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Original Article

Pattern of Refractive Errors and Disturbances of Binocular Vision in Medical College Students

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Abstract

Introduction: The present study is an attempt to work out the pattern of refractive errors and disturbances of binocular vision in 1265 medical college students, who are subjected to visual stress of higher education.

Material and Methods: Nine successive batches seeking admission to 1st year MBBS at Government Medical College, Patiala, Punjab, India from 2007 to 2016 were subjected to vision testing on distant vision testing snellen's chart, retinoscopic examination, Maddox rod test, and range of fusion on synaptophore.

Results: 175 (34.6%) students were found to be myopic and only 27 students (5.3%) were hypermetropic with or without astigmatism. 51 female students (33.7%) were myopic as compared to 39 male students (25.7%). Astigmatism of 0.6 D or more with or without spherical errors was exhibited by 47 students (9.3%). Exophoria on Maddox rod was found to be more common than esophoria and was maximum in the range of 0-4 prism dioptres, i.e., 640 students (50.6%). On synoptophore, in 775 students (61.34%) adduction fusional range was between 0 and +12 indicating convergence insufficiency.

Conclusion: The study shows that myopia and convergence insufficiency are common in medical college students.

Key words: Binocular vision, Medical college students, Refractive errors

INTRODUCTION

Estimates of refractive errors and other visual disturbances in specialized populations - children or different ethnic groups has naturally excited a great deal of interest and the first such statistical study by Stromberg indicated that 98% of all refractions fell between +4 D and −4 D.[1] It was conducted on recruits for Swedish Armed Forces. Among Scottish children, Thomson found 18.8% myopia.[2] Jackson among 1482 patients between 20 and 30 years of age found 13.7% emmetropia, 66.7% hypermetropia, and 19.6% myopia.[3] A considerably greater incidence of myopia occurs in Japan[4] and also in China where Li (1920) found 53% of Chinese students having myopia. However, in India, most of the studies relating to refractive errors are derived from material seen in clinics and are, therefore, biased in that they carry a significant number of refractive errors for which relief may have been sought. Furthermore, no comparable survey is available in the specialized group of medical students who are subjected to visual stress of higher education as in our case. Hence, the need for this studies into the pattern of refractive errors and disturbances of binocular vision in medical college students.

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MATERIALS AND METHODS

A total of 675 female and 590 male medical students in nine successive batches, i.e., from 2007 to 2016 seeking admission to 1st year MBBS at Government Medical College, Patiala, Punjab, India were screened. Every year, the batch of students was subjected to routine ocular examination such as vision testing on a distant vision snellen's chart. Each student was further subjected to retinoscopic examination. The mean spherical refraction (sphere +1/2 cylinder) was used for the mainly spherical errors and the ocular refraction in the least ametropic meridian for eyes with astigmatism of >0.5 D while tabulating the results. In anisometropic cases, the more ametropic eye was included in the present

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Table 1: Distribution of refractive errors

Ocular refraction (D)	Mainly spherical errors			Astigmatism of 0.6 D or more with or without spherical errors		
	Male students	Female students	Total students	Male students	Female students	Total students
+3 and above	0	0	0	0	0	0
+2 to +2.9	8	0	8	0	0	0
+1 to +1.9	0	7	7	0	7	7
0.0 to +0.9	372	387	759	25	15	40
−0.1 to −1.0	51	76	127	8	15	23
−1.1 to −2.0	33	51	84	18	7	25
−2.1 to −3.0	33	43	76	8	0	8
−3.1 to −4.0	17	17	34	0	7	7
−4.1 to −5.0	17	26	43	0	0	0
−5.1 to −6.0	0	17	17	0	0	0
−6.1 and above	0	0	0	0	0	0
Total	531	624	1155	59	51	110

study. The distribution of refractive errors thus obtained was tabulated in the given Table 1. In addition to it, tests relating to binocular vision such as Maddox rod test and range of fusion on synoptophore were also carried out.

RESULTS AND DISCUSSION

1. Table 1 shows distribution of refractive errors in 1265 medical students, i.e., 590 male and 675 female student.
2. In our study of 1265 students, 759 medical students (60%) are thus found to have no refractive error by any practical definition, i.e., they fall in the refractive group of 0.0 to +0.9 D and the rest 506 students (40%) have definitive refractive errors.
3. These 506 students with refractive errors consist of following categories:
   - Simple myopia, 152 students (30%)
   - Myopic astigmatism, 23 students (4.6%)
   - Total myopia, 175 students (34.6%)
   - Simple hypermetropia, 7 cases (1.3%)
   - Hypermetropic astigmatism, 20 cases (4%)
   - Total hypermetropia, 27 cases (5.3%)
   - Our figures are not quite different from those of Derby who found 35% of Myopia, 15% hypermetropia, and 49% emmetropia among Boston students.[5]
4. 51 female students (33.7%) are myopic as compared to 39 male students (25.7%) in the present study.
5. Astigmatism of 0.6 D or more with or without spherical errors is exhibited by 47 students (9.3%). Estimates of frequency of significant astigmatism vary considerably with the starting point arbitrarily taken, and we took it as 0.6 D. In literature, the different estimates vary from Mogge[6] 10.56% to Leibowicz[7] 48.1%. Mixed astigmatism was nil in our study. Three cases (0.6%) was having astigmatism of 0.6 D or more without any spherical error. 44 cases (8.6%) were having astigmatism of 0.6 D or more associated with spherical errors.
6. The ratio of myopia to hypermetropia comes out to be 6.5:1 in our study and the maximum number of myopes was in the range of −0.25 D to −3.0 D.
7. Exophoria on Maddox rod was found to be more common than esophoria was maximum in the range of 0-4 prism dioptres, i.e., in 640 cases (50.67%).
8. On synoptophore, in 775 students (61.34%) adduction fusional range was between +0 and +12 indicating convergence insufficiency.

The study, therefore, shows that myopia and convergence insufficiency are more common in medical college students. More studies are, however, needed to further establish the same because conducting statistical tests on data with the comparatively lesser number of cases requires considerable caution to avoid overinterpretation of the results.

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