

## REFRACTIVE ERRORS IN SCHOOL CHILDREN IN URBAN AND RURAL AREAS OF LUDHIANA, PUNJAB

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### ABSTRACT

#### BACKGROUND

Refractive errors are the second most common cause for childhood blindness across the globe. Early detection and correction of refractive errors in school children is inexpensive and also an effective form of eye care services.

Aim- To study the status of refractive errors in children through school screening programme in urban and rural areas of Ludhiana district.

#### MATERIALS AND METHODS

This study was done on students aged 5 to 15 years from randomly selected urban and rural schools of Ludhiana district, Punjab. A detailed ocular history which included, history of use of spectacles and about past and present complaints was taken. Students who were found to have a visual acuity equal to or less than 6/9 were referred to the Department of Ophthalmology, Christian Medical College, Ludhiana. At the base hospital a complete eye examination was done which included cycloplegic retinoscopy. Appropriate spectacles were then prescribed to the children after post mydriatic refraction.

#### RESULTS

Over 3 years a total of 20,235 students were examined. Of these 11,565 were males and 8,670 were females. There were a total of 1,582 myopes, 854 hyperopes, 306 with astigmatism and 89 amblyopic children (66 unilateral, 23 bilateral). As compared to males the distribution of decreased visual acuity in girls was higher. The comparison of decreased visual acuity in different age groups showed that the number of students with decreased vision increased proportionately with age.

#### CONCLUSION

In finding out the incidence and type of refractive errors in school children, school-screening programme has proven to be very effective. Children with decreased visual acuity detected at screening must undergo a thorough ocular examination at the base hospital.

#### KEYWORDS

Refractive Error, Myopia, Hypermetropia and Astigmatism.

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#### BACKGROUND

Refractive error is the second leading cause of treatable blindness and one of the most common causes of visual impairment in school going children.<sup>1</sup>

As per the estimates across the globe, 2.3 billion people have refractive errors; out of these 1.8 billion people have eye care facilities at affordable cost. The remaining 500 million have no significant eye care services and are living in developing countries. These mainly include children.<sup>2,3</sup> In

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Indian school going children, refractive error is the second most common eye problem.

Visual impairment in children is an important cause for poor performance in studies, inability to actively participate in sports and other cultural activities. This leads to the development of an inferiority complex and increased school dropouts. This can be reduced by an early detection of refractive errors in school children through screening. Uncorrected refractive errors are responsible for as much as 19.7% of blindness. About 13% of the Indian population is in the age group of 7-15 years and about 20% children develop refractive error by the age of 16 years.<sup>4</sup>

A study done on the urban population of New Delhi, showed that refractive error was the cause in 81.7% of eyes with vision impairment, with myopia in 7.4%, hypermetropia in 7.7% and amblyopia in 4.4%.<sup>1</sup>

A similar study done among school children in the 7-15 years age group in rural and urban areas of Bengaluru showed the prevalence of uncorrected refractive error to be

7.03%. The prevalence of myopia, hypermetropia and astigmatism in children was 4.4%, 1.03% and 1.6% respectively. Children in the age group of 13 to 15 years attending urban schools were most likely to have myopia.<sup>4</sup>

According to the Rapid Assessment of Avoidable Blindness Survey 2007, there was a reduction in the prevalence of avoidable blindness from 1.1% in 2002 to 1.0%, of which 19.7% was caused by an uncorrected refractive error.<sup>5</sup>

So far very few studies have been conducted on the prevalence of refractive errors among school children in Punjab state. Considering the importance of uncorrected refractive errors in school children we undertook the present study of school screening programme in both urban and rural areas of Ludhiana, Punjab.

**MATERIALS AND METHODS**

This was a prospective study conducted in randomly selected urban and rural schools in and Ludhiana district, Punjab. All students aged 5- 15 years (class 1 to class 10) in these schools were screened. Prior permission was taken from the ethical committee of Christian Medical College and Hospital Ludhiana to conduct this study and also from the principals of all the respective schools.

The demographic details of the students in the study were obtained from school registers. A questionnaire was finalized to collect information from the student and a detailed ocular history was taken about past and present eye problems along with history of use of spectacles.

The distant visual acuity of children was tested with Snellen’s chart with standard distance of 6 meters. If the child’s visual acuity was found less than or equal to 6/12, then these children were identified as having visual impairment. These students were then given a reference letter for their parents asking them to bring their children to the Department of Ophthalmology, Christian Medical College and Hospital, Ludhiana. The school authorities were requested to ensure that these students would come for the ophthalmic check up.

At the base hospital, all children who were referred from the schools underwent a complete ophthalmological examination. Auto-refractometer readings were taken and a cycloplegic retinoscopy was done after taking written consent from the parents.

Post mydriatic subjective refraction was done after 3 days of cycloplegic retinoscopy and as per the protocol glasses were prescribed to the children who were having visual impairment due to refractive errors. In this study children who were having refractive error of -0.50D spherical and above in one or both eyes were labeled as myopes, + 1.00 D spherical in one or both eyes were considered as hypermetropes and astigmatism was considered to be visually significant if  $\geq \pm 0.50D$ .

