ORIGINAL ARTICLE

A COMPARATIVE STUDY IN AXIAL LENGTH OF EYE BETWEEN MYOPES AND EMMETROPES IN INDIAN POPULATION

Md. Abdul Mateen[1], Madhusudhan U[2], Shankarappa C[3], Bhanuprakash G[4]

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 21-30years. 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 ccase 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 children[1,2,3] 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]

ORIGINAL ARTICLE

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 21-30years (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 in to 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.

ORIGINAL ARTICLE

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.

REFERENCES:
1. Tan N, Saw SM, Chee D, Lam DS, Cheng HM, Rajan U, Chew SJ. Non-linear progression of myopia during a school year. Invest Ophthalmol Vis Sci. 1998; 39: S280.
2. Saw SM, Katz J, Schein OD, Chew SJ, and Chan TK. Epidemiology of myopia. Epidemiol Rev 1996; 18: 175–87.
3. Wallman J, McFadden S. Monkey eyes grow into focus. Nat Med 1995; 1: 737–9.
4. Teasdale TW, Goldschmidt E. Myopia and its relationship to education, intelligence and height. Preliminary results from an on-going study of Danish draftees. Acta Ophthalmol Suppl. 1988; 185: 41–3.
5. Hung LF, Crawford ML, Smith EL, 3rd. Spectacle lenses alter eye growth and the refractive status of young monkeys. Nat Med 1995; 1: 761–5.
6. Richler A, Bear JC. Refraction, near work and education. A population study in Newfoundland. Acta Ophthalmol (Copenh) 1980; 58: 468–78.
7. Delmarcelle Y, Francois J, Goes F, Collignon-Brach J, Luyckx-Bacus J, Verbraeken H. Biometrie oculaire Clinique Oculometrie). Bull Soc Belge Ophtalmol 1976; 172.
8. De Luise VP, Anderson DR. Primary infantile glaucoma (congenital glaucoma). Surv Ophthalmol 1983; 28: 1-19.
9. Sampaolesi R, Caruso R. Ocular echometry in the diagnosis of congenital glaucoma. Arch Ophthalmol 1982; 100: 574-7.
10. Rose K, Harper R, Tromans C, et al. Quality of life in myopia. Br J Ophthalmol. 2000; 84: 1031–1034.
11. Schiffman RM, Jacobsen G, Whitcup SM. Visual functioning and general health status in patients with uveitis. Arch Ophthalmol 2001; 119: 841–849.
12. Van Alphen G. On emmetropia and ametropia. Opt Acta (Lond) 1961; 142(Suppl): 1-92.

ORIGINAL ARTICLE

Age in years	Cases		Controls	
	No	%	No	%
14-20	37	13.3	11	10.8
21-30	121	43.5	52	51.0
31-40	111	39.9	39	38.2
41-50	8	2.9	0	0.0
51-60	1	0.4	0	0.0
Total	**278**	**100.0**	**102**	**100.0**
Table 1: Age wise distribution of study population				

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 2: Axial length comparison in myopes & emmetropes			

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 3: Gender distribution of study population				

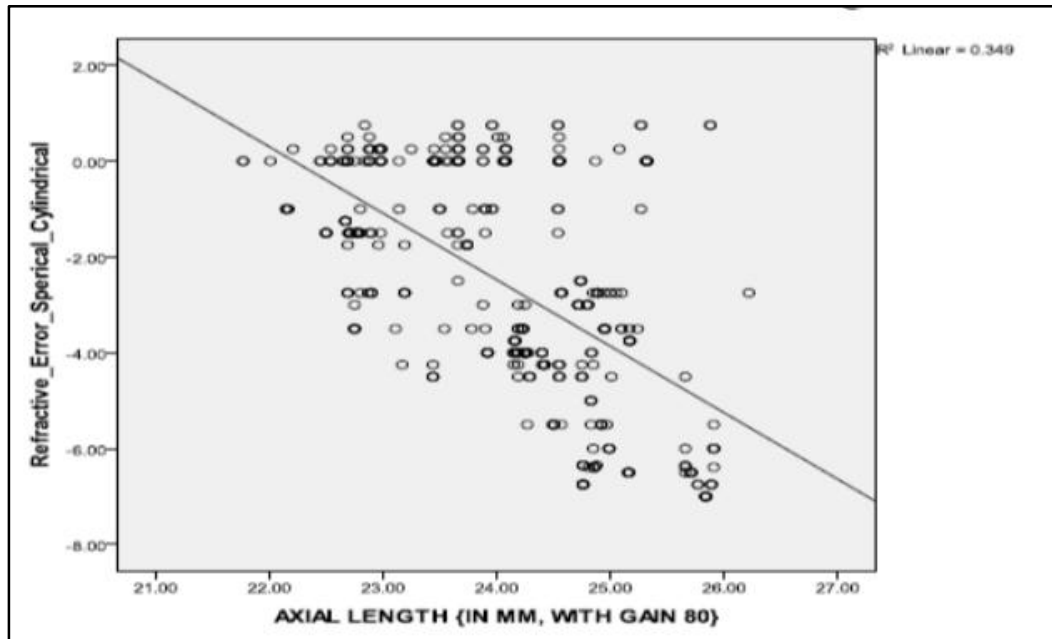| Refractive errors	Cases	Controls	P value
Right			
Spherical	-3.53±1.93	0.11±0.16	<0.001**
Cylindrical	-1.03±0.88	0.00±0.00	<0.001**
Left			
Spherical	-2.81±1.84	0.12±0.19	<0.001**
Cylindrical	-0.90±0.66	0.00±0.00	<0.001**
Table 4: Comparison of refractive error in study sample			

ORIGINAL ARTICLE

Fig. 1: Scatter plot for the refractive error vs axial length values in whole population

AUTHORS:
1. Md. Abdul Mateen
2. Madhusudhan U.
3. Shankarappa C.
4. Bhanuprakash G.

PARTICULARS OF CONTRIBUTORS:
1. Assistant Professor, Department of Physiology, DM Wayanad Institute of Medical Sciences.
2. Assistant Professor, Department of Physiology, DM Wayanad Institute of Medical Sciences.
3. Professor, Department of Physiology, IMS & RC.
4. Assistant Professor, Department of Physiology, DM Wayanad Institute of Medical Sciences.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Md. Abdul Mateen,
SA 311, DM WIMS Campus,
Naseera Nagar, Meppadi,
Wayanad-673577, Kerala.
E-mail: matynne@gmail.com