Myopia in Medical Students and its Association with Parental History, Gender and Use of Electronic Screens.

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Abstract
Background: To determine magnitude of problem of myopia in young medical students and its association with parental history, gender, reading and electronic device usage.

Methods: In this cross sectional study a total of 334 medical students were selected using random sampling technique. Visual acuity was measured at 6 meters distance using Snellen’s chart and for those below 6/6 myopia was confirmed through auto-refractometer and ophthalmologic consultation. A structured questionnaire was also administered to gather information regarding factors to be assessed. Data was analyzed using SPSS for frequencies and percentages, whereas associations were determined through Chi square test at 5% level of significance.

Results: Myopia was observed to be present in 44% of students amongst whom 53.2% of females and 37.4% of males were myopic. 69.4% of all myopic students had at least one parent with a refractive error, that is statistically significant (p=0.023). Relationship of reading hours (p=0.230) and electronic device usage (p=0.499) with myopia was statistically insignificant.

Conclusion: Myopia is commonly prevalent (44%) amongst young medical students and it is associated with parental history of myopia.

Keywords: Myopia, Visual acuity, Parental history, Snellen chart, Medical students

Introduction
Visual acuity is a measure of smallest high contrast detail that one can resolve. An individual with 6/6 visual acuity is considered to have normal ability to see small details at the distance tested. People having poor acuity for distance charts are myopic. Myopia is a refractive error of eye, whereby parallel light rays are focused in front of the retina causing blurring of image when the person tries to see a distant object. It is center of attention for many researchers because of its possible association with various pathological conditions of the eye such as amblyopia, strabismus, glaucoma, cataracts and even blindness. Besides this, there are socioeconomic implications. Low visual acuity hinders social dealings, academic performance and professional interaction. Use of refractive eye-wear is an unsightly inconvenience and a costly burden on one’s pocket.

Myopia is becoming an epidemic in East Asia. In Taiwan alone the incidence of myopia exceeds 70%. Several researches have shown that incidence of myopia is growing amongst medical students. Myopia was found to be the commonest refractive error according to a study conducted in an Indian Medical College. Another South Indian study revealed that incidence of myopia is growing year by year among medical students and majority of myopic students also had myopic parents. In Allama Iqbal Medical College Lahore, 57% of students were found myopic with 1st and 2nd year class having the highest prevalence. An association of near work with prevalence of myopia has long been suspected. A positive correlation between long hours spent on near work activities and frequency and progression of myopia has been reported. High risk individuals include children and adults including medical students, pursuing higher education that demands great deal of time spent on near work activities such as reading and use of electronic screens in this era of advancing technology. In a research paper from Jordon, myopic children were found to spend significantly more time in computer work and reading.

It has already been established that incidence of low visual acuity is growing in younger people, especially the literate people. Young people, especially students form the backbone of industry and society of Pakistan. Therefore, it is very important to find out how factors mentioned earlier take part in the development of myopia among medical students.

Patients and Methods
This cross sectional study was conducted under the supervision of Department of Physiology at...
Rawalpindi Medical College in year 2014 Keeping confidence level as 95%, absolute precision as 5.5% and expected prevalence as 57%, the minimally required sample size was calculated as 312 through WHO sample size calculator, but we included 334 students in total, studying in first and second academic years. Using the enrollment sheet of 1st and 2nd year medical students as the sampling frame work, and using random number generated list through of SPSS, we randomly selected 334 students irrespective of batches and gender, 167 each from first and second year respectively. A structured questionnaire was constructed to gather information on age, gender, family history and amount of near work done per day in the period of last year. Amount of near work was determined by the number of hours spent on reading and on electronic screens in a day. A pretested structured questionnaire was administered to all students included in the study after verbal informed consent. They were given 10 minutes to fill in the questionnaire and return it. After getting it completed, their visual acuity was measured through Multi-letter Snellen chart. The student was seated comfortably 6 meters away from the Snellen chart, in the well-lit room of physiology laboratory. Visual acuity was tested without glasses and then with glasses or contact lenses if worn by student. Each eye was tested separately by the individual to cover the other eye with one hand. Visual acuity of the weaker eye was recorded. Visual acuity of 6/6 was taken as normal and below 6/6 was considered low. In students with low visual acuity, myopia was confirmed through auto-refractometer and by ruling out other ophthalmological disorders by a consultant ophthalmologist, to whom they were referred. All the information was entered in the structured performa. Data was then entered in statistical Package of Social Sciences (version 17). To determine associations, Pearson’s Chi Square test at 5% level of significance was applied. P values less than 0.05 was considered statistically significant.

Results
Out of 334 students, 99 (29.6%) were males and 235 (70.4%) were females. Visual acuity, as measured through Snellen chart, was observed to be low, that is less than 6/6 for 147(44%) students. Sixteen students had ophthalmologic disorders other than Myopia. Therefore 147 i.e. 44% of total students were confirmed to be Myopic whereas remaining 187(56%) students had no myopia, so referred as non-myopic. Among females majority 125(53.2%) had myopia whereas this proportion was lower 37 (37.4%) amongst male students (Figure 1). However this difference was not statistically significant (p-value 0.11).

When inquired from all participants if their parents were also known to have any refractive error, confirmed through any consultant ophthalmologist, majority 209(62.6%) of students replied positively and 125(37.4%) stated that their parents had no known refractive error. Amongst 147 students with Myopia, 102(69.4%) students confirmed that their parents had a refractive error. This proportion was higher than the proportion of parents of 107(57.2%) students without myopia and this difference was statistically significant with p value 0.02 (Figure 2).

