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Evaluation of myopia and its correlation with Corneal Curvature and Axial Length of Eyeball in Tertiary Center

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Abstract: Myopia is a major threat for vision health across the world. It is responsible for around 75% of refraction related complications with serious social and economic consequences. Patients with severe forms of myopia or high myopia are more susceptible to ocular abnormalities such as lacquer cracks, retinal detachment, chorioretinal atrophy and glaucoma. Simple myopia is due to variation within normal limits of the optical system.

Materials and methods: A total of 100 myopic subjects (200 eyes) age group 6-60 years were examined and the axial lengths of these eyes were determined using A-scan Ultrasonography. Statistical analysis was done with Mean, standard deviation and Pearson correlation coefficient.

Results: On stastical analysis we noted that mean axial length increases as the degree of myopia increases with a strong positive correlation (r = 0.9475). This study also revealed that the myopia is more common in female (56%) than male (44%). It is also found that maximum no of cases were found in the age group of 11-20 years followed by21-30. Least number of cases were found in extremes of age groups.

Conclusion: From this study of 100 patients (200 myopic eyes) a positive correlation between the mean axial lengths and degree of myopia was seen and also the longer the axial length the severer the myopia.

Keywords: A scan biometry, Axial length, Fundus changes, Myopia, Refractive error

I. Introduction

Myopia is a major threat for vision health across the world. It is responsible for around 75% of refraction related complications, with serious social and economic consequences. Patients with severe forms of myopia or high myopia are more susceptible to other ocular abnormalities such as lacquer cracks, retinal detachment, chorioretinal atrophy and glaucoma. [1] According to a recent report of the Joint World Health Organization–Brien Hold en Vision Institute Global Scientific Meeting, myopia and high myopia were estimated to affect 27% (1893 million) and 2.8% (170 million) of the world population, respectively, in 2010.[2] In India under vision 2020 refractive errors are one of the most important priority. most refractive errors can be corrected easily at the primary care level with spectacles. despite the availability of a cost-effective intervention to address this problem, uncorrected refractive error is a major public health challenge [3]. As per 2001-02 national survey on

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blindness in India, refractive errors account for 19.7 % of total blindness Myopia is that form of refractive error wherein parallel rays of light come to a focus in front of the sentient layer of the retina when eye is at rest. In simple myopia this is brought about by variation within normal limits of the optical system- an increased curvature of the corneal or the lens surfaces, a shallow anterior chamber, a high refractive index of the lens, or a great axial length of the globe.[4] so assessment of myopia is very important to prevent burden of visual impairment. This clinical study is an attempt to evaluate myopia and its correlation with axial length of the eyeball.

II. Materials and methods

A total of 100 Patients between 6-60 years of age diagnosed to have myopia were selected for the study. Patients with astigmatism, media opacities, corneal lesions, lens defects and uveitis were excluded Detailed history, clinical examination with visual acuity, anterior segment examination and fundus examination were done. Axial length was calculated using A scan biometry. Stastical analysis was done using Mean. Standard deviation and Person's correlation coefficient.

III. Results

Table no 1 Correlation between degree of myopia and axial length

Degree of myopia(dioptre)	**Range of axial length (mm)**	**Mean axial length(mm)**
0 to -3	22.61-26.68	24.34±0.84
-3 to -6	23.26-27.82	25.35±1.09
-6 to -9	24.47-29.13	26.79±1.29
9 to -12	26.02-31.32	28.02±1.30
-12 to -15	27.68-32.35	29.65±1.67
>-15	28.3-31.32	29.87±1.19

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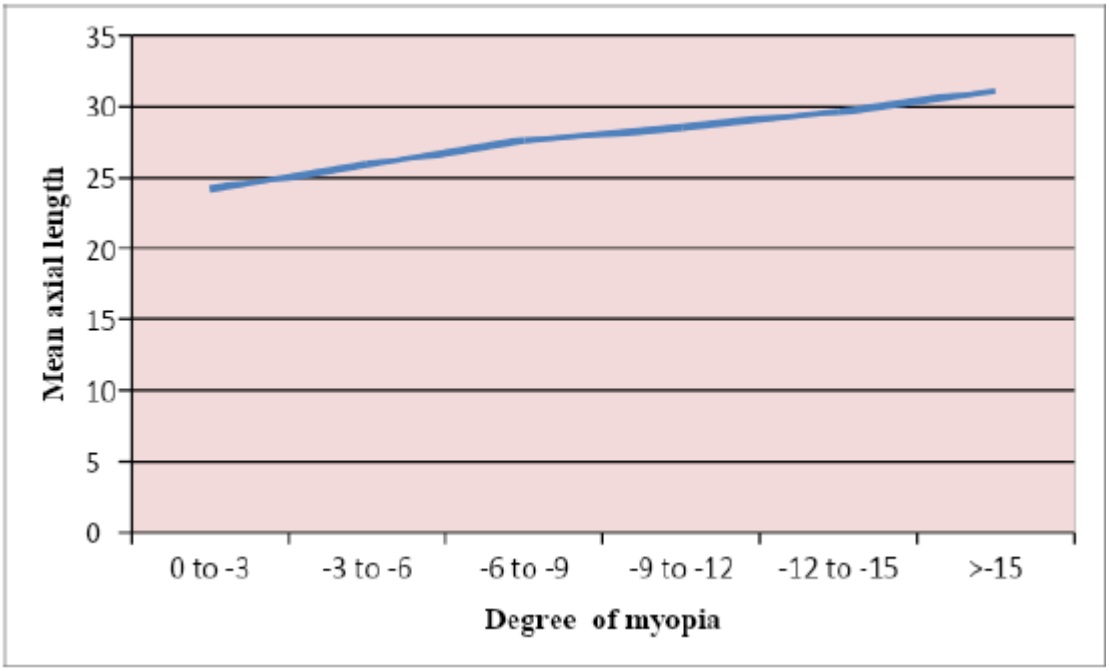

