

## Study of refractive errors in medical students

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### Abstract

**Introduction:** Refractive errors are apparently more prevalent among the high educational group and have become a huge economic and social burden.<sup>1</sup>

**Materials and Methods:** The study was conducted at Era's Lucknow Medical College and Hospital and included 420 medical students of consecutive 4ys (2013-2016). Refractive error was assessed under cycloplegia using Snellen's visual acuity drum and streak retinoscope. The students were categorized according to their refractive error and the prevalence was calculated.

**Results:** Of 420 students 54% had refractive error. Of these 77.7% had myopia, 8.4% had hypermetropia and 1.7% had astigmatism. Myopes were further divided into mild moderate & severe. It was found that 62.8% had mild, 35.4% had moderate and 13.7% had severe myopia.

**Conclusion:** The commonest refractive error among medical students is myopia of varying grades.

**Keywords:** Medical students, Myopia, Refractive error.

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### Introduction

Refractive error is the optical state of the eyes, in which the parallel rays of light coming from infinity are said to be focused either behind or in front of retina in either one or both the meridians, keeping accommodation at rest. Myopia is a refractive error wherein the image forms in front of retina. The refractive error wherein the image is formed behind the retina is known as hypermetropia. The type of refractive error wherein the refraction of light varies in different meridia of eye and the rays of light entering the eye cannot converge to a point focus but form focal lines is known as astigmatism.

Refractive errors are becoming problematic for our society and are increasing day by day. According to the Govt. of India, Annual Report, 2004, these are the second most common causative disease leading to blindness in India and other developing countries. They are one of the commonest reason for patients visit to an ophthalmologist. It is causing a huge social and economic consequence due to its increasing prevalence.

Academically active professionals are the major sufferers of this disease of refractive error.<sup>2</sup> This may be, for this group comes into contact with technology the most in their day-to-day activities and also spend long hours reading and doing near work.<sup>1</sup> Students usually have no complaints regarding their defect of vision and tend to be unaware of the same. Unknowingly, adjustment of defective vision is done by either taking the front seat in the classroom or reading by bringing the book close to face is done by them. The most common presentation is often that of watering from eyes, ocular redness, ocular heaviness and ocular tiredness. Health habits formed at young age will be carried to adult age, old age and even to next generation. Poor vision in students has a negative

influence on their future life as it affects productive performance in education thus in long term affecting the economic burden of the country.<sup>3</sup> Timely detection and intervention can tremendously improve student's potential during his or her formative years.

There are not many studies that throw light on the prevalence and type of refractive errors among medical students. Therefore, medical students of Era's Lucknow Medical College and Hospital were selected to determine the prevalence of various refractive errors among medical students.

### Materials and Methods

A cross sectional institution based study was conducted by random selection. The study group included 420 students of consecutive 4 years, who took admission for (MBBS), from 2013 to 2016. The students were explained regarding the nature of the study and assured confidentiality of their information and thereafter their written consent was taken for enrollment in the study.

The history regarding parental refractive errors, information on activities before and at age seven, like indoor activities of playing video or computer games/watching TV or outdoor activity, quantitative information on current close-up work activity, and the refractive errors of the students was taken.<sup>1</sup>

For the assessment of refractive errors, visual acuity was checked using Snellen's drum. The students were instructed to sit at a distance of 6 meters from the Snellen's drum and were asked to read the letters from the top of the chart to the bottom line. Each eye was tested separately with glasses as well as without glasses. Refraction was performed both with and without cycloplegia. Cycloplegia was achieved by instilling tropicamide 0.5% in both eyes one drop every

15min, 3 to 4 times. Retinoscopy was done using streak retinoscope. Post mydriatic test was done and refractive error was quantified.

Refractive error was diagnosed if spherical equivalent was +0.50D or greater or a sphere/cylinder of  $\pm 0.50$  diopters or greater. Those errors which required only cylindrical correction were considered as simple astigmatism. Compound myopic or mixed astigmatism was diagnosed if cylindrical errors were associated with minus or plus spherical errors respectively.

Myopic errors less than  $-3.00$ D were considered as low myopia, those between  $-3.00$  to  $-6.00$ D as moderate and more than  $-6$  were considered as high myopia. The average of students who had refractive error against the total numbers of students in the class was taken to determine the prevalence of refractive error.

Statistical Package for Social Sciences (SPSS) version 10.0 was used for statistical analysis. Comparison of the data was done using Chi square test where p value of  $<0.05$  was taken to be significant.

## Result

420 students of 4 different batches are assessed for refractive error.

225 (54%) of 420 subjects had some or the other form of refractive error; with 38 (54.2%), 49 (54.4%), 80 (53.3%), 58 (52%) students having refractive errors in successive years from 2013 to 2016. Among those with refractive error, 121 (54%) were males and 104 (46.2%) females, While 77.7%, 8.4% and 13.7% were myopes, hyperopes and simple astigmats, respectively.

In all the batches, the successive year wise distribution of refractive error showed highest prevalence of that of myopia as compared to hypermetropia & astigmatism. Myopia ranging from 41 (83.6%) in 2014 to 42 (72.4%) in 2016; hypermetropia from 3 (6.1%) in 2014 to 8 (13.7%) in 2016 and astigmatism from 5 (10.2%) in 2014 to 6 (15.7%) in 2013.

Majority of those with myopia had mild myopia 62.8% ( $<3$  Diopters) followed by moderate myopia 35.4% (3-6D) and severe myopia 1.7% ( $>6$  Diopters).

