A COMPARATIVE STUDY IN AXIAL LENGTH OF EYE BETWEEN MYOPES AND EMMETROPS IN INDIAN POPULATION
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ABSTRACT: BACKGROUND: The refractive state of the human eye is dependent on the balance of change in eye size and refractive components, namely, the cornea and crystalline lens. The axial length (AL) is the distance from the corneal surface to an interference peak corresponding to the retinal pigment epithelium. Myopia is one of the most common causes of visual impairment worldwide. It is proved in earlier studies that the eye shape is different in myopic and non-myopic children even at a very young age. AIM: The present study was conducted to compare the axial lengths of eye in myopes and emmetropes. MATERIALS & METHODS: Study comprised of Healthy individuals visiting for routine eye check-up and clinically diagnosed Myopia patients visiting outpatient department of Ophthalmology at Vydehi Institute of Medical Sciences and Research Centre, Bangalore. Sample size was 380. A-Scan Biometry was used to determine the Axial Length of the eye. We compared axial length of eye in myopes & emmetropes. RESULTS: Out of 380 subjects 278 were myopes & 102 were emmetropes. Majority of the subjects (45.6%) belong to age group between 21-30 years. Axial length was significantly (p<0.05) more in myopes (24.25±0.96) than emmetropes (23.52±0.96) in both the eyes. CONCLUSION: A greater AL of the eye was observed in the case group examined. Hence, axial lengthening is the main morphological factor related to myopia. KEYWORDS: Axial length, A-scan biometry, Myopia.

INTRODUCTION: Myopia or Short Sightedness is a common cause of reversible in India with a prevalence of 27%. Increase in Axial Length (distance between the anterior and posterior poles of the eye) and decrease in radius of Curvature of Cornea are considered as the two most significant factors associated with Myopia.

Several authors have proposed classifying myopia into two main categories according to the age of its appearance as juvenile-onset myopia and adult-onset myopia. In both myopia types, it has been demonstrated that an increase in the axial length (AL) of the eyeball is the main factor related to its progression in children¹,²,³ and adults.⁴,⁵,⁶ Juvenile myopia has been also attributed a genetic cause because several studies have linked its development with a familial history of the disease.

Several studies have demonstrated relationship between corneal radius (CR), & Axial length especially in emmetropes. We know that during emmetropization, an increased AL of the eye will be counteracted by an increase in the CR to maintain emmetropia. Paradoxically, other authors have found that the most myopic subjects, those with greatest ALs, have smaller corneal radii.⁷,⁸,⁹ Other authors find no relationship between AL and CR in any category of myopes.¹⁰,¹¹
So the present study was conducted to compare axial length of eye in myopes & emmetropes.

**AIM:** To compare the axial lengths of eye in myopes and emmetropes.

**MATERIALS & METHODS:**

**Study Area:** Vydehi Institute of Medical Sciences and Research Centre, Bangalore.

**Study Design:** Comparative clinical study.

**Study Sample:** Comprised of Healthy individuals visiting for routine eye check-up and clinically diagnosed Myopia patients visiting outpatient department of Ophthalmology at Vydehi Institute of Medical Sciences and Research Centre, Bangalore.

**Group A** {Controls} - Emmetropic men and Women.

**Group B** {Cases} - Myopia patients attending the Ophthalmology Department.

The Sample Size was 380 including the control and case groups.

**A-SCAN BIOMETRY** will be used to determine the Axial Length of the eye.

In A-scan biometry, one thin, parallel sound beam is emitted from the probe tip at its given frequency of approximately 10 MHz, with an echo bouncing back into the probe tip as the sound beam strikes each interface. An interface is the junction between any two media of different densities and velocities, which, in the eye, include the anterior corneal surface, the aqueous/anterior lens surface, the posterior lens capsule/anterior vitreous, the posterior vitreous/retinal surface, and the choroid/anterior scleral surface. Ethical clearance was obtained from the university.