Total students who wore glasses or contact lenses for correction of vision were 124 (37.1%) while 210(62.9%) students did not wear glasses. Amongst those who did not wear glasses 34(16.2%) were diagnosed of myopia first time during current study. Out of those who wore glasses and who were already diagnosed for myopia, 59(47.6%) students showed deterioration that they were unaware of. When average duration of students was inquired that they spent during last six months on using any electronically screened devices (like mobile phones, computer, computerized games, watching television or playing games on screened devices) no statistically significant differences were observed in myopic students versus normal students. Similarly on comparing the average duration spent on reading books or printed materials, no statistically significant difference was observed in both groups.

![Figure 1: Clustered bar chart displaying visual acuity according to gender distribution. (n=334)](image-url)
Figure 2. A clustered bar chart displaying the distribution of refractive errors in parents, amongst myopic and non-myopic students (n=334).

Table 1. Association of various activities affecting vision with myopia

<table>
<thead>
<tr>
<th>Activities</th>
<th>Average duration in hours spent per day</th>
<th>Normal No(%)</th>
<th>Myopics No(%)</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronically screened devices</td>
<td>0-2 Hours</td>
<td>44(23.52%)</td>
<td>27(18.36%)</td>
<td>0.499</td>
</tr>
<tr>
<td></td>
<td>2-4 Hours</td>
<td>61(32.62%)</td>
<td>56(38.09%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4-6 Hours</td>
<td>43(22.99%)</td>
<td>42(28.57%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 6 Hours</td>
<td>39(20.85%)</td>
<td>22(14.96%)</td>
<td></td>
</tr>
<tr>
<td>Reading from books/printed material</td>
<td>0-2 Hours</td>
<td>22(11.76%)</td>
<td>15(10.20%)</td>
<td>0.230</td>
</tr>
<tr>
<td></td>
<td>2-4 Hours</td>
<td>63(33.68%)</td>
<td>52(35.37%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4-6 Hours</td>
<td>57(30.48%)</td>
<td>36(24.48%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 6 Hours</td>
<td>45(24.96%)</td>
<td>44(29.93%)</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

The findings of this study reveal that myopia prevails amongst the medical students of 1st and 2nd year of Rawalpindi Medical College and suggest that development of myopia has a relationship with parental history of myopia, but no association with gender, with time spent on reading or with time spent on electronic devices. We also found that a number of medical students were not aware of being myopic and hence were diagnosed of having myopia at the time of our study.

As expected, a considerable proportion of medical students were found to have myopia, that is, a prevalence rate of 44%. The prevalence rate of myopia in medical students AIMC, Lahore was 57.9%. However, when we compare our results with similar studies conducted on medical students in other countries, we find that prevalence rates vary, from as low as 32.9% amongst Turkish medical students to as high as more than 90% amongst Taiwanese medical students. In other studies myopia occurred in 50.3% of students of Norway and in 82% of students in Singapore. These contrasting results clearly point to a genetic predisposition and ethnic factors contributing to the development of myopia. It’s still important to keep in mind that differences in methodology can confer limitation in making a definite comparison.

Although the prevalence rate of myopia was higher in female students (70.4%) than in male students (29.6%), there was no strong evidence of association of gender with myopia (p=0.113) (Figure 1). A study on Greek High School students suggested a significant relationship of gender with myopia. Gender variations were significant neither amongst medical students of AIMC Lahore nor amongst students of NRI medical college, India. Similarly, in a Jordanian study any association of gender with myopia was rendered insignificant after adjusting for other variables. There is a strong evidence of association of myopia with parental history. In this study, 62.6% of total students had at least one parent with a refractive error and 69.4% of students having low visual acuity had at least one parent with a refractive error (Figure 2). This relationship was statistically significant (p=0.023) Based on the findings in our study and supportive evidence from other studies, we suggest that relationship between myopia and parental history and ethnicity is significant and there is strong evidence of genetic predisposition to myopia. Results on time spent on electronic and time spent on reading were not consistent with the prevalence rate of myopia. Among myopic students, only 22(14.96%) spent more than 6 hours on electronic devices and majority 56(38.09%) spent 2-4 hours. These results showed no significant association (p=0.499) (Table 1). Majority of myopic students, that is, 52(35.37%) spent 2-4 hours on reading. These results were also insignificant (p=0.230) (Table 1). Most of the studies do not show any strong evidence of relationship of reading hours and electronic screen work with myopia. There was no statistically significant relationship of computer working and reading with myopia amongst medical students of AIMC, Lahore. In the study conducted amongst medical students in Kerala, association of computer work with myopia was significant but not so with reading hours. In a Norwegian study, no association was
found with watching television or working with video display terminals. There is documented evidence that increased amount of near-work activities such as carpet weaving and higher education attainment are a risk factor for myopia. AIMC study suggests that although near-work activities do not show any significant relationship with myopia, they could affect the age of onset of myopia. Most of the medical students of AIMC acquired myopia in late childhood.

To further rationalize this, a study amongst Jordanian children shows that myopic children spent significantly more time on reading and computer work and another study from Hong Kong revealed a borderline statistical association of watching television during childhood with myopia. Present study does not show any strong evidence of association of hours spent on reading or electronic devices with prevalence rate of myopia, but an absolute conclusion can only be made after evaluating other factors like age of onset of myopia, distance and light under which these activities were performed.

In present study 16.2% of students who did not wear glasses were diagnosed of myopia at the time of conduction of our study. These students might not have been aware of having myopia because of less frequent visits to the ophthalmologist, but due to lack of data we cannot establish this with certainty. Second, 47.6% of students who wore glasses had low visual acuity when checked with glasses on, showing a deterioration of vision. Both these findings were highly significant (each having p value of 0.000). This gives a clue that myopia is showing a progression amongst medical students but in order to explain this progression we need further evidence and investigations.

**Conclusion**

1. Myopia is prevalent amongst medical students.
2. There is a strong evidence of association of parental history of refractive errors.

**References**