

The Effect of Near-Work & Family History on the Development of Myopia in Adult Population

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Abstract: **Introduction:** The most relevant clinical environmental factor typically associated with myopia in humans is near work. Increase in Axial Length (AL) and decrease in radius of Curvature of Cornea (CR) are considered as the two most significant factors associated with Myopia. Several studies showed that prevalence rates of myopia are higher among people who have occupations requiring near work (microscopists, visual display terminal worker). **Aims & Objectives:** 1. To study the changes in axial length and radius of corneal curvature in subjects with near work occupation. 2. To study the association of parental myopia and near work on the onset of myopia. **Materials & Methods:** Study comprised of Healthy individuals visiting for routine eye check-up & patients diagnosed as myopic 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. Autorefractometer was used for measuring the Radius of Curvature of Cornea. We studied the changes in AL & CR in near work induced myopia. **Results:** It was found that the 63.3.7% of the cases recorded yes for the history of near work which is slightly higher in case than of control group (41.2%). It was noted that 76.9% of the case group had family history where as it was 54.9% in the control group. **Conclusion:** There is a strong correlation between near work & myopia, also noted that subjects with family history of myopia had early onset of myopia.

Keywords: myopia, A scan biometry, axial length, corneal curvature.

1. 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.

Higher progression rates are associated with earlier onset of myopia and with greater time spent on near work and less time spent outdoors.

Several studies show a greater prevalence of myopia and prevalence rates are highest among people who have occupations requiring near work (microscopists, visual display terminal workers...) [1]– [5]. In addition myopia is less common in populations where school is not compulsory [6] as opposed to the high prevalence of myopia found in some Asian cities, such as Singapore, where school tasks are very demanding and require high levels of reading. [7].

2. Aims & Objectives

- 1) To study the changes in axial length and radius of corneal curvature in subjects with near work occupation.
- 2) To study the association of parental myopia and near work on the onset of

3. 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.

Auto Refractometer

An autorefractor is a machine used to quickly measure a person's refractive error and prescription for eyeglasses or contact lenses. This is achieved by measuring how light is changed as it bounces off the back of a person's eye. The automated refraction technique is quick, simple and painless. The patient takes a seat and places their chin on a rest. Using one eye, they look into the machine at a picture of a balloon. The picture moves in and out of focus as the machine takes readings to determine when the image is on the retina. Several readings are taken which the machine averages to form a prescription. No feedback is required from the patient during this process. In this study Autorefractor Keratometer Potec PRK-5000 was used. Autorefractor Keratometer Potec PRK-5000 combined Autorefractor and Keratometer includes other useful measurement modes such as contact

lens base curve, pupil diameter, corneal diameter, contact lens diameter & Retro illumination

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.

4. 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).

(TABLE 3) compares the incidence of history of near work in the sample population. It was found that the 63.3% of the cases recorded yes for the history of near work which is slightly higher in case of control group (41.2%). With reference to the family history in the sample population, it was noted that 76.9% of the case group had family history where as it was 54.9% in the control group (TABLE 4).

5. Discussion

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...) [8]

The AL(axial length), CR(corneal radius), AL/CR and Keratometric values observed in our study population are in general agreement with those provided by other authors for similar population samples.[9] This data also confirm the significant differences observed in AL and CR according to subject sex. Consistent with previous reports, AL was found to be approximately half an mm greater in men than in women, and could be attributed to the relatively increased height and weight of men.

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.

Also, our data suggest that an excessive increase in AL could lead to a reduction in CR, perhaps by the mechanical stretching effect of the globe. At the end of the body's growth stage it is more difficult for axial lengthening to occur, but it is possible that at this stage, the emmetropic eye may start to axially lengthen and that the already myopic eye will continue to do so. The triggering factor for this lengthening might be an extensive use of near vision because, although no direct cause effect exists, the two factors always appear to be linked.

Parents who have myopia tend to have children with myopia. The prevalence of myopia in children with two parents with

myopia is 30% to 40%, decreasing to 20% to 25% in children with one parent with myopia and to less than 10% in children with no parents with myopia [10]- [12]. An increasing number of parents with myopia significantly elevates the odds of being myopic, with an odds ratio of 5.09 reported for having two versus no parents with myopia [13]

6. Conclusion

There is a strong correlation between near work & myopia, also noted that subjects with family history of myopia had early onset of myopia.

7. Figures & Tables

Table 1: Age wise distribution of subjects

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 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: Compares the incidence of history of near work in the sample population

History of near work	Cases	Controls	P value
Yes	176(63.3%)	42(41.2%)	0.001*
No	102(36.7%)	60(58.8%)	-----
Total	278(100%)	102(100%)	-----

Table 4: Comparison of family history in the study sample

Family History	CASES	CONTROLS	P VALUE
Yes	214(76.9%)	56(54.9%)	0.001*
No	64(23.1%)	46(45.1%)	-----
Total	278(100%)	102(100%)	-----

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