Figure no1: correlation between degree of myopia and mean axial length

From this table and graph it is clear that as the mean axial length increases degree of myopia also increases. The Pearson's correlation coefficient, (r = 0.974) suggesting a strong positive correlation.

Table 2: No of myopic cases in different age groups

Age group(yrs)	No. of myopic eyes examined	No of cases observed	% of cases
6 -10	6	3	3%
11-20	62	31	31%
21-30	56	28	28%
31-40	40	20	20%
41-50	30	15	15%
51-60	6	3	3%
Total	200	100	100

Maximum number of cases were found in 11-20 yrs age group and least number of case were found in extremes of age (6 to 10 and 51-60 years of age group)

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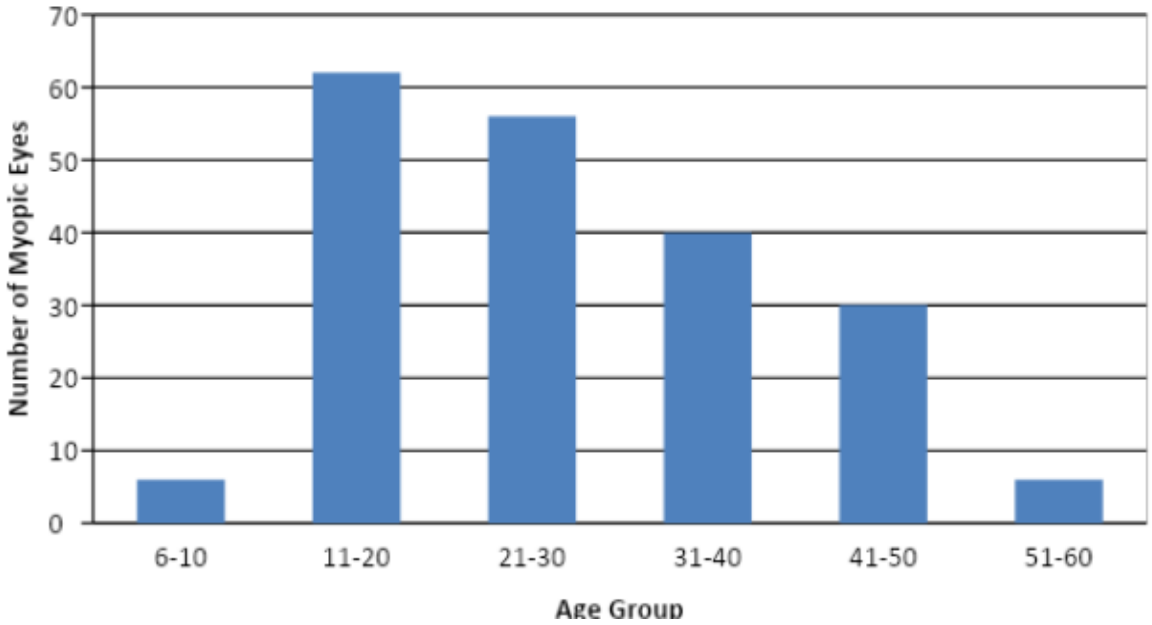

