

Original Article

Refractive Error in a Combined School

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Abstract:

Background: A huge number of children are visually impaired, and most of the visual impairment due to refractive errors. Schools are the best forum for implanting health education for children and for early detection of ocular morbidity.

Objectives: To assess the prevalence of refractive error among co-education school children in Border Guard School & College, Akhalia Sylhet

Study Design: Cross-sectional.

Participants: All the children from class I to class X.

Study period: March & April, 2022.

Sample size: 2408 school children including 1163 boys and 1245 girls.

Study variables: Refractive errors by age, sex, & types.

Statistical analysis: Chi square test. Proportions.

Results: Prevalence of refractive error was found in this study 11%. Out of these 46.04% were boys and 53.96% were girls. According to the types of refractive error, 52% was myopia, 17 % was hyperopia and 31 % was astigmatism.

Conclusions: The Refractive error of school going children is a common and important ocular problem which needs to be assessed regularly for early intervention.

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Introduction:

Evaluation of refractive error in school going children is essential to find out the refractive status in early age. The aim of the study is to see the prevalence of refractive error in a coeducation school, where both boys & girls are studying from both urban & rural areas. Refractive error usually developed in the school going age. So if we can detect the error in early age, we can reduce the huge number of visual impairment in our society and can provide them a healthy visual life.

Visual impairment is a significant public health problem. Refractive errors are one of the most common causes of visual impairment around the world and second leading cause of treatable blindness.¹ Refractive error is a very common eye disorder. It occurs when the eye cannot clearly focus the images from the outside world. The result of refractive errors is blurred vision, which is sometimes so severe that it causes visual impairment².

285 million people are visually impaired worldwide. Globally main causes of visual impairment are uncorrected refractive errors (myopia, hyperopia and astigmatism) 43%, cataract 33%, glaucoma 2%.³ Children in school going age group (6-16 years) represent 25% of population in developing countries. They fall in preventable age group for correction of refractive errors.⁴ An estimated 19 million children are visually impaired of these, 12 million are visually impaired due to refractive errors.³ The presence of refractive errors in school going children affects their physical, mental and behavioral development as well⁵.

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Childhood blindness and visual impairment are as important and perhaps more devastating and disabling than adult onset blindness, because of the long span of life and their permanent effects on the developing eyes.⁴ Children do not complain of defective vision, and may not even be aware of their problem. This warrants early detection and treatment to prevent permanent disability.⁶ Schools are best forum for implanting health education for children and for early detection of ocular morbidity.⁴ 2020-the right to sight is a global initiative launched by WHO in 1999 to eliminate avoidable blindness like cataract, xerophthalmia, refractive errors, trachoma and other causes of childhood blindness by 2020.⁷

Considering the fact that 30% of India's blind lose their sight before the age of 20 years, the early detection of ocular morbidity in young children is obvious.⁸

Materials and Method

A cross sectional study was conducted during March and April of 2022 among all present students of class 1 to class 10 of Border Guard school and college, Akhalia, Sylhet. The friends Eye Hospital team headed by me were conducted the sight screening program on verbal request of the then sector commander of BGB, Sylhet Sector.

Before starting the screening program, a preparatory meeting was held with the principle and teachers of Border Guard School by the presence of sector commander. All class & section teachers and 40 number of volunteer students of class 9 and 10 were trained by me to know, how to examine visual acuity & write the proforma.

A 3 meter snellen's chart, an Occluder and a structured proforma were supplied to all classes. The proforma listed with particulars of the students (name, age, sex, class, section, roll no), visual acuity with & without glass, any squint, any history of ocular operation and any other ocular disease, like corneal opacity, cataract etc.

Each class teacher and two volunteer students conducted the primary screening program among all students in each class according to their suitable class time for a period of 3 days. The classroom were well illuminated & each

eye tested separately. I and my team had supervised the screening program regularly to correct the mistakes if any.

After completion of primary screening program in each class, the structured proforma were collected from each class separately for further evaluation. Total 2408 number of students (boys & girls) were participated in the primary screening program.

After collection of primary screening data sheet of all students, were divided into 3 groups. Primary group (class I to V), junior group (class VI to VIII) and Secondary group (class IX to X).

Then scrutiny of data sheets (structured proforma) were done by a selecting criteria, where visual acuity 6/9 or less in any eye with or without glass and absence of other ocular disease is selected for second phase evaluation. Total 295 students were selected for 2nd phase.

The second phase evaluation of refractive error was conducted by me and my team with torch, Snellen's chart, picture chart, Ishihara chart, Ophthalmoscope, Retinoscope, mydriatic drops, Trial box and Trial frame. Visual acuity was tested again of all students of second phase. Decreased vision due to corneal opacity, strabismic amblyopia, following ocular trauma or operation and the students having normal VA (6/6) in 2nd phase were excluded from this group.

