boys [8,11,35-37] and higher LP in girls.[35,37,38] However, results in terms of corneal CR and LT are inconclusive[11,35,37] A look to studies in older age groups shows that most inter-gender differences seen in adolescence ages continue to exist in middle age and older groups.[2,39-41] For example, Olsen et al[39] showed smaller LP and larger AL and ACD in elderly men compared to women. Similarly, He et al[40] studied elderly Chinese and found smaller LP and larger AL and ACD in men compared to women. Warrier et al[41] demonstrated longer Al and ACD in Myanmar elderly men compared to women. Thus, larger AL and ACD in men is a common finding in all age groups of most studies. Since the biometric structure tends towards emmetropia in adolescent ages, the higher LP and CR in girls seems to be a compensation mechanism for the shorter AL.

Based on linear multiple regression results, there was no significant correlation between ocular biometric components and age in this study. One reason could be the small age range (14 to 20 years) of the study sample, as well as the small sample size. Also, studies have shown that most changes in ocular biometrics occur during childhood and adolescence up to the age of 14.[24,41] These changes include increases in AL and ACD, and decreases in LT and LP. However, in the study in Nepal, Garner demonstrated that biometric components change between the ages of 6 and 18 years.[42] Nonetheless, detailed results of Garner's study indicated that the slope curved upward mostly up to the age of 15 years, and biometric components did not have obvious changes thereafter.[25] Also, it must be noted that some studies have observed a shortening trend in AL and ACD after the age of 40 years,[41,43-45] and results indicate that LP[45] decreases with age while LT increases.[29] Overall, ocular biometrics appear to be stable between the ages of 15 and 40 years; changes before the age of 15 years are

due to emmetropization while changes after the age of 40 are due to alterations in the lens protein structure.

In this study Mean WTW was 12.26 mm; this was 11.81 mm in the 14-19 year age group in the Tehran Eye Study, and 11.99 mm in 19-29 year old Koreans. Overall, WTW shows great variation among different studies. Factors such as race, ethnicity, and study age group could be some of the most important determinants. However, it should be noted that studies use different devices for measuring the WTW which can be a main cause of variations. WTW readings were not only higher among boys, but also among urban students, which is hard to explain, and thus, further studies are suggested to shed light on this issue.

Table 6. Ocular biometry in other studies

	Age (year)	AL (mm)	ACD (mm)	CR (mm)	LT (mm)	VCD (mm)	LP (diopter)
This study	14-20	23.4±0.84	3.14±0.25	7.74±0.27	3.44±0.19	16.82±0.83	22.65±1.83
U.K[46] white	17-30	23.91±1.18	3.62±0.32	7.74±0.29	NA	NA	NA
U.K[46] Asian	17-30	24.09±1.24	3.55±0.28	7.77±0.24	NA	NA	NA
Madrid[30]	20.32±2.82	23.61±1.05	3.52±0.30	7.75±0.25	3.61±0.14	NA	NA
Australia[11]	11-15	23.38±0.85	NA	7.78±0.25	NA	NA	NA
Jordanian[1]	17-22	23.08±1.01	3.32±0.46	7.71±0.28	3.71±0.38	15.99±0.92	NA
Australian[47]	5.5– 8.4	22.61	3.34	NA	NA	NA	NA
Chinese[48]	7-12	22.7±0.90	NA	NA	NA	NA	NA
Sydney, Australia[49]	12	23.38±0.85	3.67±0.25	7.78±0.25	NA	NA	22.15±1.46
Nepal[42]	18	NA	3.53	7.81	3.38	16.27	23.31
Orinda[24]	6-13	22.9±0.7	3.7±0.2	NA	3.5±0.1	15.8±0.7	23.6±2
White European[8]	9.8-12	23.01	3.42	7.80	NA	NA	NA
Black African Caribbean[8]	9.8-12	23.25	3.39	7.85	NA	NA	NA
South Asian[8]	9.8-12	23.43	3.42	7.81	NA	NA	NA

NA: The data not available, AL: Axial length, ACD: Anterior chamber depth, CR: Corneal radius, LT: Lens thickness, VCD: Vitreous chamber depth, LP: Lens power

Conclusion

In this report, we described the normal range of ocular biometric components in a sample population of 14-20 years old. ACD in this study was shorter and WTW was higher than previous studies; other components were in the mid range. Further studies are necessary in Iran to confirm a shorter ACD and larger WTW. Inter-gender differences in all biometric components were statistically significant. Differences in anterior chamber and WTW diameter must be considered when contact lenses or intraocular lenses are prescribed in the studied population.

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