

A Study On The Refractive Status Of School Going Children Aged Between 10 To 15 Years In Dibrugarh Town, Assam, India

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Abstract: A cross sectional study was conducted among children between 10-15 years of age attending government schools in Dibrugarh town, Assam, India to find out the prevalence of refractive error among them. A total of 600 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 OutPatient Department of Department of Ophthalmology, Assam Medical College and Hospital. Data was tabulated in MS Excel 2007 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 8.8% of the study population had refractive error, boys (51%) more than girls (49%). Myopia (7.17%) was the most common refractive error followed by astigmatism (2.17%) and hypermetropia (1.50%). 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.

Keywords: visual acuity, refractive error, school children.

I. Introduction

Eyes are the mirror of the soul and the body's window to the outside world. The objective of learning begins in childhood and the accuracy of a child's vision can immensely affect or alter his/her learning capacity. School going years are considered as wonder years in a person's life. These years are also the formative years which determine one's physical, intellectual and behavioural pattern. Any problem in vision during formative years can hamper the intellectual development, maturity and performance of a person in future life¹.

Refractive error is an optic defect, intrinsic to the eye which prevents light from being brought to a single point focus on the retina, thus reducing normal vision. Diagnosis and treatment of refractive error is relatively simple and is one of the easiest ways to reduce impaired vision. Yet, in India refractive error is the second most major cause of patients to consult ophthalmologists². At present, 153 million people globally over 5 years of age are estimated to be visually impaired from uncorrected refractive error, of whom 8 million are blind. Although refractive errors cannot be prevented, they can be treated. Under the National Society of Prevention of Blindness, India, a survey was conducted in 1974 to assess the ocular conditions of the children. It showed 67.37 percent of the students had some form of eye disease of which refractive error was 18%. A.K. Khurana et al (1984)³ contemplated a study on ocular morbidity among children in Rohtak city, Haryana under "District School Health Services" and found the prevalence of refractive errors to be 14.42%. Sanjay Chaturvedy, OP Agarwal(1999)⁴ Department of PSM, University College Of Medical Sciences, Delhi, India examined a total of 679 students in the age group of 5 – 15 years and found visual acuity of less than 6/9 in 7.4% of the study population. When a study was done on a rural population, in children in the age group of 7-15 years in the southern state of Andhra Pradesh from April 2000 through February 2001 by Dandona R et al, refractive error was the cause of 61% of the total eyes with visual impairment. A gradual shift to lesser positive values as age progresses was noted. Myopia was present in 4.1% of the total value. Hyperopia in at least one eye was present in 0.8% of the children, with no significant predictors there was a benefit of spectacles in 70% of those who had visual acuity of 20/40 or worse in the better eye at baseline examination⁵. According to the study done by Das A et al (2007)⁶ in Kolkata in India, out of the total 2317 students observed, in the age group of 7-15 years, 53 were suffering from refractive errors. Myopia was the most common (14% of the total). It also became more common in the older age group that is 9-15 years of age.

With these facts in view, this study has been undertaken with the following aims and objectives:

- To find the prevalence of refractive error among school going children between 10 to 15 years age group in Dibrugarh Town, Assam, India.
- To find out the different types of refractive error among the study group.
- To find out the visual outcome after correction of refractive error.

II. Methodology

Our study was conducted among school children between the ages 10–15 years of age. Study was undertaken for a period of 1 year from August 2013 to September 2014; during which the children were first examined in their respective schools and those who were found to have VA<6/6 on Snellen's chart were taken for further reexamination in the Out-patient Department, Department of Ophthalmology, Assam Medical College & Hospital, Dibrugarh for proper dark room evaluation. The sample size is calculated by taking the prevalence rate of refractive error (14.7%)⁷ at 5% significance level and 20% error as follows:

$$n = 4pq/L^2$$

Where, $p = 14.7\%$ (prevalence of refractive error)⁷

$$q = 100 - p = 100 - 14.7 = 85.3$$

$$L = 20\% \text{ of } p = 20\% \text{ of } 14.7 = 2.94$$

$$n = ((2)^2 \times 0.853 \times 0.147) / (0.0294)^2 = 580.51, \text{ which can be rounded off to } 600.$$

In this study, few schools were drawn at random by systemic sampling for screening from the total no. of 26 Government schools of Dibrugarh Urban area. According to feasibility and accessibility 10 schools were visited till the desired sample size of 600 was reached. The modified version of Kuppaswamy's Socioeconomic Status Scale for the year 2007 based on education, occupation and family income was used to divide the study population into various socioeconomic classes¹⁰.