**METHOD OF ANALYSIS:** The filled pre-structured Performa and the details of the clinical examination were numbered; the responses were coded and entered on a Microsoft Excel 2007 spread sheet and analysed by statistical methods like mean, standard deviation, T- test and ANOVA using SPSS 10.

**RESULTS:** Out of 380 subjects 278 were myopes & 102 were emmetropes. Majority of the subjects (45.6%) belong to age group between 21-30 years (TABLE 1). Axial length was significantly (p<0.05) more in myopes (24.25±0.96) than emmetropes (23.52±0.96) in both the eyes (TABLE 2). Majority (52.8%) of the subjects were females (TABLE 3). There was a significant correlation in right and left refractive errors (TABLE 4) in case and control group (P<0.001). Correlation was found high in the case of refractive error (Spherical) and axial length values in the whole population (r² = 0.349) (Fig. 1).

**DISCUSSION:** This was a comparative study in axial length of eye between myopes and emmetropes, which was done on the healthy individuals and clinically diagnosed Myopia patients.

In this study the subjects were divided into case and control groups. In this study out of 278 subjects in the control group, 127 were males whereas 150 were females. The control group consisted of equal number of males and females out of 102 subjects (TABLE 1). Maximum percentage of myopes was recorded in the age group between 31-40 years in the case and case groups.
Myopia in humans is a very common condition and has typically been associated to age and genetic factors (familiar antecedents, ethnic heritage...) as well as environmental factors (near work, social status, occupation).

The main finding of the study was that the axial length of eye in myopes is significantly more than emmetropes. The data on the refractive error of the subjects in the present study revealed positive correlation between AL and refraction in two groups mainly in the case group.

The data on the refractive error of the subjects in the present study revealed positive correlation with axial length. It may be assumed that when the AL exceeds a certain value, the cornea could show a smaller radius. Thus, it is highly probable that axial lengthening could be initially compensated by the increase in CR, preserving emmetropia.

Myopia will appear when, for any genetic and/or environmental reason, axial growth is excessive and cannot be sufficiently compensated by the increase in CR. This theory is in line with hypotheses put forward by Van Alphen 12.

CONCLUSION: A greater AL of the eye was observed in the case group examined, irrespective of other factors. Hence, axial lengthening is the main morphological factor related to myopia.

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### Table 1: Age wise distribution of study population

| Age in years | Cases | Controls |
|--------------|-------|----------|
|              | No %  | No %     |
| 14-20        | 37    | 13.3     |
| 21-30        | 121   | 43.5     |
| 31-40        | 111   | 39.9     |
| 41-50        | 8     | 2.9      |
| 51-60        | 1     | 0.4      |
| Total        | 278   | 100.0    |

### Table 2: Axial length comparison in myopes & emmetropes

| Axial length (mm) | Cases       | Controls    | P value   |
|-------------------|-------------|-------------|-----------|
| Right             | 24.25±0.96  | 23.52±0.84  | <0.001**  |
| Left              | 23.81±1.01  | 23.52±0.72  | 0.008**   |

### Table 3: Gender distribution of study population

| Gender | Cases | Controls |
|--------|-------|----------|
|        | No    | %        | No    | %        |
| Male   | 127   | 45.7     | 51    | 50.0     |
| Female | 150   | 53.9     | 51    | 50.0     |
| Total  | 278   | 100.0    | 102   | 100.0    |

### Table 4: Comparison of refractive error in study sample

| Refractive errors | Cases       | Controls    | P value   |
|-------------------|-------------|-------------|-----------|
| Right             |             |             |           |
| Spherical         | -3.53±1.93  | 0.11±0.16   | <0.001**  |
| Cylindrical       | -1.03±0.88  | 0.00±0.00   | <0.001**  |
| Left              |             |             |           |
| Spherical         | -2.81±1.84  | 0.12±0.19   | <0.001**  |
| Cylindrical       | -0.90±0.66  | 0.00±0.00   | <0.001**  |
Fig. 1: Scatter plot for the refractive error vs axial length values in whole population

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