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CLEARING THE BLUR: A STUDY TO COMPARE THE PREVALENCE AND PATTERN OF REFRACTIVE ERRORS AMONG MEDICAL AND NON-MEDICAL UNDERGRADUATE STUDENTS

Community Medicine

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ABSTRACT

Introduction: It has been recorded that medical students tend to have the most reported visual defects among other professions. The medical curriculum demands prolonged hours of reading and related visually tiring tasks for many years, most of which are those of prime youth. This study was a cross sectional observational comparative study between medical and non-medical undergraduate students of our university. This research assesses the common refractive errors and focuses on likely contributory factors to the visual defects among the medical students vis-à-vis other students of the same age.

Materials and Methods: A cross-sectional study was conducted among the medical and non-medical undergraduate students of Jaipur National University, Jaipur, Rajasthan. Ours is a cross sectional observational study where we interviewed 300 medical students in their first and second professional years and compared them with 300 students pursuing graduation courses in Law, Arts and Engineering at our University. The study involved two modes of data collection viz. administration of questionnaire and a clinical eye examination. The results so obtained were tabulated in MS Excel spreadsheets. Appropriate statistical tests were applied and data was analysed using SPSS ver. 21.

Results: Out of the students using visual aids, 67% belonged to Medical and 33% belonged to Non-Medical professional courses. Myopia appeared to be the most common refractive error among the students. Age group of analysis revealed that 57.9% of visual aid users had acquired refractive errors after the age of 17 years. There was a significant association between errors of refraction and use of digital devices (Fischer's exact p value <0.005) **Conclusions:** The study conclusion revealed a definite increase in the prevalence in the refractive disorders, among the undergraduates, the most common being myopia. This was significantly more among the Medical undergraduates as compared to the Law, Arts and Engineering students. This research focuses on likely contributory factors to the visual defects among the medical students vis-à-vis other students of the same age. This serves to increase our own awareness and is also a step forward in problem identification and planning of corrective strategies.

KEYWORDS

Refractive errors, Medical, Non-Medical, Myopia

INTRODUCTION

After several years, a major addition has been incorporated in the Declaration of Geneva," I will attend to my own health, well-being, and abilities in order to provide care of the highest standard" [1]. Even as members of the medical fraternity we often fail to emphasize on our own good health. It is time to identify problem areas and work on them. One such area is visual health. Of all the cognitive senses, vision is used the most. However, the rate of visual impairment has been on a steady rise. In fact, in Asia, particularly among the youth, it has reached epidemic proportions [2],[28]. Among several reports, it has been recorded that medical students tend to have the most reported visual defects among other professions [3]. In fact, medical schools at Singapore, Taiwan, Denmark and Norway showed prevalence of eye defects among their students at the rate of 89.8%, 90%, 50% and 50.3% respectively [4]. Among several factors linked with ocular disease such as age, family history and lifestyle, the use of electronic devices has also been accepted as a predisposing cause of poor eye sight [5].

This goes on to say that besides the genetic aspects controlling refractive errors, environment also plays a strong influence. A computer use of 3 hours daily has also been observed to cause computer vision syndrome [8]. While going through literature we found that not much has been done to study the prevalence of major eye defects among medical students in India or to assess the factors which contribute to the visual impairment among them. Therefore, to fill the existing lacunae in knowledge, and to satisfy our own curiosity, we undertook this project. This research does not just clearly assess the common refractive errors, but also focuses on likely contributory factors to the visual defects among the medical students vis-à-vis other students of the same age.

This serves to increase our own awareness and is also a step foward in problem identification and planning of corrective strategies. The study aims to fulfil the following objectives:
1. To compare and statistically prove if any significant difference exists in the prevalence of refractive errors among the two groups.
2. To try and correlate the association of refractive errors with specific demographic variables and behaviour.
3. To try and correlate emmetropia with lifestyle and healthy behaviour.

4. To come out with recommendations for fostering better visual health.

MATERIAL AND METHODS

The research was a cross sectional study involving two modes of data collection viz. administration of questionnaire and a clinical eye examination. It was carried out at JNUIMSRC (Jaipur National University Institute for Medical Sciences and Research Centre) located at Jagatpura (Jaipur) in the months of August and Septemberas was approved under the ICMR short-term studentship program of 2018 (Reference ID 2018-02523). A total of 600 students from Jaipur National University (deemed university) willingly volunteered to be a part of this study, of which 300 students from the medical college and 100 students each from the college of Law, Engineering and Arts participated. Anyone above the age of 18, pursuing an undergraduate course in either medical or non-medical fields at the aforementioned University, agreeing to examination under consent was considered eligible. Age was the only exclusion criteria among the willing participants. 28 students were excluded because they were above the age of 25 but were replaced by other eligible candidates that could be included in the study.

