

Prevalence of Refractive Error in School Children of Pathankot District of Northern India.

Nitin Singh Salaria¹

¹Assistant Professor, Department of Ophthalmology, KD Medical College, Mathura

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ABSTRACT

Background: Refractive error is one of the most common causes of visual impairment around the world and the second leading cause of treatable blindness. A number of studies have been reported in different parts of India. Such reports are lacking in northern India. Therefore, the present study was planned to know the prevalence of refractive error in school children in Ghaziabad, UP. Objective: To know the prevalence, distribution and type of refractive error in school children and their relationship with age and sex of children. **Methods:** It is a cross-sectional among school children aged 6-15 years in schools in and around Ghaziabad. Visual acuity was done by snellen test type (6 meters). Retinoscopy at 1 m distance after cycloplegia using 1% cyclopentolate to detect refractive error. **Results:** In our study 25.31% were ametropic and 74.68% were emmetropic out of a total of 1647 study subjects. Within the age group of 6-8.9 years, 76(13.4%) were present with refractive errors, 107(21.35%) were in 9-11.9 years groups, 161(35.22%) were among 12-14.9 years age group and 63(50%) were of 15 years and above. Number of ametropic were increasing standard or class, thereby showing relationship between no. of years of schooling and refractive errors. **Conclusion:** The data support the assumption that vision screening of school children in developing countries could be useful in detecting correctable causes of decreased vision especially refractive errors. It also helps in minimising long term visual disability.

Keywords: Blindness, Refractive error, Visual Acuity.

INTRODUCTION

Refractive error is one of the most common causes of visual impairment around the world and the second leading cause of treatable blindness.^[1] Reliable data on prevalence and distribution of refractive errors from population based surveys are needed to plan cost effective programs for reduction of visual impairment and blindness. Few population based data on refractive error are available from India,^[2] but very few are available for children attending school.^[3] Data obtained from school children can be reliably used to plan eye care services, because they are representative of the a significant proportion of children amongst population.^[4]

To address a widespread need for population based data on childhood refractive error, a Refractive Error Study In Children (RESC) protocol was prepared to assess the prevalence of refractive error and related visual impairment in children of different ethnic origins and cultural settings by using consistent

definitions and methods.^[5] RESC surveys were recently conducted in China, Nepal, Chile and results have been published.^[6-9]

Worldwide, uncorrected refractive error is increasingly been recognized as a significant cause of visual disability as evidenced by its inclusion in one of the six disease controlled measures in targets for blindness control in vision 2020: the right to sight-a global initiative launched by a coalition of non- governmental organizations and the world health organizations in view of the increasing realization of the enormous need for the correction of refractive error worldwide.^[10]

The most important factors to be considered regarding prevention of blindness are the ophthalmologic disorders occurring at school age. However, in developing countries like India, preventive and interventional programs are not implemented, probably due to limited resources in health area and to the lack of emphasis on effective actions to be taken by the community.^[11]

The present study is conducted amongst school children of Ghaziabad district. Students of age group 6-15 years were chosen because refractive errors were most prevalent in this age group, and correction of refractive errors during this critical period is of paramount importance, occurring in as high as 20% in children of 16 years of age.^[11]

Name & Address of Corresponding Author

Dr. Nitin Singh Salaria
Assistant Professor, Department of Ophthalmology,
KD Medical College,
Mathura

This study is a cross-sectional study aiming at estimating the prevalence of refractive errors by age, sex, type, and class among school children of Ghaziabad. The mean age of onset of refractive errors was computed, this information may be used planning appropriate eye care programs for the high risk groups in order to reduce the burden of visual impairment in this age.

MATERIALS AND METHODS

The present study is a cross-sectional from Jan, 2006 to April 2007 among school children aged 6-15 years in schools in and around Ghaziabad. The study was approved by the Institutional Ethics Committee, Santosh Medical College and Hospital, Ghaziabad. The sample of school children aged 6-15 years was taken from 5 schools to assess the prevalence of refractive errors in school children. The parents/care givers were appraised about the ongoing study and non of them had any objections.

Place of study

1. Guru Nanak public school B Block, Patel Nagar, Ghaziabad.
2. SSK public school, Pratap Vihar, Ghaziabad.
3. Childrens Academy, Pratap Vihar, Ghaziabad.
4. Bloom public school, vijay nagar, Ghaziabad.
5. DAV public school, Ramprastha, Ghaziabad.

Inclusion criteria

- 1) Children aged between 6 to 15 years
- 2) Visual acuity <6/6 in one or both eyes tested by Snellen chart were put in the category of having refractive error. Myopia was considered as spherical refractive error of at least -0.25 D and Hypermetropia as +0.25D or more.

