

EFFECT OF PARENTAL HISTORY OF MYOPIA OVER MYOPIA PROGRESSION IN YOUNG PEOPLE.: A LONGITUDINAL STUDY

Ophthalmology

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ABSTRACT

Purpose- To determine the effect of parental myopia on myopia progression in young people. **Method-** This prospective observational single centered study was conducted in Department of Ophthalmology of Shyam Shah Medical college and associated GMH Rewa, during the period of January 2020 to September 2021. A total of 400 eyes of 200 myopic patients attending outdoor of Ophthalmology department of SSMC and GMH satisfying all inclusion criteria and meet no exclusion criteria were included. Progression of myopia was calculated as increase in myopic refraction (spherical equivalent) of subject's eye between Time 1 and Time 3 (after 1 year of first visit). Cycloplegic autorefractometer with 1% cyclopentolate followed by subjective refinement of refraction was done and Spherical equivalent was calculated in Time 1, Time 2 (after 6 months of first visit) and Time 3. Questionnaire survey about family history of myopia in father, mother and siblings was done. Then multivariate analysis was done to estimate the adjusted odds ratio for one or both parents having myopia associated with myopia progression. **Result-** There were 400 eyes of 200 patients enrolled in the initial study, One year later they all were evaluated, to determine myopia progression. In present study, odds of progression was significantly higher in patients with family history involving both parents (OR=4.7; $p=0.006$). Similarly, risk of progression was significantly higher in patients with moderate myopia with family history in both parents (OR=3.9; $p=0.001$). **Conclusion-** Data of diopter power change in eyes of young people suggest that parental history of myopia influences the myopia progression in their offsprings. History of myopia in both the parents was significantly associated with higher odds of myopia progression ($p<0.05$).

KEYWORDS

myopia progression, parental myopia, young people.

INTRODUCTION

Myopia is becoming a major epidemiological problem and its prevalence is growing worldwide. While the prevalence of myopia in various studies has been reported very high in East Asia^[1-5], it is yet not considered a cause of concern in India. A previous study by the authors had reported a prevalence of only 13.1% among school children in India.^[6]

High myopia is associated with increased risk of severe and irreversible loss of vision and may lead to certain comorbidities such as dense cataract, retinal detachment, sub retinal neovascularization and glaucoma.^[7,8,9]

Both environmental variations and genetic variations play important role in myopia onset and its progression. Multiple factors that were associated with progression of myopia include family history of myopia, maternal reproductive age, and birth order, birth weight seasonal variation, near-work activities and less duration in outdoor activity.

Several longitudinal studies reported that the number of myopic parents was as a risk factor for their children myopia onset and myopic progression.^[10]

This study was designed to determine association between myopia progression and parental history of myopia in young people.

METHOD-

This prospective observational single centered study was conducted in Department of Ophthalmology of Shyam Shah Medical college and associated GMH Rewa, during the period of January 2020 to September 2021

CASE SELECTION:

A total of 400 eyes of 200 patients diagnosed with myopia of any degree attending the outdoor patient department of Ophthalmology Department of S.S. Medical College and associated Gandhi Memorial Hospital, Rewa (M.P.) fulfilling the following criteria were enrolled in the study.

Inclusion Criteria:-

Patients with 1. Young people (Age Group 10 to 24 years)^[11] having myopia. 2. Those who were ready to participate in study and willing to sign informed consent form.

Exclusion Criteria:-

Patients with 1. Corneal dystrophy and degeneration. 2. Astigmatism

more than 2 diopter. 3. Keratoconus 4. Any fundus abnormality other than myopic changes. 5. Any media opacity. 6. Any ocular surgery in past.

DATA COLLECTION AND METHOD

Subjects who satisfy all inclusion criteria and meet no exclusion criteria were recruited in the study. Informed consent was taken. The purpose of study was explained to the subjects and their parents in cases of minority of subject's age and confidentiality was assured. This prospective observational longitudinal single- centre study was initiated in the spring (March-April) of 2019. The subjects enrolled in this study were examined at six-month intervals. For the purposes of this, we used the data from 3 initial examinations at time 1-spring season (March-April) 2019, time 2-autumn (October-November) 2019, and time spring (March-April) 2020. Seasonal variation of myopia was calculated as diopter power change of eye with change in season and Progression of myopia was calculated as increase in myopic refraction of subject's eye between Time 1, Time 2 and Time 3. Data collected from all subjects included demographic characteristics like age, gender, residence, occupation and a detailed clinical history including the chief visual complaint, history of present illness, past history of ocular surgeries, any ocular trauma and wearing spectacles for vision correction and its possible changes, family history of myopia in parents, siblings.

After that general and systemic examination of subjects was done to rule out any systemic pathology for diminution of vision. Then ocular examination of both eyes of all subjects was started under the following headings.

OCULAR EXAMINATION

1. Visual Acuity (VA): The examination was started with the determination of the best uncorrected central visual acuity of both eyes. The visual acuity was measured with self-illuminated Snellen's chart at a distance of 6 meters in a room with lighting intensity between 50-100 foot-candles. Visual acuity was determined in the unaided eye (without spectacles or contact lenses) of the subject in sitting position with the other eye being covered with an eye patch or pad. Visual Acuity measurement was done at Time 1, Time 2 and Time 3.