After collecting the filled questionnaires students were divided into groups of 20 for convenience to test their vision with Snellen's and Jaeger's visual acuity charts. The eye tests were carried out in a well illuminated and prepared environment for the assessment of visual acuity of the participants. The Snellen's chart was used to assess far sight acuity. The chart was placed at a distance of 20 feet from the participant and then the participant was asked to read out the standardized chart. Normal vision was attributed to a 20/20 vision. Near vision was examined among the volunteers using the Jaeger's chart which was held at a 14 inch distance. They read it out to determine their near sight acuity. The observations were recorded similar to that of Snellen's chart test. All the tests were carried out in both eyes separately for any significant variation and the results recorded. Eyesight was also measured through autorefractometry by a qualified optometrist to eliminate bias in the clinical examinations. An average of three readings per eye was taken. The results so obtained were tabulated in MS Excel spreadsheets. Appropriate statistical tests

were applied and data was analysed using SPSS ver. 21.

OBSERVATIONS AND RESULTS

Our study design was that of a cross sectional observational study. The sample population consisted of 600 students, of which 300 students from Medical college and 100 students each from colleges of Law, Arts and Engineering participated. All the entries were tabulated in MS Excel spreadsheets and then entered in SPSS ver21. Appropriate statistical tests were applied and p-value of less than 0.05 was considered as significant.

The gender was evenly balanced with 300 males and 300 females in all i.e. 150 of the 300 students interviewed in medical college were males and 150 were females i.e. we took 50 males and 50 females from each of the colleges. Samples were selected randomly. First 50 students of each gender who gave their consent and volunteered in all the colleges were taken. The age of the sampled population ranged between 18-25 years with mean age of 19.6years (SD 1.54).

Of the tested population 309 students out of the total 0f 600 i.e. 52% had refractive errors. Of this 67% (n=207) were in the medical and 33% (n=102) were from the non medical undergraduate group. This difference was statistically significant (chi square p value =0.00001) Among the subjects with refractive errors, all those in the medical group i.e. 207 and most of the non-medical students i.e. 97 were suffering from myopia. Only 5 students among the non-medical group suffered from hypermetropia. In all we can say that, myopia is the most prevalent (50.6% of 600 students) error of refraction.

When we analysed the age group, we found that 57.9% of visual aid users had acquired their refractive errors after the age of 17, which is the age at which most of them were studying for entrance examinations and thusly join respective colleges. This phenomenon was alarmingly higher among the medical undergraduates i.e. 51.7% of the total and 77.3% of those among medical students using visual aids. This was statistically significant with p= 0.0001(chi square test). This goes onto prove that the error was an acquired one rather than a familial or genetic one; mainly and quite significantly among the medical undergraduates.

We tried to incriminate common risk factors and found that there was a significant association between errors of refraction and use of digital devices such as laptops, smartphones and tablets for >3h (Fischer's exact test). In fact most of the interviewed people who were using visual aids were actively using at least 2 electronic devices with virtual display. But when we tested the association between visual aid use and preference to use a virtual device for reading, we did not get a statistically significant result (chi square p=0.28). This goes onto say that using a screen for more than 3 hours and having 2 or more devices may be an environmental risk factor but preference to on-screen reading is not necessarily one.

We also tried to establish a correlation with family history and socioeconomic background. Here we found that 64.7% people who had refractive errors had a positive family history. However when family history and presence of refractive error were tested statistically by chi square test the result was not significant. (p value= 0.34 at 95% CI). Therefore we say that family history is not associated with refractive error. In socioeconomic evaluation maximum subjects that is 39.5% belonged to the Class II of Modified Kuppuswamy socioeconomic scale updated for 2018 [27], closely followed by those in class I.

The awareness about visual health and need to visit an ophthalmologist was more apparent among medical undergraduates than non-medical undergraduates as 89% of medical undergraduates had visited an ophthalmologist for a check-up at least once in the last year as opposed to 57% of non-medical students.

DISCUSSION:

Our study was among 600 students of which 300 were medical undergraduates and 300 were from other non-medical professional courses. This was comparable with the study population of Otohinoyi David Adeizaa et al[5] among 200 Medical Students in Dominica, study by Gopalakrishnan S et al AIMST University, Malaysia[19] among 425 medical students and that by Kshatri JS et al[2] among 506 students of Medical College of Odisha.

All the studies were cross sectional and questionnaire based followed by clinical examination of vision, like the model we have applied. The only difference was in the study by Mozolewska-Piotrowska K et al[16] among students of medical and dental faculties of Pommeranian Medical Academy in Szczecin, Poland where they have evaluated medical records at the time of admission and that by Kumar N et al[23] which was a case control study.