Exclusion criteri

Low visual acuity related to any pathological condition like

- 1) Amblyopia
- 2) Macular or retinal pathology
- 3) Cataract
- 4) Conjunctivitis
- 5) Ptosis
- 6) Styes and Chalazion
- 7) Corneal opacities
- 8) Trauma

Clinical Examination

Visual acuity was done by snellen test type (6 meters). Retinoscopy at 1 m distance by cycloplegia using 1% cyclopentolate. Detailed fundus examination was done in every case using direct ophthalmoscope (HEINE BETA-200CE).

For children wearing glasses, visual acuity was measured both with and without them. Lens power was measured. Ocular mortality was evaluated with a cover test at 0.5 and 4.0 m, with corneal light reflex used to quantify the degree of tropia. Cycloplegia was induced with 2 drops of 1% cyclopentolate, administered 5 min apart by

ophthalmic assistants, with a third drop administered after 20 min. Cycloplegia and pupil dilation were evaluated after an additional 15 min. Pupillary dilation of 6 mm or more with absence of light reflex was considered complete cycloplegia. Refraction was performed first with a streak retinoscope (Welch Allyn, Skaneateles, NY) independently. Subjective refraction was performed on children with un aided visual acuity 6/9 or worse in either eye.

We evaluated the external eye an anterior segment (eyelids, conjunctiva, cornea, iris and pupil) with a magnifying loupe and direct ophthalmoscopic examination of the media and fundus. Children with vision that improved with refraction were prescribed and provided with spectacles. Chidren needing medical or surgical treatment were referred to Santosh medical college and hospitals, Ghaziabad. Myopia was defined as spherical equivalent refractive error of atleast -0.25 D and Hyperopia as +0.25 D or more. Refractive error data are presented only for eyes with successful cycloplegic dilation. Children were considered myopic if one or both eyes were myopic; Hyperopic if one or both eyes were hyperopic, so long as neither eye was myopic; and emmetropic if neither eye was myopic or hyperopic. The association between myopia/hyperopia and child’s age and gender and class were explored using chi square.

Data Analysis

The data was collected on a pre designed and pre tested study performa (annexure 1).The collected data was analysed by using chi square test.

Chi Square

$$X^2 = \frac{\sum(O-E)^2}{E}$$

Where O= Observed value and E= Expected value.

INTERPRETATION OF RESULTS

P<0.05 (is significant)

P>0.05 (is insignificant)

RESULTS

Amongst 1647 students who were examined, 872 were males and 775 were females. In our study 417(25.31%) were ammetropic and 1230(74.68%) were emmetropic out of a total of 1647 study subjects

Table 1: Age wise distribution of students with and without refractive errors.

| Age Groups | Refractive Errors | | | | Total |
|----------------------|-------------------|-------|------|-------|-------|
| | Yes | % | NO | % | |
| 6-8.9 | 76 | 13.4 | 487 | 86.6 | 563 |
| 9-11.9 | 107 | 21.35 | 394 | 78.65 | 501 |
| 12-14.9 | 161 | 35.22 | 186 | 64.88 | 457 |
| 15 | 63 | 50 | 63 | 50 | 126 |
| Total | 417 | | 1230 | | 1647 |
| X ² =8.37 | | DF=3 | | P<.05 | |

Age wise distribution of study subjects has been split into four groups wherein within the age group of 6-8.9 years, 76 (13.4%) were present with refractive errors, 107 (21.35%) were in 9-11.9 years groups, 161 (35.22%) were among 12-14.9 years age group and 63 (50%) were of 15 years and above.

Table 2. Class wise distribution of students with or without refractive errors.

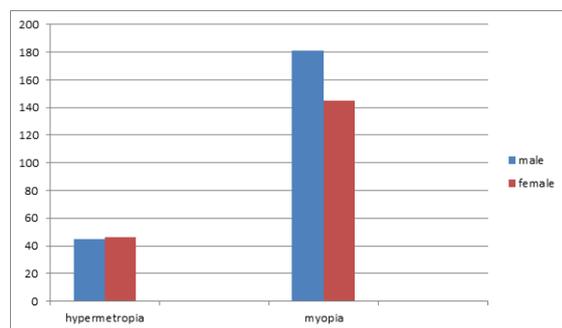
| Class | Refractive Error | | | | Total |
|----------------------------------|------------------|-------|------|-------|-------|
| | YES | % | NO | % | |
| 1 | 25 | 12.56 | 174 | 87.44 | 199 |
| 2 | 24 | 12.5 | 168 | 87.5 | 192 |
| 3 | 27 | 15.69 | 145 | 84.31 | 172 |
| 4 | 32 | 17.48 | 151 | 82.52 | 183 |
| 5 | 30 | 20 | 120 | 80 | 150 |
| 6 | 34 | 20.23 | 134 | 79.77 | 168 |
| 7 | 27 | 24.10 | 85 | 75.90 | 112 |
| 8 | 33 | 22.14 | 116 | 77.86 | 149 |
| 9 | 50 | 25.51 | 146 | 74.49 | 196 |
| 10 | 46 | 36.50 | 80 | 63.50 | 126 |
| TOTAL | 328 | | 1319 | | 1647 |
| X ² =17.35 DF=9 P<.05 | | | | | |

