

Ocular Biometrics in Emmetropic Sudanese

Sara Ibrahim Gubara and Ahmed Alsideeg

Faculty of Optometry, AlNeelain University, Khartoum – Sudan.

Abstract

Aim: To determine the range and mean of axial length (AL), anterior chamber depth (ACD), lens thickness (LT), and vitreous chamber depth (VCD) in emmetropic Sudanese. **Material and Methods:** This is a cross sectional study was done in a period from September 2018 to February 2019 at Khartoum eye hospital. The sample was selected from patients presenting to the optometry department and volunteers who accept to be enrolled in the study. The range of ages was between 18-50 years old. It includes 105 males and 150 females. Participants with ocular surgery, extensive pterygium, recent trauma were excluded. All participants were examined for vision and refraction tests for both eyes then A-scan test for right eye just. **Results:** Mean of axial length was 22.61 ± 0.83 mm (19.14-24.92), mean of anterior chamber depth was 2.95 ± 0.45 mm (1.96-5.78), mean of lens thickness was 3.65 ± 0.41 mm (2.83-4.94), and mean of vitreous chamber depth was 16.01 ± 0.82 mm (13.60-18.08). Axial length is significantly higher in men than in women (P value 0.029) as same as vitreous chamber depth (P value 0.040). Person coefficient correlation test demonstrated that negative relation had been found between age and anterior chamber depth -0.146 (P value 0.020) and positive relation had been found between age and vitreous chamber depth 0.138 (P value 0.027). **Conclusion:** The study showed that the axial length mean is higher in males compared to females. Anterior chamber depth decreased with age and lens thickness increased with age.

Keywords: Axial length, anterior chamber, lens thickness, emmetropic

Introduction

Ocular biometric dimensions vary between races and ethnicities, and knowledge of their normal variations is essential to understand the pathogenesis, diagnosis and optimal management of ocular diseases. (Khathutshelo, Olalekan, 2017).

The axial length of the eye is the distance between the anterior and posterior poles of the eye. At birth is approximately 17mm and reaches approximately 24mm in adult hood. (<https://medical dictionary>)

The anterior chamber is a space filled with fluid, the aqueous humor, it is bounded in front by the cornea, behind by the iris and the part of the anterior surface of the lens which is exposed in the pupil. It is about 2.5mm deep in the center in the normal adults. (Ramanjit, Radhika 2011)

The lens of the eye is transparent biconvex a vascular structure. It is suspended between the iris and the vitreous by the zonules, which connect the lens with the ciliary body. The adult lens measures 5mm anteroposteriorly and 9mm equatorially. (HV. Nena, N. Nena 2012)

The vitreous is a transparent extracellular gel, with a complicated structural framework consisting of collagen, soluble proteins, hyaluronic acid and a water content of 99 %. (Jack, Brad, 2011)

The aim of this study is to determine the range and mean of axial length (AL), anterior chamber depth (ACD), crystalline lens thickness (LT) and vitreous chamber depth (VCD) in emmetropic Sudanese population.

Material and Methods

This study is a descriptive, cross-sectional study was done in a period of 6 months from September 2018 to February 2019 at Khartoum Eye Hospital. The study sample was selected randomly from patients present to the refraction department and volunteers who accepted to be enrolled in the study. Their ages range between 18-50 years old. The sample includes 105 males and 150 females. Participants with ocular surgery, extensive pterygium, recent trauma were excluded. All participants had vision and refraction (objective and subjective) tests. Vision test was done by Snellen chart test,

objective refraction done by Tomey autorefractometer, and subjective test was refined by trained Optometrists. All participants had distant visual acuity of 6/6 and spherical equivalent of refractive error ranged between -0.5 D to ± 0.75 D sphere. Verbal consent was obtained from all subjects. Biometry test was done for the right eyes, including axial length (AL), anterior chamber depth (ACD), lens thickness (LT), and vitreous chamber depth (VCD) by using ODM-2100S ultrasonic A/B scanner for ophthalmology which display eight readings and average this readings. Data were analyzed by statistical package for social science SPSS 20.

Results

A total of 255 participants were included in this study, 105 were males that represents 41.2% and 150 were females that represents 58.8%. Participants' age was classified according to Canadastatistic.org into two groups, 65 person from 15 to 24 that represent 25.5% which classified to teenage and 190 person from 25 to 64 as adults 74.5%; the mean was 32.1 ± 9.11 and the general range 18-50 years. The mean of axial length is 22.61 ± 0.83 mm with range from 19.14 mm to 24.92 mm, anterior chamber depth mean is 2.95 ± 0.45 mm with range from 1.96 mm to 5.78 mm, lens thickness mean is 3.65 ± 0.41 mm with range from 2.83 to 4.94 mm, and vitreous chamber depth mean is 16.01 ± 0.82 mm with range from 13.60 mm to 18.08 mm. Independent sample t-test done to compare between the studied variables mean according to gender; the test showed a significant difference between males and females in axial length (P value 0.029) as same as vitreous chamber depth (P value 0.040). Males had higher mean axial length and vitreous chamber depth values than females. Another measure by t-test to compare between the studied variables mean according to age group showed a significant difference between age and vitreous chamber Depth (P value 0.042). In adults vitreous chamber depth had higher mean than in teenagers. Person coefficient correlation test was done to evaluate the relation between age

and the studied variables; the test demonstrated that negative relation between age and anterior chamber depth -0.146 (P value 0.020) and positive relation between age and vitreous chamber depth 0.138 (P value 0.027).

Discussion

This study provides cross-sectional normative data on axial length, anterior chamber depth, lens thickness, and vitreous chamber depth in emmetropic Sudanese.

Mean axial length in this study was 22.61 mm. Hashemi *et al.*, reported a mean axial length of 23.14 mm in 40-64 years Old Iranian population. Mean anterior chamber depth in this study was 2.95 mm. Hashemi *et al.* showed this value to be 2.62 mm. In our studied sample the lens thickness mean was 3.65 mm. In Hashemi *et al.* study it was 4.28 mm. Mean vitreous chamber depth in this study was 16.01 mm but in Hashemi *et al.* study it was 15.72 mm. These differences can be explained by age range of samples.

Conclusion

In this study the axial length mean is higher in men compared to women. Anterior chamber depth decreased with age and lens thickness increased with age. Age and gender were significantly associated with all indices assessed in this study. This study provides valuable information from emmetropic sample which can add to our knowledge about Sudanese population. The data can serve as a guideline for diagnostic and clinical purposes. Potential limitation of this study is a small sample size.

Recommendations

- Encourage researches about determining of the normal ocular parameters in Sudanese.
- Do studies in this field using big sample size and different age groups.

References:

1. <https://medicaldictionary.thefreedictionary.com/axial+length+of+the+eye>

2. Hashemi 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 .12:50. Available at: <https://www.biomedcentral.com/1471-2415/12/50>
3. J. Jack, Bowling, (2011). Clinical ophthalmology: A systematic approach. 7th ed. Edinburgh; New York. Elsevier/Saunders.
4. Nema H.V., Nema N. (2012). Textbook of ophthalmology. 6th ed. New Delhi. Jaypee Brothers Medical publishers (P) Ltd.
5. P. Khasthutshelo, A. Olalekan. Axial length, anterior chamber depth and lens thickness: Their intercorrelations in black South Africans. Afr Vision Eye Helth. 2017; 76(1), a 362. Available at: <https://www.avehjornal.org>
6. Shen Laurance et al, (2010). Distribution and determinants of ocular biometric parameters in an Asian Population: The Singapore Malay Eye Study. Available at: <https://iovs.arvojournals.org>