The prevalence of refractive errors in our study was 52% while that in studies conducted in Medical students at Kerala[22], Odisha[2] and Hyderabad[21] were 40.4%, 49.6% and 68% respectively. In literature reviews, studies among medical undergraduates of Dominica[5], Malaysia[19], Kingdom of Saudi Arabia[18] and Nigeria[17] the prevalence was 49.5%, 32.39%, 72.2% and 79.5%. This variation could be because of the varying sample size and also the ethnicity of the population. That ethnicity influences refractive errors was also suggested in S Gopalakrishnan's study at AIMST University, Malaysia[19].

They found that there was significant difference in proportion of refractive errors among Chinese and Indian male students and the proportion of both refractive errors and myopia showed huge difference among Chinese and Indian female students also. The occurrence of low myopia was significantly higher in Chinese female students than Indian female students. We found no statistically significant association between gender and myopia. This was contrary to what S Gopalakrishnan et al[19] have found in Malaysia and also contrary to the findings of Kumar N et al[23] at Rohtak, Haryana, but it was in agreement with Megbelayin EO et al[17] in a Nigerian medical school and the study by Kshatri JS et al[2] at Odisha. Therefore it cannot be conclusively said what influence gender has on refractive errors and this remains a lacuna to be explored.

Myopia was the commonest visual impairment that was found in our study , in agreement with all the studies with a prevalence of 30.5%, 50.3% and 64.8% in studies from Dominica[5], Norway[15] and Nepal[20]. The prevalence of myopia in our study was 50.6%. The study from Nepal also had a higher prevalence of high myopia i.e. 3.7% vis-à-vis ours which was 1.93% among the medical students.

We also found an association between increased virtual display usage and refractive errors. This was similar to the findings of Otohinoyi David Adeizaa[5] in Dominica, and while we found a significant increase in people who owned two or more devices, they have found it with three or more gadgets.

The major strength of our study lies in its comparative model and gender distribution. Although we have taken a sample size of 600 which is more than most of the reviewed research works, yet more needs to be done in this field and larger, multi centric studies should be encouraged. The major limitation of our study was the short duration and limited resources with which it was carried out. We were limited to the students in one Private University and hence factors such as socioeconomic influence and ethnicity could not be explored accurately. We were not able to perform autorefraction on all the subjects and we were relying on their recollection of the power of the visual aid they are using as opposed to an objective measurement. We did use the Snellen's and Jaeger's charts but in the few participants who were subjected to autorefractometry also, we did not account for cycloplegia, which may lead to slight overestimation of myopia and underestimation of hyperopia.

CONCLUSION:

Therefore we can say that there is a definite and alarming increase in the prevalence of refractive disorders (mainly myopia) among undergraduates. This prevalence is significantly higher among medical undergraduates as compared to students of other professional courses considered in this study viz. Law, Arts and Engineering. Also, the incidence is mainly after 17 years of age, which is the general age of entering professional courses in present times.

Myopia is the commonest error of refraction and it is significantly associated with increased usage of electronic devices with virtual display for more than 3 hours. The prevalence was also higher among those who owned two or more devices. Reading online was not an associated risk factor provided, the usage was for less than 3 hours. Factors such as gender, family history and socioeconomic class were not found to be significantly associated with refractive errors.

**Table 1: Showing the Gender distribution of refractive errors**

	Refractive error		Normal Vision		Total
	Medical	Non-medical	Medical	Non-medical	
Males	108	43 (3 hypermetropes)	42	107	300
Females	99	59 (2 hypermetropes)	51	91	300
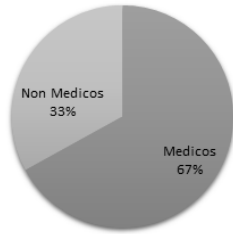
Fig 1: Pie chart showing the prevalence of refractive errors among Medical and Non-medical undergraduate students

class I	38.50%
class II	39.50%
class III	20%
class IV	1%
class V	0.01%
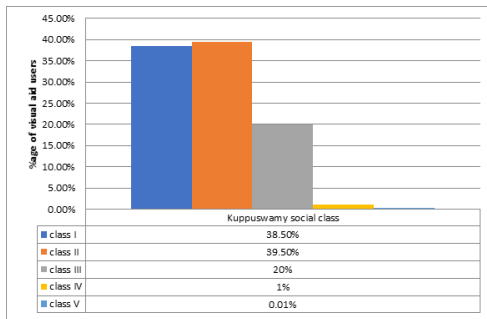
Fig 2: Showing distribution of visual aid users and Kuppuswamy socioeconomic class
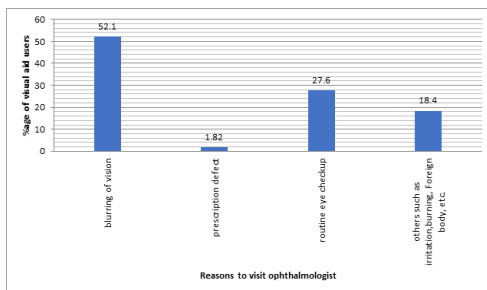
Fig 3: Chart showing common reasons to seek Ophthalmology consult

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