III. Results And Observations

3.1 - Demographic Profile Of The Study Group (Fig 5.1) : In our study, out of 600 students, there were 11.16% of 10 year olds, 11.16% of 11 year olds, 14.16% of 12 year old students, 17.83% in 13 year old age group and 22.66% and 23.00% in the age groups of 14 and 15 respectively. Mean age was found to be 12.99 with standard deviation of 1.66. This observation was similar to the one done by Sonam Sethi et al⁸ in their study on refractive errors in school children of Ahmedabad city where the mean age was 13.22 years. In our study we found 51% males and 49% females which is similar to the one made by Kalkivayi et al⁹ in their study group where 58.3% were males and 41.7% females. In our study we found majority of the study population belong to Hinduism (87.5%), Islam (11.16%), Christianity (1.17%) and Buddhism (0.17%). We found most of the students belonging to Lower Middle (III), Upper Lower (IV) and Lower (V) socioeconomic class. The modified version of Kuppaswamy's Socioeconomic Status Scale for the year 2007 based on education, occupation and family income was used to divide the study population into various socioeconomic classes¹⁰.

3.2 - Refractive Error (Table 5.2): In this study we found the prevalence of refractive error to be 8.83%. The prevalence is almost similar to the prevalence observed by G.V.S.Murthy et al in New Delhi which was 6.4%¹¹. And similar to study results of Kumar et al¹² who carried out a study on "Prevalence of refractive error in school children in Luknow, India". They reported a prevalence rate of 7.4%. But is less compared to the prevalence observed by Seema S et al¹³ in Haryana who observed a prevalence of 13.65% in children of 6-15 year age group.

3.3 – Age Wise Prevalence Of Refractive Error (Table 5.3): In our study, we found highest prevalence of refractive error in 13 year old age group (15.09%). Prevalence of refractive error among the other age groups were 7.35% (10 years olds), 13.64% (11 year olds), 8.88% (12 year olds), 4.44% (14 year olds) and 7.09% (15 year olds). We found the "p" value = 0.05 and degree of freedom 5 and Chi square = 11.02. This means the relation is not statistically significant. Similar results were seen in a study conducted by S.Matta et al¹⁴ among the adolescent attending the ophthalmology OPD. They found that refractive error increased with increasing age especially in the age group of 10- 14 years.

3.4 – Gender Wise Prevalence Of Refractive Error (table 5.4): In our present study we found 53 students out of 600 to have refractive errors. Out of these 53, we found 41 males (13.40%) and 12 females (4.08%). "p" value was found to be 0.00005 with degree of freedom 1 and Chi-square value 16.163. This means the results are statistically significant. Bhattacharya RN¹⁵, et al in their study found that refractive error was more in males (2.13%) than in females (1.52%). A study conducted by Niroula DR et al¹⁶ 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%).

3.5 - Prevalence Of Different Types Of Refractive Errors (Table 5.6):

Our study shows myopia is the most common refractive error (7.17%) followed by astigmatism (2.17%) and hypermetropia (1.50%). In another study by Padhye AS, et al¹⁷ they found that the prevalence of myopia, hyperopia and astigmatism in urban children was 3.16%, 1.06% and 0.16%, respectively. Whereas Murthy GVS, et al¹¹. 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.

3.6 - Age And Sex With Myopia (Table 5.7):

In our study we found myopia more in the age groups of 13 years to 15 years. We found association of myopia with age statistically significant (p = 0.00006). 33 boys and 10 girls had myopia. Difference between males and females were not significant. These observations were similar to the one made by Kalkivayi V et al⁹ in Andhra Pradesh who also found that myopia was significantly higher in among children of >10 years(p<0.001).

3.7 - Age And Sex With Hypermetropia (Table 5.8): In our study we found hypermetropia to be 1.34%. There were 9 boys (77.7%) and 2 girls (22.2%). All the cases of hypermetropia were found in the age group of 10- 12 years, maximum numbers (6) being in age group 11 years. We found no significant association between age or gender with hypermetropia (p value = 0.09).