Figure 2: Number of myopic cases in different age group

Table 3: Incidence of myopia in two sexes

Sex	No. of cases	Percent of cases
Male	44	44%
Female	56	56%
Total	100	100%

Figure 3: Incidence of myopia in two sexes

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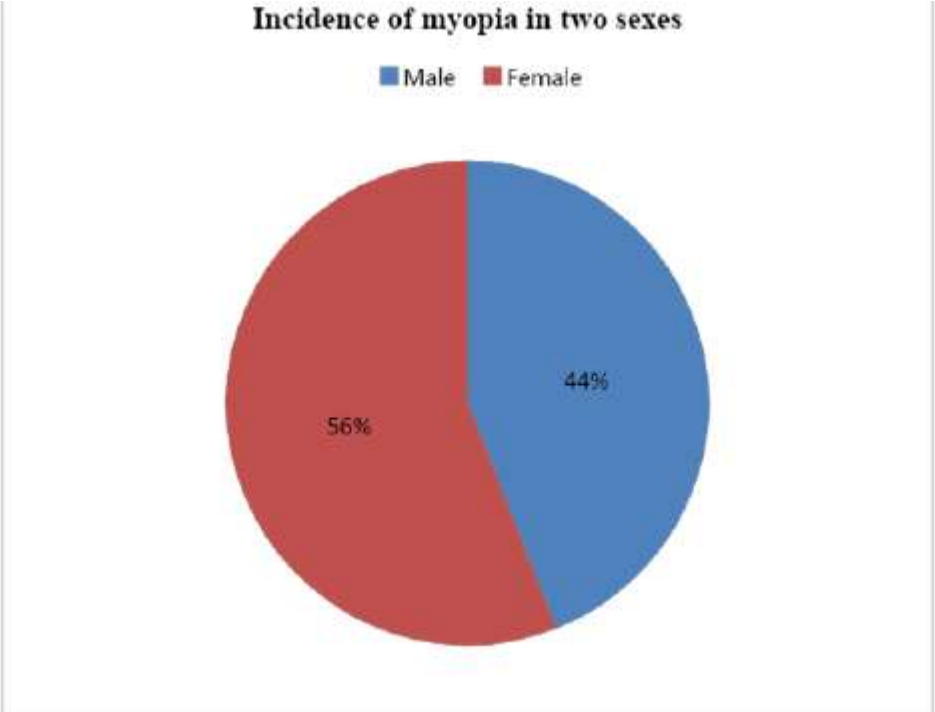

Table 4: Correlation between fundus changes, degree of myopia, and axial lengths

Degree of myopia(dioptre)	Range of axial length (mm)	Degenerative changes & complications
0 to -3	24.34±0.84	Phy
-3 to -6	25.35±1.09	Phy,Int
-6 to -9	26.79±1.29	Int,Path
9 to -12	28.02±1.30	Int,Path
-12 to -15	29.65±1.67	Int,Path
>-15	29.87±1.19	Int,Path

Myopia and axial length

We found that mean axial length increases as the degree of myopia increases. It was least (24.17±0.74) in the patients who had myopia of 0 to -3 D and highest (31.10±1.10) in patients having myopia of > -15 D. The correlation between mean axial length and dioptric power was analyzed through Pearson correlation coefficient and it was found to be r = 0.9745 which suggests a strong positive correlation between the two

Degenerative fundus changes

In our study, we found physiological changes in patients who had low myopia (0 to –3 D); physiological and intermediate changes in patients who had moderate myopia (-3 to -6 D) and intermediate and pathological changes in patients who had high myopia.We also found an axial length more in patients who developed intermediate and pathological fundus changes. Curtin and Karlin [5] found in his study that pathological changes are more in all eyes which had an axial length of 28.5mm or more. In that optic disc crescent ,temporal and annular crescents predominated

Myopia and sex

We also found that the myopia is more common in female (56%) than male (44 %). This finding is in the line with published literature. Rens et al [6] also reported that the myopia occurs slightly more frequently in females than in males. The slightly more incidence of myopia in female can be explained by the fact that women tend to have a longer AL [7], which is again partly explained by comparatively short stature of women.

Myopia indifferent age group

We found the majority of the patients (31%) were of 11-20 years of age followed by patients of 21-30 years of age (28%); 31-40 years of age (20%).Very few patients were seen at the extremes of age (6-10 and 51-60) about 3% each. The findings of our study are in the line with published literature. According to literature, myopia prevalence varies with age, race and sex, increasing at least through adolescence, and is present in 1 per cent of children at age 5 years, increasing to 8 percent at age 10 years and about 15 per cent at 15 years

IV. Conclusion

The following could be concluded from the cross sectional study of 100 cases (200 myopic eyes) carried for a period of 1 year

1. The incidence of myopia is more common in female (56%) than male (44%).
2. A strong positive correlation between the degree of myopia in dioptric powers and axial length were found (r = 0.947).
3. Physiological fundus changes were seen in patients who had low myopia (0 to –3 D); physiological and intermediate fundus changes in patients who had moderate myopia (-3 to -6 D) and intermediate and pathological fundus changes were seen in patients who had high myopia (< -6 D). The degenerative changes and complications increased with increase in axial lengths.
4. Incidence of myopia was found to be more in 11-20 years age group and it was least in extremes of age group.

Excessive axial elongation of the globe is directly related to severity of myopia. It is well known that individuals with high myopia have increased risks of retinal complications such as peripheral retinal degenerations, retinal tears, retinal detachment, posterior staphyloma, chorioretinal atrophy, retinal pigment epithelial atrophy, lacquer cracks and other changes. Some of these retinal lesions may be associated with severe irreversible visual loss and therefore it is important for clinicians to be aware of the retinal pathologies in high myopia. So the severity of myopia is directly related to axial length of eyeball and A scan can be used to assess the severity of myopia in early stages itself. The findings of our study are in the line with published literature. A large prospective study should be undertaken to establish the findings of our study.

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