Original Article

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Cross-sectional Study of Myopia among Medical Students

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Abstract

Introduction: Refractive error is the inability of the optical system to bring an image to the sharp focus on the retina. Myopia is an optical aberration of the eye whereby objects at a distance are not focused onto the retina but brought to a focus in front of the retina, resulting in a blurred image. In India uncorrected refractive errors are second major cause of avoidable blindness. *Materials and methods:* This was a cross-sectional, descriptive study over a period of 2 months to find the incidence of myopia and prevalence of peripheral retinal degenerations among medical students in ARMCH Kumbhari, Solapur. Sample size was calculated by using the formula $n = z^2 *p*q/d^2$, 400 students were included in the study. *Results:* The incidence of myopia among medical students was 278 (69.5%) and 122(30.5%) in non myopic, female dominance, with 52% (209) myopes being females. It was found to be a statistically significant association between female gender with myopia. It is also found that incidence of myopia more observed in female (58.6%) than male (41.4%). Mothers of 23 (5.8%) students were myopic according to the history given by the students. Only 7(1.8%) of them had myopic siblings while the rest 393 (98.2%) students had non myopic siblings. Parents of 35 (8.8%) students underwent fundus examination earlier. while 365 (91.2%) of them had never undergone fundus examination. only 1 (0.2%) had a post herpetic corneal scar, while rest 399 had normal slit lamp findings. Best corrected visual acuity of the right eye of 394 (98.5%) students was upto 6/6, while 6 (1.5%) of them were corrected upto 6/9. prevalence of peripheral retinal degeneration among the 400 students examined was found to be 68 (17%). *Conclusions:* Studies of this kind are helpful in knowing the magnitude of the problem of myopia and retinal degenerations, and to stress upon the need for routine eye examination and fundus examination with indirect ophthalmoscopy among myopes and general population as well.

Keywords: Refractive Error; Myopia; Peripheral Retinal Degeneration; Visual Acuity.

Introduction

Refractive error is the inability of the optical system to bring an image to the sharp focus on the retina. Myopia is an optical aberration of the eye whereby objects at a distance are not focused onto the retina but brought to a focus in front of the retina, resulting in a blurred image. The prevalence of myopia has been reported to be as high as 70-90% in some Asian population, in India the prevalence of myopia is 7-11% in 15 year old and 35% in adults [1].

Myopia is a major cause of visual impairment in both developed and developing world [2]. In India uncorrected refractive errors are second major cause of avoidable blindness. According to the WHO-NPCB survey in 1989, 1.49% population in India is blind of which 7.35% is due to refractive errors which later increased to 19.7% [3]. Three fourth of the visual impairment was attributed to refractive errors in the same survey.

The suspected environmental factors include early age close work seen in highly educated people of the society and their offsprings and individuals with higher intellectual capacity. A study postulated that medical students are a select population with high level of education as well as an above average intelligence which perhaps explains the high prevalence of myopia among medical students [4]. The prevalence of myopia

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among medical students in India ranges from 45-70% in different regions [5].

Myopia is associated with several retinal degenerations that can cause irreversible blindness [6].

High myopia or pathological myopia is associated with globe elongation and refractive error of at least 6 diopters (D) and/or axial length of greater than 25.5mm [7]. Excessive axial elongation of the globe in high myopia can cause mechanical stretching and thinning of the choroid and retinal pigment epithelium (RPE) layers resulting in various retinal degenerative changes [8]. Benign changes include "paving stone" degeneration, "white without pressure" areas, peripheral cystoids degeneration and snow flecks [9].

Individuals with high myopia have increased risks of retinal complications such as peripheral retinal degenerations, retinal tears, rhegmatogenous retinal detachment (RRD), posterior staphyloma, chorioretinal atrophy, retinal pigment epithelial atrophy, lacquer cracks, choroidal neovascularization (CNV) and macular haemorrhage [9,10].

Therefore the detection of these degenerative changes in a silent myopic eye during ocular examination may warrant prophylactic treatment by laser or less commonly by cryotherapy.

This paper describes the salient features and results of my cross sectional study to determine the incidence of myopia and prevalence of peripheral retinal degenerations among medical students of Ashwini Rural Medical College, Hospital and Research centre, Kumbhari.

Our study is one of the unique studies in which incidence of myopia has been co-related with prevalence of peripheral retinal degenerations in medical students.

Materials and Methods

This was a cross-sectional, descriptive study over a period of 2 months to find the incidence of myopia and prevalence of peripheral retinal degenerations among medical in ARMCH Kumbhari, Solapur.

Sample size was calculated by using the formula $n = z^2 * p * q / d^2$

Expected prevalence (p) by previous study is 45% [10], and with confidence level of 95%, z=1.96, d= acceptable error 5%, q=1-p, the sample size would be 380; and considering dropout rate 10%, the sample size would be 400.