3.8 – Astigmatism (Tables 5.8 & 5.9) : In our study we found prevalence of astigmatism to be 2.17%. There were 10 boys (76.92) and 3 girls (23.08%). We did not find association with age or gender with astigmatism. This is similar to the study done by Lian-Hong et al (2010)¹⁸ in China among school children of 6-15 years where they did not find any significant relation between age and astigmatism. In our study we found WTR astigmatism to be most common. This is similar to the results found in other studies (Abrahamson et al, 1990¹⁹; Fan et al., 2004²⁰). It is thought that reduced eyelid tension with age causes flattening of the vertical corneal meridian thereby decreasing WTR astigmatism and increasing ATR astigmatism (Fan et al., 2004²⁰). The most common type of astigmatism found in our study was simple myopic astigmatism.

3.9 - Visual Outcome After Correction Of The Refractive Error (Table 5.11): In our study, maximum students had low myopia 60.4% (-0.50D to -0.75D) for left eye and 60.78% (-0.50D to -0.75D) in right eye. 10 students (20.83%) had myopia of 1D or worse in the left eye while 13 students (25.49%) had myopia of 1D or worse in the right eye. 8 students (16.66%) had low hypermetropia of +0.50D to +0.75D in left eye and 6 students (11.76%) had low hypermetropia in right eye. Only one student had hypermetropia of >3D in both eyes. In a study conducted by Afroz Khan et al., (2005)²¹, it was seen that low myopia (-0.25d to -1.75D) was seen in almost 95% of the study population. They found 28 cases (5.04%) had low hyperopia while only 2 cases (0.36) had hyperopia of >2D.

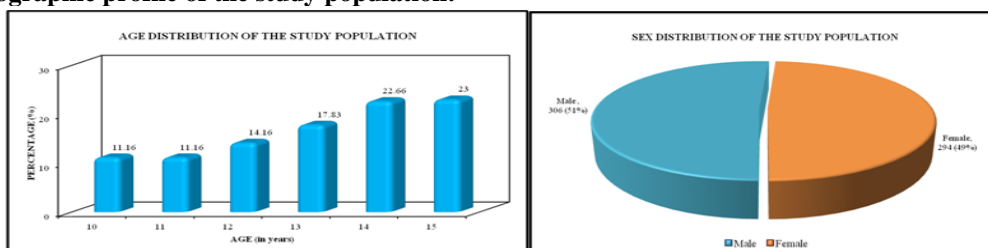
3.10 – Amblyopia: In the present study 3 children (0.50%) were found to be having Amblyopia. One was a girl of 13 years and two boys of 10 years and 11 years. There were no cases of blindness found in this study. In another study by Asad A. Khan et al (2010)²² 1.5% had amblyopia.

IV. Conclusion

This study shows that screening of school children can play an important part in detecting refractive errors. Early detection can prevent deterioration of refractive errors and prevent the development of amblyopia. It could be helpful to achieve better quality of life in our children who are the future of the nation, as well as it would be helpful to attain the global initiative for elimination of avoidable blindness by the year 2020 thus attaining the goal of vision 2020 Right to Sight.