Further division of myopia among different batches showed 18 (69.2%), 26 (63.4%), 39 (62%), 27 (64.2%) mild myopia, 10 (34.4%), 14 (34.1%), 24 (38%), 14(33.3%) moderate myopia and 1 (3.44%), 1 (2.43%), 0%, 1 (2.4%) high myopia respectively in consecutive batches.

**Table 1: Distribution of students of different year with refractive error according to gender**

	2016	2015	2014	2013	Total
Males	29 (50%)	44 (55%)	27 (55%)	21(55.2%)	121(54%)
Females	29 (50%)	36 (45%)	22 (44.8%)	17 (44.7%)	104(46.2%)
Total	58 (52%)	80 (53.3%)	49 (54.4%)	38 (54.2%)	225(54%)

$\chi^2=0.449$ ;  $p=0.930$  (NS)

**Table 2: Distribution of different types of refractive error among students from different batches**

MBBS Batch	Total students with ref. error	Myopia	Astigmatism	Hypermetropia
2016	58	42 (72.4%)	8 (13.7%)	8 (13.7%)
2015	80	63 (78.7%)	12 (15%)	5 (6.2%)
2014	49	41(83.6%)	5 (10.2%)	3 (6.1%)
2013	38	29 (76.3%)	6 (15.7%)	3 (7.8%)

$\chi^2=0.077$ ;  $p=0.994$  (NS)  $\chi^2=3.85$ ;  $p=0.696$  (NS)

**Table 3: Year- wise distribution of medical students according to severity of myopia**

Myopia	2016			2015			2014			2013		
	M	F	T	M	F	T	M	F	T	M	F	T
0-3D (mild)	12	15	27(64.2%)	22	17	39(62)	14	12	26(63.4)	10	8	18(69.2)
3-6D(moderate)	7	7	14(33.3)	12	12	24(38)	8	6	14(34.1)	6	4	10(34.4)
$>6$ D(severe)	1	0	1(2.4)	0	0	0	0	1	1(2.43)	0	1	1(3.44)
<b>Total</b>	20	22	42	34	29	63	22	19	41	16	13	29
Gender-wise for each year	$\chi^2=1.24$ ; $p=0.538$ (NS)			$\chi^2=0.246$ ; $p=0.620$			$\chi^2=1.23$ ; $p=0.542$			$\chi^2=1.33$ ; $p=0.515$		
Among years for Grade of Myopia	$\chi^2=2.06$ ; $p=0.915$ (NS)											

## Discussion

Among medical students, the prevalence of refractive error was found to be 54% which is supported by the study conducted by Rajdeep et al<sup>1</sup> and Emmaneul Olu Megbelayin<sup>3</sup> et al in which it was 54% and 79.5% respectively. However, our study included a larger study group than the above studies.

The prevalence of refractive error among males (54%) was slightly greater than that among females (46.2%), which is similar to previous studies.<sup>4</sup>

Majority of students with refractive error had myopia (77.7%) with overall prevalence among all students being 41.6%, which is in accordance with the study conducted by R.S.Sood<sup>4</sup> et al who found it to be 45%. Whereas the study conducted by Onalet al<sup>5</sup> and Shiny George,<sup>6</sup> reported it to be 32.9% & 39.5% respectively.

Of the myopes 62.8% had mild (0-3D), 35.4% had moderate (3-6D) and 1.7% had severe myopia (>6D) which was comparable to study by Rajdeep et al,<sup>1</sup> which reported that 61.22% were mild, 34.69% were moderate and 4.09% were severe myopes. While Onalet al<sup>5</sup> reported slightly higher prevalence rates such that 81% of all the myopes had mild, 17.6% had moderate, 1.4% had severe myopia with overall more prevalence of mild myopia. The reason for high prevalence of myopia could be increased reading and close up work and excess screen time. However, despite several decades of research, the etiology of myopia is unknown.<sup>2</sup> Racial differences in myopia prevalence between different countries and between different racial groups point toward a genetic predisposition to myopia.<sup>7</sup> A consistent association between a parental history of myopia and development of myopia has also been documented.<sup>7-10</sup>

Our study revealed low prevalence of hypermetropia (4.5%) and astigmatism (7.3%) as compared to myopia which was in agreement with Matta S, et al., 2005<sup>11</sup> and SD Jessica et al.<sup>12</sup>

There limitations of our study were that no controls were taken. The environmental, racial and genetic factors for predilection of refractive error were not assessed.

## Conclusion

The predominant refractive error detected among medical students was myopia, although multiple conceivable confounding variables such as ethnicity, culture, nutrition among others may have inadvertently influenced this outcome. Majority of students had mild to moderate degree of myopia with only a few having severe grade of myopia.

The era of smart phones and high tech gadgets and tech savvy youth frequently using them has impacted the prevalence rates and increased the cases of the worsening of already present refractive error. Therefore, prevention of refractive error may almost be impossible, but the knowledge of these refractive

errors, factors affecting them and contributing to these factors as well as methods of decreasing the prevalence of refractive errors maybe of help. The application of the appropriate correction methods along with preventive measures and ample knowledge regarding the same must be our long-term goal in the society in order to curb it's rise in prevalence.

Thus, our study prompts at studying the causative factors of refractive errors among medical students and for investigating along specific lines indicating the exact causes for the increase of myopia as a refractive error in among medical students.

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