All the 400 students were included in the study.

Permission was obtained from the institutional ethics committee. The aims and objectives of the study, procedure of examination, and adverse effects of pupillary dilatation were explained to the students and the procedure was carried further. The basic examination was conducted in the ophthalmic outpatient department. Questionnaire was filled accordingly by the students.

The first part of the questionnaire included age and sex of the students, the class in which they study, their parents' occupation and their refractive error, and visual acuity. Visual acuity was measured first of the right eye followed by the left, by using Snellen's visual acuity chart for distant vision and Jaeger's visual acuity chart for near vision. Visual acuity was recorded as the smallest line read on the Snellen's chart with one or no error. All students with visual acuity of < 6/6 were taken for further examination by an ophthalmologist. Anterior segment examination was done by slit lamp examination in all students.

The data in the second part of the questionnaire was entered by the ophthalmologist. Every student was subjected to slit lamp examination, fundus examination by a direct ophthalmoscope and indirect ophthalmoscopy with +20D lens and scleral indentation. Streak retinoscopy was done and best acceptable refraction was prescribed. Objective and subjective refraction performed till best corrected visual acuity achieved, and glasses were then prescribed.

Students who had variable refraction on streak retinoscopy and fundal glow were subjected to cycloplegic refraction by using 1% cyclopentolate eye drops. They were followed up again and prescribed spectacles. Refractive error was expressed as the spherical equivalent (SE). Myopia was defined as SE of at least -0.50DSp, hypermetropia as SE of at least +0.50DSp, astigmatism was diagnosed when the difference in the refraction of the axes in one eye was <0.5.DCy.

Intraocular pressure was measured by Applanation tonometer. Eyes were anaesthetised with a topical anaesthetic agent (proparacaine 0.5%) and stained with sterile fluorescein. The examination was done under blue filter. The pressure ranging from 10-20mm of mercury was considered normal. Peripheral retina was examined by indirect ophthalmoscope with a +20D lens and scleral indentation with full pupillary dilatation by a mydriatic agent (tropicamide + phenylephrine).

Statistical Analysis

Descriptive statistics such as mean, SD and percentage was used. A p-value less than 0.05

were considered as significant. Data analysis was performed by using Microsoft Excel and Epinfo.

Result

Table 1: Incidence of myopia in medical students

Myopia	Frequency	Percentage
Present	278	69.5
Absent	122	30.5
Total	400	100

The incidence of myopia among medical students were 278 (69.5%) and 122(30.5%) were non myopic (Table 1).

Table 2: Sex distribution of subjects with Myopia

Sex	Frequency	Percentage
Female	209	52.2
Male	191	47.8
Total	400	100.0

This study showed a female dominance, with 52% (209) myopes being females while 47.8% (191) were males (Table 2).

Table 3: Relation of incidence of myopia with gender

Myopia	Gender		Total
	Female	Male	
Absent	46 (37.7)	76 (62.3)	122
Present	163 (58.6)	115 (41.4)	278
Total	209	191	400

χ^2 = 14.88, df=1, p<0.0001 highly significant association

It was found to be a statistically significant association between female gender with myopia. It is also found that incidence of myopia more observed in female (58.6%) than male (41.4%) (Table 3).

Table 4: Family history of myopia in Father

Myopic Father	Frequency	Percentage
No	247	61.8
Yes	153	38.2
Total	400	100.0

Of the total students examined, fathers of 153(38.2%) students had myopia. while 247(61.8%) were non myopic (Table 4).

Table 5: Family history of myopia in Mother

Myopic Mother	Frequency	Percentage
No	377	94.2
Yes	23	5.8
Total	400	100.0

Mothers of 23 (5.8%) students were myopic according to the history given by the students (Table 5).

Table 6: Family history of myopic siblings

Myopic Siblings	Frequency	Percentage
No	393	98.2
Yes	7	1.8
Total	400	100.0

Among the 400 students, only 7(1.8%) of them had myopic siblings while the rest 393 (98.2%) students had non myopic siblings (Table 6).

Table 7: Distribution of subject parents who had undergone Fundus Examination

Fundus Exam	Frequency	Percentage
No	365	91.2
Yes	35	8.8
Total	400	100.0

Parents of 35(8.8%) students underwent fundus examination earlier. while 365(91.2%) of them had never undergone fundus examination (Table 7).

Table 8: Distribution of subject according to Slit lamp exam

Slit lamp exam	Frequency	Percentage
corneal scar (PHK)	1	.2
normal	399	99.8
Total	400	100.0

Of the 400 students examined only 1(0.2%) had a post herpetic corneal scar, while rest 399 had normal slit lamp findings (Table 8).