2. Slit Lamp Biomicroscopy: It was done to rule out any cause of diminution of vision other than myopia.

3. Fundus Examination: Indirect Ophthalmoscopy: The pupil of all subjects was dilated using a combination of 0.75% tropicamide and 2.5% phenylephrine eye drops. This was followed by indirect ophthalmoscopy to rule out any fundus abnormality other than myopia

at Time 1.

4. Autorefractometry: All subjects with any degree of myopia underwent cycloplegia with 2 drops of cyclopentolate 1% in each eye 5 minutes apart then after 30 minutes autorefraction was done with Shin Nippon Autorefractometer at Time 1, Time 2 and Time 3.

5. Refraction: Subjective refinement of refraction was done for each eye in all subjects after cycloplegic autorefraction at Time 1, Time 2 and Time 3.

6. Spherical Equivalent: Spherical equivalent (SE) was calculated for each eye separately by adding the sum of the sphere power with half of the cylinder power. Progression (PR) of myopia was calculated by dioptric power change (change in Spherical Equivalent of eye) between Time 1 and Time 2, between Time 2 and Time 3, and between Time 1 and Time 3 of examination.

QUESTIONNAIRE

After ophthalmic examination the questionnaire survey was done about Family history; regarding history of wearing myopic spectacles in mother, father, and siblings.

CLASSIFICATION

After complete evaluation the participant's eyes were divided into 3 groups according to degree of myopia:

1. Low myopia (A): myopia of -3.00 diopters or less.
2. Moderate myopia (B): myopia between -3.00 and -6.00 diopters.
3. High myopia (C): myopia more than -6.00 diopters

STATISTICAL ANALYSIS PLAN

The collected data was compiled using MS Excel and analysed using IBM SPSS software version 20.

Categorical data like sex, residence, family history was expressed as frequency and percentage.

Multivariate analysis was done to estimate the adjusted odds ratio for risk factors associated with progression.

p value less than 0.05 was considered statistically significant

RESULT

The present study aimed to assess the effect of parental myopia on myopia progression in young people. The study was conducted on 400 eyes of 200 myopic patients in which 102 were male and 98 were females. All the eyes were categorized into 3 groups based upon degree of myopia (low, moderate and high) at the time of presentation. The findings of present study are tabulated as under.

Distribution Of Subjects According To Age

Mean age of patients with low, moderate and high myopia was 18.62 ± 3.18 , 17.65 ± 3.59 and 17.49 ± 3.91 years respectively. Majority of patients with low myopia belonged to 15 to 19 years of age (49.8%), whereas majority of patients with moderate and high myopia belonged to more than 20 years of age (41.9% and 44.9% respectively). The observed difference in age composition of patients was statistically highly significant ($p < 0.01$) Table and Graph-1

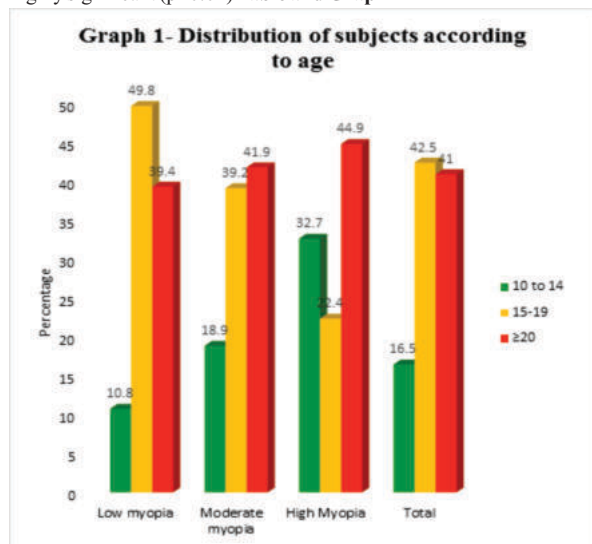


Table 1- Distribution Of Subjects According To Age

Age	Low myopia	Moderate myopia	High Myopia	Total
10-14	11 (10.8)	14 (18.9)	8 (32.7)	33 (16.5)
15-19	50 (49.8)	29 (39.2)	5 (22.4)	85 (42.5)
≥20	40 (39.4)	31 (41.9)	11 (44.9)	82 (41.0)
Mean Age	18.62±3.18	17.65±3.59	17.49±3.91	18.12±3.46
Total	101	74	25	200
χ^2	20.08			
P value	0.001			

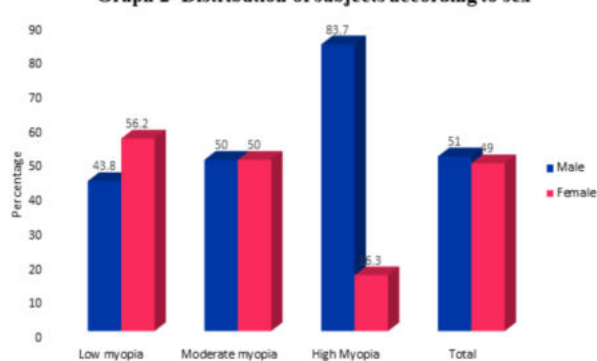
Distribution Of Subjects According To Sex