Number of ametropic were increasing standard or class, thereby showing relationship between no. of years of schooling and refractive errors.(X²=17.35 DF=9 P<.05)

Table 3: Refractive error distribution among study subjects.

| Refractive error | Number | Percentage |
|----------------------------------|--------|------------|
| Hypermetropia | 91 | 21.82 |
| Myopia | 326 | 78.17 |
| TOTAL | 417 | 100 |
| DF=1 X ² =6.32 P<1.02 | | |

Out of 417 students with refractive errors Hypermetropia was found in 91(21.82%) and Myopia in 326(78.17%) thus showing increasing prevalence of myopia amongst study subjects. (DF=1 X²=6.32 P<1.02)



Graph 1: Gender based category of refractive errors amongst male and female subjects.

It was found that myopia was present in 181(80.09%) in males and 145(75.92%) in females and hypermetropia 45(19.91%) in males and 46(24.08%) in females. Thus showing increased prevalence of myopia amongst male and female subjects

DISCUSSION

Refractive errors constitute a sizable proportion of any eye OPD in our country. The overall incidence has been reported to vary between 21% and 25% of the patients attending eye OPD in India.^[12] About 13% of Indian population is in the age group of 10-15 years.^[13] Planning of a youth's carrier is very much dependant on the visual acuity, especially in jobs for Navy, Military, Railways and Aviation.^[14]

In the present study prevalence of refractive error was found in 25.3%(417) out of the total of 1647 study subjects which included 78.17% myopia, 21.82% hypermetropia (X²=6.32 P<1.02) which is consistent with the findings by Khan Afroz et al (2005) who conducted a study in school children (6-16 yrs) in Srinagar and found myopia as the most common refractive error.^[15] The study also showed increase in number of study subjects with refractive error with increasing age .i.e.76 (13.4%) between 6-8.9 yrs, 107 (21.35%) between 9-11.9 yrs, 161 (35.22%) between 12-14.9 and 63(50%)at 15 yrs of age. Mobaso R G et al(2006)in Limpopo, South Africa found a significant increase in prevalence of refractive error with increasing age of children.^[16]

Refractive errors did not differ significantly between males and females with 26.7% in males and 23.9%in females (X²=2.83,P>.05 which were found by chance as P value is insignificant.^[17] However in other studies Refractive errors were found more commonly in girls than in boys properly related to their rate of growth as girls attain puberty 1-2yrs earlier as compared to boys.^[18-19]

In our study, Ammetropic subjects increased with increasing number of years of study from 12.56% in class 1 to 36.50% in class x(x²=17.35,p<.05). This is consistent with the findings of Sperduto, which showed that myopic prevalence rises with educational level, implying thereby that a significant relationship exists between refractive error and educational level.^[35,36]

CONCLUSION

Refractive error is the main cause of visual impairment in children aged between 6 and 15 years in India. There was a benefit of spectacles in 70% of those who had visual acuity of 6/9 or worse in the better eye at baseline examination. Because visual impairment can have a significant impact on a child's life in terms of education and development, it is important that effective strategies be developed to eliminate this easily treated cause of visual impairment.

Recommendations

The present study shows that the adolescent age group forms the high risk group for refractive errors and most of the children are unaware of refractive errors.

Salaria; Refractive Error in School Children

1. Vision testing programmes in school should be developed and children should be screened at least once during adolescence.
 2. Vision testing programmes could be organized and implemented by the nearby health centers after getting the necessary training from the responsible higher health
 3. Guidelines for visual screening of school children should be officially established and constantly reinforced by both the health and Education Departments, both departments would coordinate the execution of visual screening and the setting up of basic offices for ophthalmologic examinations in municipal health centers, and would provide the required infrastructure for ophthalmologic examinations of schoolchildren .the integration of those departments, teacher training, screening coordination and follow-up of the visually deficient may be facilitated by the creation of more specialized schools for the visually deficient.
 4. Students need to be educated about signs and symptoms of refractive errors.
 5. Preschool and school screening for detection of refractive errors should be carried out on periodic basis
 6. Ways of providing lenses either free or charged or at a reduced cost should be considered for those children with refractive errors of <6/12 and who cannot afford to buy the glasses
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