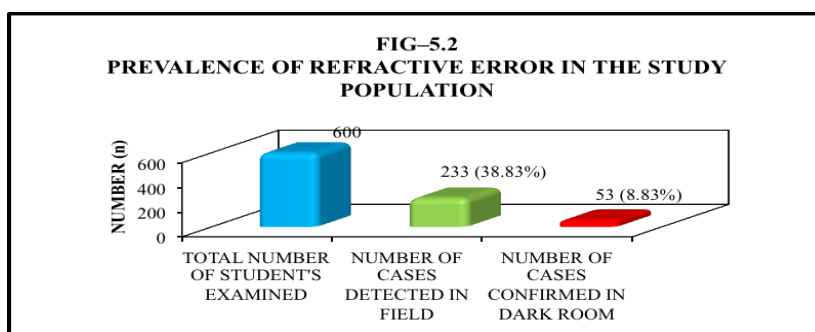
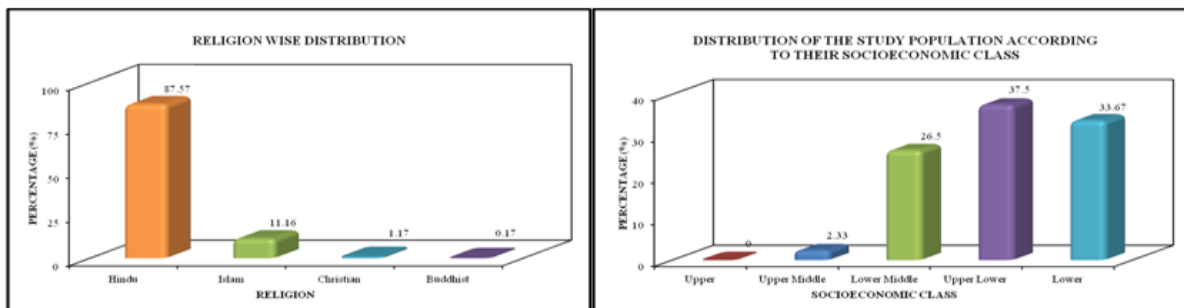
V. Tables And Charts

5.1 Demographic profile of the study population:



5.2 – Prevalence of refractive error in the study population:

TOTAL NUMBER OF STUDENT'S EXAMINED	NUMBER OF CASES DETECTED IN FIELD		NUMBER OF CASES CONFIRMED IN DARK ROOM	
	N	%	N	%
600	233	38.83	53	8.83



5.3 – Age wise distribution of population with and without refractive errors

AGE (in years)	PRESENT		ABSENT		TOTAL (n)	
	N	%	N	%		
10	5	7.35	62	10.33	67	
11	9	13.64	58	9.66	67	
12	7	8.33	78	13.00	85	P=0.05 df=5 x ² =11.02
13	16	15.09	91	15.16	107	
14	6	4.44	130	21.66	136	
15	10	7.09	128	21.33	138	
TOTAL	53	8.83	547	91.14	600	

5.4 Gender wise distribution of students with and without refractive error

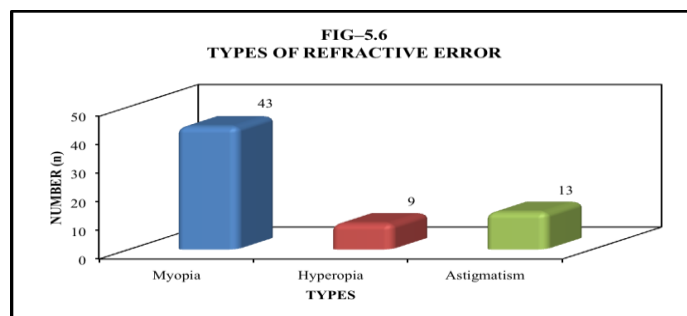
SEX	PRESENT		ABSENT		TOTAL (n)	
	n	%	N	%		
Male	41	13.40	265	86.6	306	
Female	12	4.08	282	95.92	294	P = .0005 df= 1 x ² =16.16
TOTAL	53	8.83	547	91.17	600	

5.5 : Newly detected and old cases of refractive error in the study group

CASES	NUMBER (n)	PERCENTAGE (%)
Old Cases	11	1.83
Newly Detected Cases	42	7.00
TOTAL	53	8.83

5.6 : Types of refractive errors

TYPES	NUMBER (n)	PERCENTAGE (%)
Myopia	43	7.17
Hyperopia	9	1.50
Astigmatism	13	2.17
TOTAL	65	10.83



5.7 : Comparison of age and sex with myopia & hypermetropia

	SEX	AGE (in years) (n)						TOTAL		
		10	11	12	13	14	15	N	%	
Myopia	Male	2	3	4	12	6	6	33	76.7	P=0.00006
	Female	0	0	0	4	2	4	10	23.2	
	Total	2	3	4	16	8	10	43	100	
Hyper-Metropia	Male	1	6	0	0	0	0	7	77.77	P=0.09
	Female	1	0	1	0	0	0	2	22.22	
	Total	2	6	1	0	0	0	9	100	

5.8: Comparison of age and sex with astigmatism

SEX	AGE (in years) (n)						TOTAL		
	10	11	12	13	14	15	N	%	
Male	1	4	2	2	1	0	10	76.92	P = 0.25
Female	0	0	1	2	0	0	3	23.08	
TOTAL	1	4	3	4	1	0	13	100.00	