Overall, myopia was observed in higher proportions of males as compared to females (51% vs 49%). However, high myopia was observed to be in significantly higher proportions of males as compared to females ($p < 0.01$) Table 2 Graph 2

Table 2- Distribution Of Subjects According To Sex

Sex	Low myopia	Moderate myopia	High Myopia	Total
Male	44 (43.8)	37 (50.0)	21 (83.7)	102 (51.0)
Female	57 (56.2)	37 (50.0)	4 (16.3)	98 (49.0)
Total	101	74	25	200
χ^2	25.15			
P value	0.001			

Graph 2- Distribution of subjects according to sex



Association of progression of myopia with family history

In present study, odds of progression was significantly higher in patients with family history involving both parents (OR=4.7; $p=0.006$). Similarly, risk of progression was significantly higher in patients with moderate myopia with family history in both parents (OR=3.9; $p=0.001$). Table 3 Graph 3

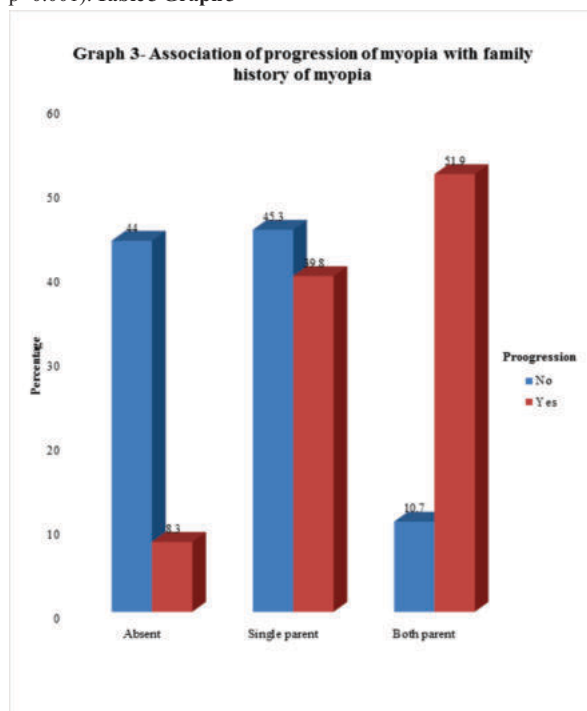


Table 3- Association Of Progression Of Myopia With Family History

Myopia	Family history	Progression		OR (95% CI)	P value
		No	Yes		
Low	Absent	60 (50.4)	18 (21.4)	-	
	Single parent	54 (45.4)	52 (61.9)	0.68 (0.15-3.1)	0.62
	Both parent	5 (4.2)	14 (16.7)	0.3 (0.04-2.2)	0.24
Moderate	Absent	10 (31.2)	2 (1.7)	-	
	Single parent	18 (56.2)	42 (36.2)	0.78 (0.18-1.58)	0.37
	Both parent	4 (12.5)	72 (62.1)	3.9 (1.4-7.9)	0.001
High	Absent	0 (0)	0 (0)	-	
	Single parent	0 (0)	2 (4.9)	1.20 (1.02-1.78)	0.87
	Both parent	8 (100)	39 (95.1)	0.80 (0.02-1.74)	0.89
Total	Absent	70 (44)	20 (8.3)	-	
	Single parent	72 (45.3)	96 (39.8)	1.1 (0.3-3.9)	0.89
	Both parent	17 (10.7)	125 (51.9)	4.7 (1.8-11.2)	0.006

DISCUSSION

In present study odds of progression was significantly higher in patients with family history involving both parents (OR=4.7; p=0.006). These findings were concordant with the findings of Kurtz T et al (2007)¹² in which myopia in children with no family history of myopia (zero) progressed by -1.81 ± 0.18 D whereas that with one and both myopic parent was -2.04 ± 0.13 D and -2.59 ± 0.19 D (P=0.03).

Lam DS et al (2008)¹⁰ In which the average rate of myopia progression as measured by cycloplegic autorefraction was -0.40 ± 0.30 D per year. They found a strong positive relationship between parental history of myopia and progression of myopia in children who were initially nonmyopic in the cross sectional study (P<0.001). Children with two myopic parents had the greatest annual myopia progression (mean = -0.22 D) followed by children with one myopic parent (mean myopia progression = -0.07 D and children with no myopic parents (mean myopia progression = -0.02 D all P<0.001),

CONCLUSION

The present study was conducted on 400 eyes of total of 200 patients with myopia of any degree attending the outdoor patient department of Ophthalmology Department of S.S. Medical College and associated Gandhi Memorial Hospital, Rewa (M.P.) with the aim to assess the effect of parental myopia on myopia progression in young people. Data of dioptric power change in eyes of young people suggest that parental history of myopia influences the myopia progression in their offsprings. History of myopia in both the parents was significantly associated with higher odds of myopia progression (p<0.05).

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