Table 9: Distribution of subject according to UCVA for both eyes

UCVA	Right eye	Percentage	Left eye	Percentage
1/60	1	.2	1	.2
3/60	2	.5	1	.2
4/60	2	.5	2	.5
6/12	21	5.2	12	3.0
6/18	36	9.0	36	9.0
6/24	31	7.8	32	8.0
6/36	40	10.0	42	10.5
6/6	157	39.2	151	37.8
6/60	66	16.5	67	16.8
6/9	35	8.8	47	11.8
FC 1	1	.2	2	.5
FC 1/2	4	1.0	3	.8
FC 2	2	.5	1	.2
FC 3	2	.5	3	.8
Total	400	100.0	400	100.0

Uncorrected visual accuity of right eye in the 400 subjects showed a varied range. 157 (39.2%) of whom had normal vision(6/6), 66(16.5%) had a vision of 6/60, followed by 6/36 and 6/18 in 40(10%) and 36(9%) students respectively. Finger Counting(FC) was reported in a few cases as well(2.2%).

Of the uncorrected visual acuity in the left eye of the 400 students, 151(37.8%) students had a normal vision(6/6), 67(16.8%) had a vision of 6/60 followed by 6/9 (11.8%) and 6/36(10.5%). with a very less incidence of 6/12 (3%). A minor incidence of finger counting was reported here as well (Table 9).

Table 10: Distribution of subject according to BCVA in right eye

BCVA right eye	Frequency	Percentage
6/6	394	98.5
6/9	6	1.5
Total	400	100.0

Best corrected visual acuity of the right eye of 394(98.5%) students was upto 6/6, while 6(1.5%) of them were corrected upto 6/9 (Table 10).

Table 11: Distribution of subject according to BCVA for left eye

BCVA Left eye	Frequency	Percentage
6/6	394	98.5
6/9	6	1.5
Total	400	100.0

Best corrected visual acuity of the left eye showed the same incidence as that of the right eye (Table 11).

Table 12: Prevalence of Peripheral retinal degeneration

Peripheral retinal degeneration	Frequency	Percentage
No	332	83.0
Yes	68	17.0
Total	400	100.0

In present study, prevalence of peripheral retinal degeneration among the 400 students examined was found to be 68 (17%) (Table 12).

Table 13: Relation between prevalence of peripheral retinal degeneration and gender

Peripheral retinal degeneration	Gender		Total
	Female	Male	
No	167	165	332
Yes	42	26	68
Total	209	191	400

$\chi^2 = 2.97$, df=1, p=0.09 Not significant association

There was no statistically significant association between peripheral retinal degeneration and gender (p=0.09) (Table 13).

Discussion

Incidence of myopia:

The incidence of myopia in this study was found to be 69.5%, which was similar to studies conducted by Reddy (68%) [21], and Woo (68.7%) [4]. The incidence was found to be much less in various other studies varying from 28.23% to 51%. Due to the varying refractive error cut offs, different sample populations and different methodologies used, it is difficult to interpret whether this difference indicates an actual increase in incidence.

A much greater incidence was found in a study in Singapore (89.8%) and China (82.2%), as it has been hypothesised that an underlying genetic predisposition may alter eye growth [22].

Association between myopia and gender

Of the students found to be myopic, 52% (209) were female, which was a highly statistically significant association. No such association was found among the studies conducted earlier.

The information regarding the family history of myopia has been gathered in this study and found to have a paternal relation in 153 (38.2%) and maternal relation in 23 (5.8%) of the students. However, whether it is due to genetic predisposition or through just habitual influence, cannot be concluded by the present study.

There was no statistically significant correlation observed between the number of myopic students and family history of myopia in an another study [4].

No significant relation has been found between students and their parents having peripheral retinal degenerations which might be due to the fact that majority of the parents had not undergone fundoscopic examination.

Prevalence of peripheral retinal degenerations:

Of the 400 students examined, 68 (17%) students were found to have peripheral retinal degeneration which was nearly similar to a study conducted by Siyal NA (10%) [6].

Association between peripheral retinal degenerations and gender:

In this study, of the 68 (17%) students with peripheral retinal degenerations, 42 (61.76%) were female and 26 (38.24%) were male similar to a study conducted by Siyal NA in which (60%) were female and (40%) were male [6].

Conclusion

Studies of this kind are helpful in knowing the magnitude of the problem of myopia and retinal degenerations, and to stress upon the need for routine eye examination and fundus examination with indirect ophthalmoscopy among myopes and general population as well.

By conducting such studies awareness is created about the possibility of having peripheral retinal degenerations among normal population as well as myopes; which in turn helps to prevent progression by early diagnosis and intervention by procedures like laser photo-coagulation.

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