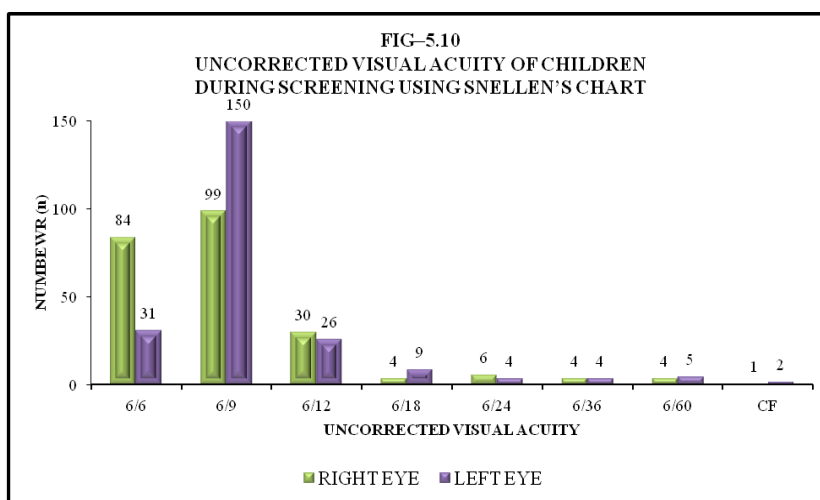
5.9: Types of Astigmatism :

TYPES	NUMBER OF CHILDREN WITH (n = 53)	OF FOUND ERROR	PERCENTAGE (%)
Simple Hypermetropic	3		5.66

Compound Hypermetropic	1	1.89
Simple Myopic	6	11.32
Compound Myopic	2	3.77
Mixed Astigmatism	1	1.89
TOTAL	13	24.53

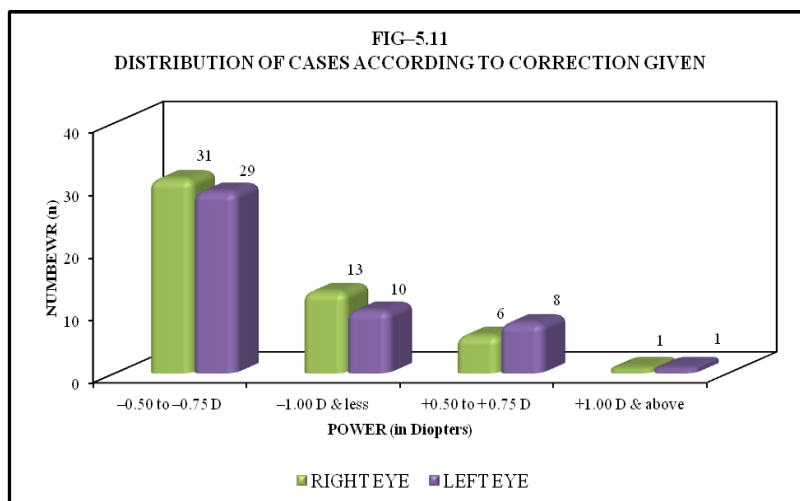
5.10: Uncorrected visual acuity of children during screening using snellen's chart

UNCORRECTED VISUAL ACUITY	BILATERAL			
	RIGHT EYE		LEFT EYE	
	N	%	n	%
6/6	84	14.00	31	5.16
6/9	99	16.50	150	25.00
6/12	30	5.00	26	4.33
6/18	4	0.66	9	1.50
6/24	6	1.00	4	0.66
6/36	4	0.66	4	0.66
6/60	4	0.66	5	0.83
CF	1	0.16	2	0.33
TOTAL	234	38.64	234	38.47



5.11 : Distribution of cases according to correction given

POWER (in Diopters)	RIGHT EYE		LEFT EYE	
	n	%	n	%
-0.50 to -0.75 D	31	60.78	29	60.41
-1.00 D & less	13	25.49	10	20.83
+0.50 to + 0.75 D	6	11.76	8	16.66
+1.00 D & above	1	1.96	1	2.08
TOTAL	51	100.00	48	100.00



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