**RESULTS**

This study included a total of 20,235 students, of which 2,831 children had defective vision. There were a total of 1582 myopes, 854 hypermetropes, 306 astigmatic and 89 amblyopic children (66 unilateral, 23 bilateral).

In this study we observed that the refractive errors were more prevalent in females (18.40%) as compared to males (10.60%). The difference was statistically significant ( $p < 0.01$ ). (Table 1)

Refractive Errors	Total (n=20,235)	Male (n=11,565)	Female (n=8,670)	P value
Myopia	1582 (7.81%)	673 (5.81%)	909 (10.48%)	< 0.01
Hypermetropia	854 (4.22%)	369 (3.19%)	485 (5.59%)	< 0.01
Astigmatism	306 (1.51%)	147 (1.27%)	159 (1.83%)	<0.01
Amblyopia	89 (0.43%)	46 (0.39%)	43 (0.49%)	0.29

**Table 1. Comparison of Decreased Visual Acuity in Males and Females**

We compared decreased visual acuity in different age groups. The refractive errors were more prevalent in the age group of 5-10 years when compared to those between the 11 to 15 years. However this difference was not statistically significant ( $p=0.125$ ). (Table 2)

Refractive Errors	Age 5-10 yrs. (n=9219)	Age 11-15 yrs. (n=11016)	Total (n=20235)	P value
Myopia	696 (7.54%)	886 (8.04%)	1582 (7.81%)	0.125
Hypermetropia	398 (4.3%)	456 (4.13%)	854 (4.22%)	
Astigmatism	123 (1.33%)	183 (1.66%)	306 (1.51%)	

**Table 2. Comparison of Decreased Visual Acuity in Different Age Groups**

The prevalence of refractive errors was higher in urban school children (8.25%) as compared to rural school children (7.35%), this difference being statistically significant ( $p < 0.01$ ) (Table 3)

Refractive Errors	Urban (n=11485)	Rural (n= 8750)	P Value
Myopia	1284 (11.17%)	298 (3.40%)	<0.01
Hypermetropia	672 (5.85%)	182 (2.08%)	<0.01
Astigmatism	142 (1.23%)	164 (1.87%)	<0.02

**Table 3. Comparison of Decreased Vision in Children from Urban vs Rural Schools**

**DISCUSSION**

India is a developing country and the second highest in world population. According to the Rapid Assessment of Avoidable Blindness Survey conducted by the NPCB during 2006-2007 there was a reduction in the prevalence of blindness from 1.1% (2001-02) to 1% in 2006-07. In certain areas of India, Eye care facilities are insufficient due to inadequate manpower and shortage of resources. Treatment of childhood blindness including refractive errors is one of the priority aims in Vision 2020: the Right to Sight initiative of the World Health Organization. We therefore

need to strengthen our eye care services at the grass root level.<sup>3</sup>

The prevalence of refractive errors in our study was 13.9%, similar to the prevalence observed by Sharma et al in Haryana (13.65%).<sup>6</sup> and Zhao et al in Shunyi district, China (12.8%).<sup>7</sup> However it was less when compared to the prevalence observed by Dandona et al in Andhra Pradesh (61%).<sup>8</sup>

The prevalence of refractive errors was more in females (18.40%) as compared to the males (10.60%). Similar results were found by Pavithra et al in their study on refractive errors in school children in Bengaluru.<sup>4</sup> But in another study Matta et al found males had more refractive errors as compared to females.<sup>9</sup>

In our study, myopia was the most common refractive error found in 7.81% of the school children followed by hypermetropia in 4.22% and astigmatism in 1.51%. In a study conducted by Matta et al, the prevalence of myopia was more common than other refractive errors.<sup>8</sup> which is similar to our findings.

The prevalence of decreased visual acuity was more among the urban school children as compared to rural school children. The difference is statistically significant ( $p < 0.01$ ). Similar findings have been reported by Dandona et al in the urban and rural population of Andhra Pradesh.<sup>8</sup>

The prevalence of refractive errors was higher among 11–15 years of age group (13.83%) as compared to age groups of 5–10 years of age (13.17%). This difference was not statistically significant ( $p = 0.12$ ). This was similar to the results of a study conducted in Bengaluru city where the prevalence of refractive errors was found more in the 13–15 years age group (7.5%) compared to those between 7–9 years of age group (6.6%).<sup>4</sup>

Limitations of our study were that we did not consider the predictors of refractive errors especially for myopia as reported in many studies (eg: genetic factors, socio-economic status, parent's education and prolonged use of electronic gadgets) and we included only school going children.

## CONCLUSION

Childhood blindness is the second most common cause for treatable blindness in developing countries. The treatment

for refractive errors being simple and cheap is still a public health problem in developing countries due to poor eye care services and management of resources. Hence government health authorities should come forward to implement effective eye care services in schools in order to aid early detection and treatment of refractive errors among school children.

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