Research Article

THE PROBLEM OF UNCORRECTED REFRACTIVE ERROR AMONG SCHOOL CHILDREN IN SOUTHERN INDIA

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ABSTRACT

A cross sectional study was conducted among children between 5-14 years of age attending schools in Cuddalore district, Tamil Nadu, India to find out the prevalence of refractive error among them. A total of 660 students were taken up for study and relevant information was collected in a pre-designed and pretested questionnaire. Children were first screened in their respective schools and those with VA<6/6 were taken for further examination to Out Patient Department of Ophthalmology, Rajah Muthiah Medical College and Hospital. Data was tabulated in MS Excel 2011 and analyzed by SPSS 20. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. In this study 10.2% of the study population had refractive error, girls (14.04%) more than boys (5.78%). Myopia (6.5%) was the most common refractive error followed by astigmatism (2.3%) and hypermetropia (1.40%). These data show that vision screening in school children in developing countries is useful in early detection of refractive errors and thereby prevent development of amblyopia and visual disability.

INTRODUCTION

Refractive errors, such as myopia, hyperopia and astigmatism are the second leading cause of visual impairment among all age, gender and ethnic groups.[1] Such visual impairments originate from refractive errors correctable by refraction ("correctable visual impairment") or refractive error associated with ocular or neurological disease and, thus not-correctable by refraction ("non-correctable visual impairment"). Correctable visual impairment implies that visual impairment is present when there is no or inadequate refractive correction.[2] There are about 150 million cases of visual impairment globally, with 13 million children (5-15 years age) affected by uncorrected refractive error in both developed and developing countries.[3] Hence uncorrected refractive error is a significant public health concern.[4,5] Though some children with uncorrected refractive error are asymptomatic,[6] other children may occasionally complain of headache and inability to read from the chalkboard, which will have serious impact on children learning ability, academic performance and personality.[2,7]

School-going children in the age group (5-14 years) represent twenty five per cent of the population in the developing countries. They offer significantly representative material for this study as they fall in the preventable blindness age group, and a controlled population i.e., they belong to a certain age group and are easily accessible and schools are the best forum for imparting health education to the children. Schools are one of the best places for effectively implementing the comprehensive eye healthcare program.[8] Hence, this study was conducted with the objective of estimating the prevalence of uncorrected refractive error among school children.

Objectives

1. To measure the magnitude of Refractive Error among 5-14years school students,
2. To explore the percentage of Refractive Error in Boys and Girls, and To know the percentage of students who wore glasses.

MATERIALS AND METHODS

A Cross-sectional study design was adopted to screen schools of urban and rural areas in Cuddalore District of northern Tamilnadu. Schools are listed according to the alphabetical order in each area. Each school should be considered as one cluster. And clusters in each area would be selected at random. Students between the age group of 5-14 years will be selected systematically in order to achieve the sample size.

After obtaining consent from respective schools, the students were tested. Uncorrected, presenting and best corrected visual acuity to be assessed by Snellen's vision chart. Any child who

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could not read atleast 6/9 of Snellen's chart were to selected for study. Anterior segment examination to conducted with oblique illumination. Ocular movements and cover test to be performed using torch light. Lastly the cases of defective vision without any anterior or posterior segment pathology to be taken as cases of refractive error for this study.

Children needing glass prescription have to be referred to Rajah Muthiah Medical College and Hospital for cycloplegic refraction, Retinoscopy and auto-refraction.

Then all the data's in the case Proforma for each student will be collected and entered into Microsoft Excel Sheet and the statistical analysis will be arrived by using IBM SPSS software.

Sample Size Calculations

The sample size is calculated by taking prevalence rate of refractive error as 17.36% and absolute precision as 5% and level of confidence as 95%, the required sample size is 660 using nMaster sample size software.

RESULTS

A total of 660 children consisting of 311 (47%) males and 349 (53%) females in the age group 5–14 years were screened. The children were divided according to their age groups. These were, 5 years with 27 (4.1%) children, 6 years with 32 (4.8%) children, 7 years with 40 (6.1%) children, 8 years 49 (7.4%) children, 9 years 57 (8.6%) children, 10 years 62 (9.4%) children, 11 years 64 (9.7%) children, 12 years 113 (17.1%) children, 13 years 78 (11.8%) children, 14 years 138 (20.9%) children. Overall, the proportion of females was more as compared to males.

The overall prevalence of refractive error was 10.2% (Table 1). It was 14% in female children and 5.78% in male children (Table 2). The commonest refractive error was myopia 6.5%, astigmatism 2.3%, followed by hypermetropia 1.4% (Table 3). Myopia is common among 12 years (34.9%) and hypermetropia 7 years (33.3%)(Table 4 & 5).

