

# Prevalence of Refractive Errors Among School Children In and around Davangere

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## Abstract :

**Background :** Childhood visual impairment due to refractive errors is a significant but avoidable problem. Uncorrected refractive errors in school children has a considerable impact on their physical and mental development. So screening school children helps in early detection and timely interventions can improve child's potential tremendously during the formative years.

**Aim :** To determine the magnitude of refractive errors among school children of different age group, frequency of various types of refractive error and the percentage of refractive error in boys and girls.

**Methods :** The study was an institution based cross sectional study of 91 government schools located in Davangere taluk and Davangere city. A total number of 7496 students studying in 5<sup>th</sup>, 6<sup>th</sup>, 7<sup>th</sup> standards were screened for defective vision using Snellens E chart and refraction was done by refractionists.

**Results :** The study population comprised of 8677 children. Excluding absentees and those in whom refraction could not be performed, a total of 7496 students were examined. The prevalence of refractive error was found to be 6.4%. Out of 7496 students 3909 were boys and 3587 were girls. The prevalence of refractive error was found to be 5.3%, 5.6%, 8.2% in 5<sup>th</sup>, 6<sup>th</sup>, 7<sup>th</sup> standard students respectively.

**Conclusion :** The prevalence of refractive error is quite significant. So there is a need to have regular and simple vision testing in school children so that corrective measures may be recommended at the earliest possible.

**Key words :** Refractive Error, Prevalence, Hypermetropia, Myopia, School Children.

## Introduction :

Ametropia (a condition of refractive error) is defined as a state of refraction, when parallel rays of light coming from infinity are focused either in front or behind the retina after passing through the dioptric power of the eye when the accommodation is at rest<sup>2</sup>.

Refractive error is one of the most common causes of visual impairment around the world and the second leading cause of treatable blindness<sup>4</sup>. An estimated 153 million people over 5years of age are visually impaired as a result of uncorrected refractive errors of which 8million are blind. Approximately 12.8 million children in the age group 5-15years are visually impaired from uncorrected or inadequately corrected refractive error estimating a global prevalence of 0.96%. The prevalence of childhood blindness in India is 0.17%. Treatable refractive error is the major

cause 33.3% followed by preventable causes like vitamin a deficiency, post cataract surgery amblyopia<sup>3</sup>.

Refractive error is an avoidable cause of visual impairment. Diagnosis and treatment of refractive errors is the simplest and most effective forms of eye care<sup>1</sup>. Since children usually do not complain of visual difficulties early detection and prompt treatment of eye diseases is important to prevent vision problems and eye morbidities which could affect their learning ability, personality and adjustment in school.

The purpose of this study is to gather information on refractive status of students so that an effective approach can be planned to tackle the burden of readily correctable refraction problems in school children. Children were also provided with glasses and medicines when found necessary by DBCS organizations aided by government of Karnataka.

## Objectives of the study

- 1) To determine the magnitude of refractive errors among school children of different age group
- 2) To find out the frequency of various types of refractive errors.

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3) To explore the percentage of refractive error in boys and girls.

**Materials and Methods**

**Study Design :** This was a institution based cross sectional study in which higher primary school children were screened for refractive errors .

**Period of study :** June 2013 to March 2014.

**Inclusion criteria :** Higher primary school children studying in 5<sup>th</sup> , 6<sup>th</sup> , 7<sup>th</sup> standards in government schools of Davangere Taluk.

Study was carried out at S.S.I.M.S.&R.C, Department of ophthalmology.

**Exclusion criteria :**

- 1) Children who were absent on the day of examination.
- 2) Children in whom refraction could not be performed because of media opacity.

Ethical issues: Permission to carry out this study was sought for and obtained from respective school head masters.

Data collection : A total number of 242 government schools are located in Davangere Taluk. 147 schools in rural area and 92 in Davangere city. In the present study out of 242 schools 91 schools are selected. Children studying in 5<sup>th</sup> , 6<sup>th</sup> ,7<sup>th</sup> standard were screened with the help of refractionists appointed by DBCS.

**Methods :** The distant vision of a child was tested using Snellens illiterate E chart. The visual acuity was tested with the chart at 6m . If uncorrected vision was <6/9 in either , the child was declared to have defective vision. All students with defective vision were examined by the refractionist. Objective refraction was performed with retinoscope which was followed by subjective refraction till the best corrected visual acuity was achieved. Hypermetropes, Children with BCVA less than 6/6 and those in whom BCVA was 6/6 but accomodation symptoms like head ache, eye pain were present, were subjected to cycloplegic refraction with cyclopentolate 1% eye drops. Children already wearing spectacles were also examined and change in power was noted. Myopia was considered when the measured refraction was more than or equal to -0.5Dsph in one or both eyes. Hypermetropia was considered when the measured objective refraction was greater than or equal to +1.0 D spherical equivalent . Astigmatism was considered to be visually significant if more than or equal to 1.00D<sup>4</sup> . The visual acuity, types of refractive error and correction was noted down. Corrective spectacle list were sent to D.H.O and spectacles sanctioned by Government were issued to children at free of cost. Children with other ocular problems were referred to base hospital.

The data was entered in Microsoft xl spread sheet and analysis was done using statistical packages z test was used to compare the gender wise prevalence of refractive error. Chi square test was used to compare the prevalence for different age groups.

**Results**

After careful analysis the observations were presented in the following tables 1-4 .

**Table 1:** Prevalence of refractive error

No. of students	No. of students with ref error	% of prevalence
7496	479	6.4

**Table 2 :** Sex wise distribution of refractive error. z test for propotion

Gender	No. of students	No.of students with ref error	% of prevalence
Boys	3909	228	5.8
Girls	3587	251	7.0

Boys v/s girls Z=2.12, p=0.02 (p<0.05)significant.

