Prevalence of myopia in urban school children in the age group of 13-19 years in Aizawl district of Mizoram India

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Abstract

Myopia is one of the most common ocular disorders seen in children and young adults and is a cause of concern world-over. The prevalence of myopia did not exceed 50% in any of the regions in 2000, but, by 2050, the prevalence will be more than 50% in 57% of the countries, if current trends continue. The prevalence of myopia among the School Students in the age group of 13-19 years in Aizawl district of Mizoram was 51.90%. The prevalence of non-myopia, mild myopia and high myopia observed were 48.5%, 48%, 3.5% and 0.3% respectively. The female students have higher percentage of myopia compare to the male students.

Keywords: Myopia, school going children, Aizawl, prevalence rate

Introduction

Myopia which is also commonly called as near or short sightedness is a refractive error of the eye. It is an important cause of correctable visual impairment and preventable blindness worldwide (Belete et al., 2017) [11]. Myopia is one of the most common ocular disorders seen in children and young adults and is a cause of concern world-over (Resniffick et al., 2008; Morgan et al., 2012; Pan et al., 2012; Wu et al., 2016 Saxena et al., 2017). Globally, the prevalence rate among the older teenager is approximately 20%-35% (Belete et al., 2017) [2-6]. While the prevalence of myopia has been reported to be very high in Asia (Matsumura and Hirai, 1999; Yoon et al., 2011) [7, 8], it is not yet considered a cause of concern in India. A previous study by Saxena and his associates had reported a prevalence of only 13.1% among school children in India (Saxena et al., 2015) [9]. However, this is higher than most previous reports from India (Dandona et al., 2002; Murthy et al., 2002; Saxena et al., 2017) [10, 11, 12]. The prevalence rates have increased since the 1950s. It is estimated to affect 1.5 billion people, 22% of the population (Foster and Jiang, 2014, Holden et al., 2014) [12, 13]. By the year 2020, it is estimated that 205 billion people – one third of the world’s population will be affected by myopia (Wojciechowski, 2011) [14]. According to published reports, the prevalence of myopia did not exceed 50% in any of the regions in 2000, but, by 2050, the prevalence will be more than 50% in 57% of the countries, if current trends continue (WHO report, 2017; Holden et al., 2016) [14, 15]. Among children, it affects 1% of rural Nepalese, 4% of South Africans, 12% of Americans, and 37% in some large Chinese cities (Foster and Jiang, 2014, Pan et al., 2015) [12, 13]. Rates of prevalence vary significantly in different areas of the world (Foster and Jiang, 2014) [12]. The rate of prevalence among the high school students was 80.7% in Beijing (Wu et al., 2015) [16], 84% in Taiwan, 80.00% in Shanghai Province (Lin et al., 2004; Qian et al., 2009) [19, 20], 73.9% in Singapore (Qu et al., 2004) [21], 33.0% and 29.3% in two Iranian studies in school children of grade 10 to 12 (Fotouhi et al., 2007; Hashemi et al., 2014) [22, 23]. In the present investigation an attempt was made to evaluate the rate of prevalence of myopia among the school going students in the age group of 13-19 years of urban population of Aizawl district of Mizoram, India.

Materials and Methods

The study was conducted on school going students from 7 schools and hospitals in Aizawl district of Mizoram during 2014-2017, who was examined to determine the prevalence of myopia. The vision of the child was documented by the optometrist. Children with sub-normal
visual acuity i.e. those unable to read the 6/9p line on the Snellen chart and those children having previous myopic glasses were further examined by an optometrist for confirmation of vision and refraction if required. Retinoscopy was done using a streak retinoscope (Heine BETA 200) and a modern automated refractionator (Matronix Q30+ Korea). The autorefractor was calibrated at the beginning of each working day and a single reading was taken for each eye. The final prescription was based on the subjective refraction. All those children who had normal unaided presenting vision in the first round but failed to read the 6/9p line on the Snellen chart were the new cases of refractive error and were evaluated for identifying cases with myopic refractive error to determine the incidence of myopia. The data analysis was carried out using the SPSS (SPSS. 2001) statistical package for social science.

### Result and Discussion

The study on the prevalence of myopia among the school going students, in the age group of 13 – 19 years of the Aizawl district of Mizoram was evaluated from 7 selected schools, hospitals and private clinics located in Aizawl district of Mizoram during 2014-2017. The prevalence of myopia among the School Students in the age group of 13-19 years in Aizawl district of Mizoram is given in the Table 1 and the graphical representation is given in Figure1. As seen in the table, the prevalence of myopia was 51.90% (963 out of 1854 patients). The prevalence of non-myopia, mild myopia, moderate myopia and high myopia observed were 48.5%, 48%, 3.5% and 0.3% respectively.