Table 1 Prevalence of Refractive Error

Refractive Error	Frequency	Percentage
Ametropia	67	10.2
Emmetropia	593	89.8
Total	660	100.0

Prevalence
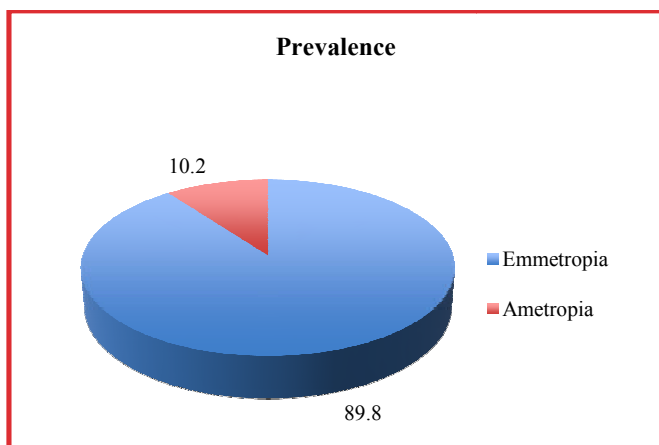
Table 2 Gender wise distribution of students with and without refractive error

Gender	Refractive error				Total	
	Absent		Present			
	n	%	n	%	n	%
Male	293	94.21	18	5.78	311	47.1
Female	300	85.95	49	14.04	349	52.9
Total	593	89.84	67	10.2	660	100.0
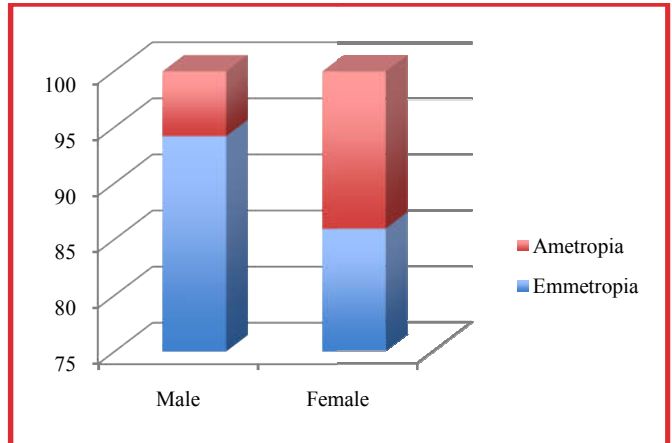
Table 3 Types of refractive errors

	Frequency	Percentage
Emmetropia	593	89.8
Myopia	43	6.5
Hyperopia	9	1.4
Astigmatism	15	2.3
Total	660	100.0

Prevalence
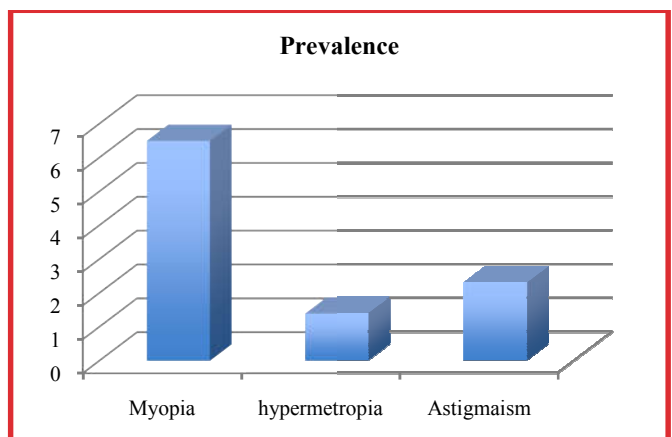
Table 4 Comparison of age with Myopia

AGE	Myopia				Total	
	Present		Absent			
	n	%	n	%	n	%
5 yrs	0	0	27	4.4	27	4.1
6 yrs	1	2.3	31	5.0	32	4.8
7 yrs	1	2.3	39	6.3	40	6.1
8 yrs	1	2.3	48	7.8	49	7.4
9 yrs	2	4.7	55	8.9	57	8.6
10 yrs	2	4.7	60	9.7	62	9.4
11 yrs	4	9.3	60	9.7	64	9.7
12 yrs	15	34.9	98	15.9	113	17.1
13 yrs	8	18.6	70	11.3	78	11.8
14 yrs	9	20.9	129	20.9	138	20.9
Total	43	100.0	617	100.0	660	100.0
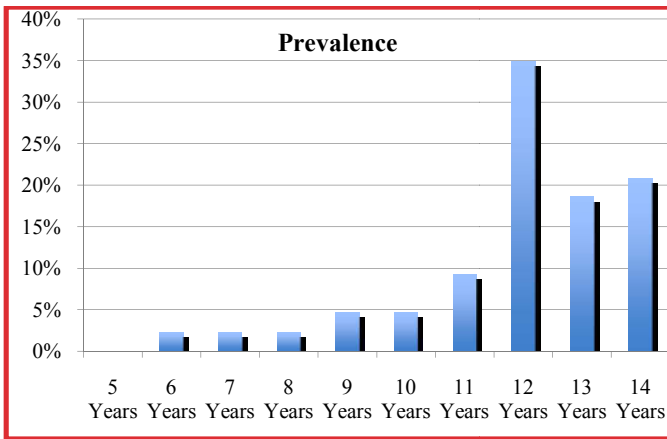
Table 5 Comparison of age with Hypermetropia