**Table 3 :** Age wise prevalence of refractive error

Age	No. of students	No.of students with ref error	% of prevalence
5 <sup>th</sup> std (10yrs)	2318	122	5.3
6 <sup>th</sup> std(11yrs)	2595	145	5.6
7 <sup>th</sup> std (12yrs)	2583	212	8.2

Chi square=21.98, P<0.05 significant.

**Table 4 :** Comparison of age wise distribution of refractive error.

Standard	X <sup>2</sup>	P value	
5 <sup>th</sup> v/s 6 <sup>th</sup>	0.25	0.62	Not significant
5 <sup>th</sup> v/s 7 <sup>th</sup>	8.68	0.03(<0.05)	Significant
6 <sup>th</sup> v/s 7 <sup>th</sup>	11.19	0.001(<0.05)	Significant
5 <sup>th</sup> v/s 7 <sup>th</sup>	8.68	0.03(<0.05)	Significant
6 <sup>th</sup> v/s 7 <sup>th</sup>	11.19	0.001(<0.05)	Significant

**Table 5 :** Frequency of distribution of various types of Refractive Error

Total no. of students with error	479	
Myopia	396	82.6%
Hypermetropia	45	9.3%
Astigmatism	37	7.9%

Total strength of the schools selected was 8677. Out of which 7496 students were present on the day of examination and were included in the present study.

Out of 7496 presented, 3909 were boys and 3587 were girls. 6.4% of the students were found to be having refractive errors. Of these 5.8% was found in boys and 7.0% was found in girls. 5.3% prevalence was found in 5<sup>th</sup> standard students. 5.6% prevalence in 6<sup>th</sup> standard students and 8.2% in 7<sup>th</sup> standard students. Out of total 479 students with refractive error, 396 were myopes constituting the highest prevalence percentage 82.6%, 45 students were hypermetropes (9.3%), 37 had astigmatism (7.9%).

**Discussion**

In India uncorrected refractive errors are the most common cause of visual impairment and second major cause of avoidable blindness. In the global initiative 2020 for the elimination of avoidable blindness refractive errors have been emphasized together with other ocular diseases like cataract, trachoma and onchocerciasis. The refractive error study in children (RESC) has been formed under this initiative to try and assess the prevalence of refractive errors in children.

The prevalence of refractive error in this study population was 6.4% similar to prevalence observed by GVS Murthy *et al* in New Delhi (6.4%) and Kumar *et al* in Lucknow (7.4%) and Pavithra MB *et al* in Bangalore (7.03%) similar studies from different parts of the world showed a prevalence of 8.2% Proslan *et al* in Baltimore (USA) 12.8% in Shunyi district in China, 2.9% in Nepal, 15.8% in Chile, 11.6% in Uganda, 18.5% in Santa Monica, USA by Chen *et al*, 10.4% by Kazuhiro *et al* in Japan.

These variations in the prevalence data from studies in different parts of the world are due to different operational definitions considered by investigators and also due to differences in demographic factors.

Refractive error was more prevalent in female

children (7.0%) as compared to males (5.8%) and this difference was statistically significant.

Seema sharma *et al* found that prevalence of refractive error was 23.7% in girls and only 12.2% in boys. Pavithra MB *et al* found that the prevalence of refractive error was 9% in females as compared to 5.3% in boys.

Similar results were obtained by Prema N at Kancheepuram district, Tamilnadu and Tay MT *et al* in their study on young Singaporeans.

In these studies the differences were related to the possible differences in the rate of growth between girls and boys. Girls attain puberty earlier on an average and reach their final body weight 1-2 years earlier than boys.

Higher prevalence was found in 7<sup>th</sup> standard students (8.2%) as compared to 5<sup>th</sup> standard students (5.3%)  $p=0.0003\%$  which is statistically significant.

These results match with study done by Pavithra MB *et al* in Bangalore and Sethi *et al* in Ahmedabad city.

Prevalence of myopia was 82.67% followed by hypermetropia 9.3%, astigmatism 7.9%.

Similar results were obtained in a study done by Kawuma M in Kampala district, Sonam Sethi *et al* among school children of Ahmedabad and Bansal A *et al* who did a study on Ocular Morbidity in School going Children of Kolar District, South India.

**Limitations of our study**

- 1) Only presentees were included in the study population.
- 2) Only school going children were included.

Significant proportion of children in rural India and other developing countries do not go to schools hence a more complete assessment of visual impairment in children would be possible with population based studies not restricted only to school going children. Population based studies covering non school going children are recommended.

**Conclusion**

Significantly low utilisation of eye care services relative to recommended guidelines is observed in low income populations. School eye screening (SES) program was initiated under National Program for Control of Blindness (NPCB) in 1994. The activities in SES include identification of schools, collection of data regarding students, training of teachers, screening of students by ophthalmic assistants/ ophthalmologists, prescription of correcting lens,

providing free spectacle to children from poor socioeconomic strata and referring patients to an appropriate centre if further management is needed<sup>5</sup>.

These data support the assumption that vision screening of school children in developing countries would be very useful. The present study indicates that the school age is a high risk group for developing refractive errors. So there is a need to have regular and simple vision testing in school children so that corrective measures may be recommended at the earliest time possible. We sincerely acknowledge the Management, Principal of S.S.I.M.S&R.C, Davangere for their support for this work. We sincerely acknowledge refractionists working under DBCS Ranganath S.K, Thippeswamy A.M, Kumar P.K and Basavraj for their support for this work. The authors are grateful to the school teachers and the children who participated and extended their full cooperation in the study.

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