<table>
<thead>
<tr>
<th>Status</th>
<th>Non Myopia</th>
<th>Mild Myopia</th>
<th>Moderate Myopia</th>
<th>High Myopia</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High School (13-15yrs)</strong></td>
<td>Male</td>
<td>54.35**(156)</td>
<td>44.25**(127)</td>
<td>1.39**(4)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>48.94**(162)</td>
<td>48.64**(161)</td>
<td>2.41**(8)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>51.45**(318)</td>
<td>46.60**(288)</td>
<td>1.94**(12)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Secondary School (16-19yrs)</strong></td>
<td>Male</td>
<td>42.16**(253)</td>
<td>54.33**(326)</td>
<td>3.33**(20)</td>
<td>0.16**(1)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>51.23**(249)</td>
<td>208**(42.79)</td>
<td>25%(5.14)</td>
<td>40.82**</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>46.22**(502)</td>
<td>49.17**(534)</td>
<td>4.14**(45)</td>
<td>0.46**(5)</td>
</tr>
<tr>
<td><strong>Non-Mizos</strong></td>
<td>Male</td>
<td>36.98**(27)</td>
<td>58.90**(43)</td>
<td>2.73**(2)</td>
<td>1.36**(1)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>57.14**(44)</td>
<td>32.46**(25)</td>
<td>9.09**(7)</td>
<td>1.29**(1)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>47.33**(71)</td>
<td>45.33**(68)</td>
<td>6.00**(9)</td>
<td>1.33**(9)</td>
</tr>
</tbody>
</table>

**Values bearing different superscripts in a row differ significantly. * Significant for p≥0.05, ** significant for p≥0.01, NS = Non significant**

The observed different degree of myopia among the teenager 13 to 15 years of was mild myopia – 46.60% and moderate myopia – 1.94% while the non-myopia students were 51.45%. In the age group of 16-19 years the mild, moderate and high myopia were 49.17%, 4.14%, and 0.46% respectively while non-myopic condition was observed in 46.22%. The non-Mizos have 52.60% of myopia. The present finding of 51.90% prevalence rate among the High School Students in the age group of 13-19 years is between the reported rates on prevalence of myopia in literature. Fotouhi et al. (2007) [23] and Hashemi et al. (2014) [24] reported the prevalence rate of 33.0% and 29.3% for two Iranian studies in school children of grade 10 to 12. The prevalence rate among the high school students in Beijing was 80.7% (Wu et al., 2015) [18], 84% in Taiwan, 80.00% in Shanghai Province (Lin et al., 2004; Qian et al., 2009) [19, 20], 73.9% in Singapore (Quek et al., 2004) [21]. This difference in the prevalence rate might be because of the variation in race between the study participants. In the present investigation the female students have higher percentage of myopia compare to the male students. The observed mild myopia and moderate myopia among the female students in the age group of 13-15 years were respectively 26.05% and 1.39% while among the male students the percentages were 20.55% and 0.64% respectively. The prevalence of Myopia among the age group of 16-19 years was 49.17%, 4.14%, and 0.46% for mild, moderate and high myopia students were 51.45%.

**Table 1: Prevalence of Myopia in different Age Groups of School going students in Aizawl district of Mizoram**

**Fig 1:** Graphical representation of the prevalence of myopia among the school going students in Aizawl district of Mizoram.
moderate and high myopia respectively while non-myopia was 46.22%. The observed mild myopia, moderate myopia and high myopia among the female students were respectively 42.79%, 5.14% and 0.82% while among the male students the percentages were 54.33%, 3.33% and 0.16% respectively. Among the myopic conditions, the rate of mild myopia is significantly higher (p<0.01) compared to other myopic conditions. The least myopic condition was observed for high myopic condition among male students with only 0.16%.

The occurrence of myopia in different ethnic communities i.e. Mizos and non-Mizos were also evaluated. The non-Mizos have 52.60% of myopia compared to 51.90% of Mizos. Among the non-Mizos, the percentage of mild, moderate and high myopia for females were 32.46%, 9.09% and 1.29% respectively while among the males the occurrence was 58.90%, 2.73% and 1.36%. Similar to Mizo students in the age group of 16-19 years, the male students have significantly higher (p<0.01) mild myopia, moderate myopia (p<0.05) however the female students have non-significant higher high myopia among the non-Mizo students.

The higher prevalence rate of myopia among the girl students observed in the present investigation is in agreement with the findings of other workers. Slight but significant gender differences in prevalence of myopia have been found between ages 10 and 15 among a wide range of Caucasian and non-Caucasian ethnic groups (NRC, 1989) [29]. Higher prevalence of myopia among girls has been reported by many workers (Saxena et al., 2015; Czepita et al., 2007; Chen et al., 2018; Wu et al., 2015) [9, 26, 27, 18]. Saxena et al. (2015) [9] observed that girls spent greater number of hours in reading and writing at home compared to boys and significantly lesser hours outdoors. This increase in time spent in reading and reduced outdoor activity predisposes them to development of myopia. Therefore girls constitute a high risk group and special efforts should be made to examine girls in this age group and also encourage them to play outdoors. (Saxena et al., 2015) [9],

Gou et al. (2016) [28] observed that the prevalence of myopia in girls was higher than in boys (49.7% vs 45.1%), and girls had 1.21 (95% CI = 1.01–1.45) times greater risk of myopia than boys and their finding is consistent with a previous study that was conducted in Beijing by Wu et al. (2015) [18] showing that the girls were more likely to be myopic than boys (odd ratio=1.31, 95% CI=1.11–1.55) and aligns with a prior Caucasian study (Czepita et al., 2007) [26] reporting that myopia occurs more frequently in girls than in boys. Chen et al. (2018) [27] reported higher prevalence of myopia in females compared to males (Chi-squared test, P < 0.005; except for 2001, P = 0.087. From 2001 to 2015, the prevalence of myopia increased 9.7% in female students (81.1% to 90.8%, mean = 88.1 ± 2.6%, P < 0.001) and 5.8% in male students (78.3% to 84.1%, mean = 81.1 ± 2.4%, P < 0.001). Gender differences probably have little effect on the comparability of data in large samples distributed over a wide range.

References