AGE	Hypermetropia				Total	
	Present		Absent			
	n	%	n	%	n	%
5 yrs	2	22.2	25	3.8	27	4.1
6 yrs	1	11.1	31	4.8	32	4.8
7 yrs	3	33.3	37	5.7	40	6.1
8 yrs	1	11.1	48	7.4	49	7.4
9 yrs	0	0	57	8.8	57	8.6
10 yrs	2	22.2	60	9.2	62	9.4
11 yrs	0	0	64	9.8	64	9.7
12 yrs	0	0	113	17.4	113	17.1
13 yrs	0	0	78	12.0	78	11.8
14 yrs	0	0	138	21.2	138	20.9
Total	9	100.0	651	100.0	660	100.0
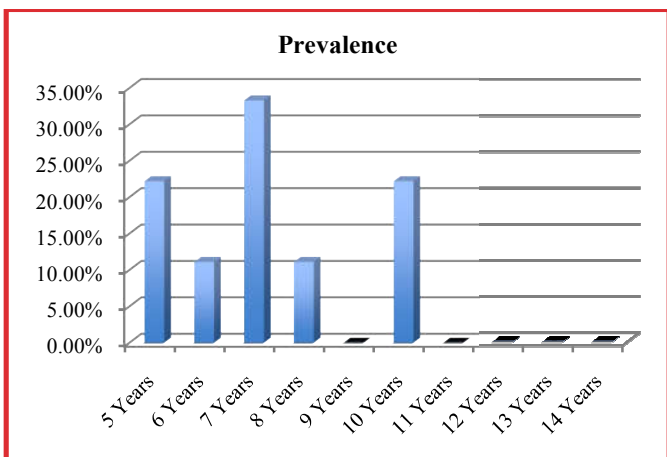
DISCUSSION

In this study we found the prevalence of refractive error to be 10.2% (Table 1). The prevalence is more than the prevalence observed by Murthy *et al* in New Delhi which was 6.4%.[9] And similar to study results of Kumar *et al*[10]who carried out a study on "Prevalence of refractive error in school children in Lucknow, India". They reported a prevalence rate of 7.4%. But is less compared to the prevalence observed by Seema *et al*[11] in Haryana who observed a prevalence of 13.65% in children of 6-15 year age group.

In our present study we found 67 students out of 660 to have refractive errors. Out of these 67, we found 18 males (5.78%) and 49 females (14.04%). "p" value was found to be 0.00005 with degree of freedom 1 and Chi-square value 12.279. This means the results are statistically significant (Table 2). Bhattacharya *et al*[12] in their study found that refractive error

was more in males (2.13%) than in females (1.52%). A study conducted by Niroula *et al*[13] on the refractive error of school going children in Pokhara City of Nepal found refractive errors more in boys (7.59%) than in girls (5.31%).

Our study shows myopia is the most common refractive error 6.5% followed by astigmatism 2.3% and hypermetropia1.40% (Table 3). In another study by Padhye *et al*[14] they found that the prevalence of myopia, hyperopia and astigmatism in urban children was 3.16%, 1.06% and 0.16%, respectively. Whereas Murthy *et al*[9] in their community based study on refractive error in children of 5-15 years age group in the urban population in New Delhi reported the prevalence of myopia as 7.4% and hyperopia as 7.7% they found that astigmatism was seen in 5.4% of the cases.

In our study we found myopia more in the age groups of 10 years to 14 years. We found association of myopia with age statistically significant (p = 0.043). 11 boys and 32 girls had myopia (Table 4). These observations were similar to the one made by Kalkivayi *et al*[15]in Andhra Pradesh who also found that myopia was significantly higher in among children of >10 years (p<0.001).

In our study we found hypermetropia to be 1.40%. There were 3 boys (33.3%) and 6 girls (66.7%). All the cases of hypermetropia were found in the age group of 05-10 years, maximum numbers (3) being in age group 7 years (Table 5).We found significant association between age with hypermetropia (p value = 0.001).

CONCLUSION

Refractive error in school going children is an important public health problem since it has substantial impact on learning capabilities and educational potential. Even though the treatment for refractive error is simple and successful, our data shows that the problem continues to be significant factor leading to visual impairment in southern India. Though refractive error is prevalent among school children only a small percentage wore spectacles. Hence periodic vision screening in school children is recommended. Both parents and teachers should be educated about early screening and correction with spectacles.

Conflicts of interest

The author has no conflicts of interest to declare.

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