Finally 265 students in different classes were selected as refractive error after objective retinoscopic and subjective VA examination.

In third phase of screening program, the structured proforma with particulars of the selective cases and a statistical result of those students were submitted to school authority and advised to inform the guardians for refraction in nearby Friends Eye Hospital.

Statistical analysis was done by Chi-square test.

Result

A total of 2408 students of class I to class X participated in this study. Among them 1163(48.30%) were boys and 1245 (51.70%) were girls, (P value .0181).Table -1.

Table -I: Gender distribution of the students:

Gender	No. of the students	p-value	Percentages
Boys	1163	.0181	48.30%
Girls	1245		51.70%
Total	2408		100.00%

Table- II: Gender distribution of students with and without refractive error:

Gender	Refractive error		p-value	Total
	present	absent		
Boys	122 (10.49%)	1041 (89.51%)	.4352	1163 (100.00%)
Girls	143 (11.48%)	1102 (88.52%)		1245 (100.00%)
Total	265 (11.00)	2143 (89.00%)		2408 (100.00%)

In gender distribution of students with and without refractive error, there were Refractive Error present in 122(10.49%) and absent in 1041(89.51%) boys, and in case of girls refractive error present in 143(11.48%) and absent in 1102(88.52%), (P value 4352). Table – II.

Table –III: Age group & gender distribution:

Age group	Boys	Girls	p-value	total
Primary (I – V) [06 – 10 years]	474 (40.76%)	512 (41.13%)	.0870	986 (40.95%)
Junior (VI – VIII) [11 – 13 years]	424 (36.46%)	443 (35.58%)		867 (36.00%)
Secondary (IX – X) [14 – 15 years]	265 (22.78%)	290 (23.29%)	.1334	555 (23.05%)
total	1163 (100.00%)	1245 (100.00%)		2408 (100.00%)

According to the age group & gender distribution, In primary group 474(40.76%) were boys & 512(41.13%) were girls, (P value .0870). In junior group 424(36.46%) were boys & 443(35.58%) were girls, (P value 3614). In secondary group 265(22.78%) were boys & 290(23.29%) were girls, (P value 1334). Table – III.

Table – IV: Age group distribution with and without refractive error:

Age group	Refractive error		p-value	total
	present	absent		
Primary (I – V) [06 – 10 years]	88 (8.92%)	898 (91.08%)	.0029	986 (100.00%)
Junior (VI – VIII) [11 – 13 years]	96 (11.07%)	771 (88.93%)		867 (100.00%)
Secondary (IX – X) [14 – 15 years]	81 (14.59%)	474 (85.41%)		555 (100.00%)
total	265 (11.00%)	2143 (89.00%)		2408 (100.00%)

In age group distribution with & without refractive error, in primary group 88 (8.92%) were refractive error present & 898(91.08%) were absent. In junior group 96(11.07%) were refractive error present & 771(88.93%) were absent. In secondary group 81(14.59%) were refractive error present & 474(85.41%) were absent, (P value .0029). Table – IV.

Table – V: Different types of refractive error according to gender:

Gender	Myopia	Hyperopia	Astigmatism	% of gender	Total RE
Boys	64 (52.46%)	20 (16.39%)	38 (31.15%)	46.04%	122 (100.00%)
Girls	75 (52.45%)	24 (16.78%)	44 (30.77%)	53.96%	143 (100.00%)
Total	139 (52.45%)	44 (16.60%)	82 (30.95%)	100 %	265 (100.00%)

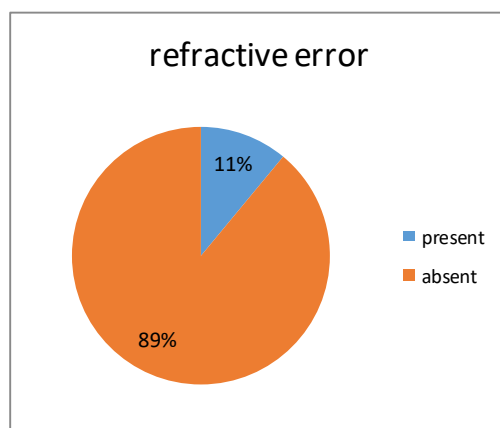
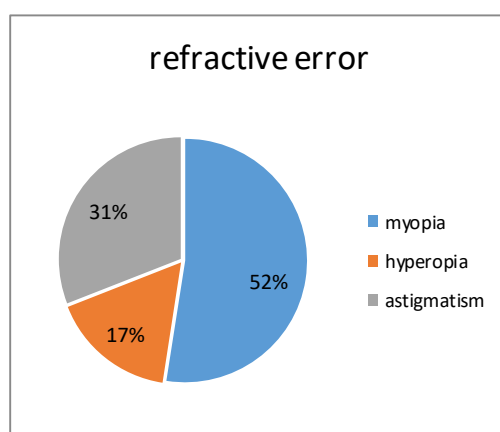
Table – VI: Group distribution of different types of RE:

Group	Myopia	Hyperopia	Astigmatism	Tot. RE	Tot. no. of students
Primary (I – V) [06 – 10 years]	41(4.16%)	23 (2.33%)	24 (2.43%)	88 (8.92%)	986
Junior (VI – VIII) [11 – 13 years]	51(5.88%)	13 (1.50%)	32 (3.69%)	96 (11.07%)	867
Secondary (IX – X) [14 – 15 years]	47(8.47%)	8 (1.44%)	26 (4.68%)	81 (14.59%)	555
Total	139 (5.77%)	44 (1.83%)	82 (3.40%)	265 (11.00%)	2408

Different types of refractive error according to gender, myopia 64(52.46%) & 75(52.45%), hyperopia 20(16.39%) & 24(16.78%) and astigmatism 38(31.15%) & 44(30.77%), respectively in boys and girls. So , out of 265 students with refractive error, myopia was found in 139(52.45%), hyperopia in 44(16.60%) and astigmatism in 82(30.95%). The gender distribution among the study

subjects with refractive errors 46.04 % of them were boys and 53.96 % were girls. Table - V.

According to the group distribution of different types of refractive error, in primary group - out of 88 students with refractive error, myopia was 41(4.16%), hyperopia was 23(2.33%) and astigmatism was 24(2.43%). 96 students with refractive error in junior group, myopia was 51(5.88%), hyperopia was 13(1.50%) and astigmatism was 32(3.69%). And out of 81 students with refractive error in secondary group, myopia was 47(8.47%), hyperopia was 8(1.44%) and astigmatism was 26(4.68%). Table – VI.



Discussions:

Uncorrected refractive errors attribute a major percentage to a visual impairment which can cause significant ocular morbidity in children. Awareness building among the teachers, students, community leaders, and guardians can help evaluate the visual status and prevent the children's visual impairment.^{9,10} In this study, prevalence of refractive error was found

11% (Table –II) which was almost similar to Jayanth et al study (10.12%),¹¹ Kawuma M. Mayeku R(11.6%)¹² and Vidusha KSS et al (10.5%).¹³

According to the types of refractive error there were 52% myopia, 17% hyperopia and 31% astigmatism. (Table –V) This was similar to the results of study by Vidusha KSS et al in Bangalore who found that myopia was 58.5%, hyperopia was 17.1% & astigmatism was 24.4%.¹³ and also similar to the study by Pavithra et al in Bangalore who found that myopia in 62.9%, hyperopia 14.4% and astigmatism in 24.4% of the study subjects.¹⁴ Shresta et al in their study reported that 35% of myopia, 19% hypermetropia, 32% astigmatism.¹⁵ According to the gender distribution refractive error present 46.04% in boys and 53.96% in girls. Refractive errors did not differ significantly between males and females.¹⁶ However, in other studies^{17,18} refractive errors were found more commonly in girls than boys, probably related to their rate of growth. Girls attain puberty earlier than boys.

In another study showed that, myopic prevalence rises with educational level.¹⁹ This study also showed that the rate of refractive errors increased in higher classes, (Table –VI) which indicates a significant relationship between refractive error and educational level. Regarding hyperopia the prevalence in this study was 1.83%, which could be comparable with the study of rural india 0.8%.¹ and North West zone of Bangladesh 3.8%.²⁰

The prevalence of astigmatism in this study was 3.44%, which could be compared with Nepal 2.2%,¹⁵ rural india 2.8%¹ and North West zone of Bangladesh 2.6%.²⁰

Sometimes young children having refractive error become asymptomatic, as they have no idea about standard visual acuity and lack of awareness of such problem and they can see the near object clearly. It should be remember that some of them are myopic, and without objective retinoscopic examination it is not possible to diagnosis.

Conclusion:

The Refractive error of school going children is a common and important ocular problem

which needs to be assessed regularly for early intervention. Most of the guardians and students are not conscious about such a major problem. Knowledge about refractive error should be incorporated in Primary eye care Program and teachers might be involved in vision screening procedure by supplying screening aids.

There were some limitation of this vision screening program, as the primary screening was done by the respective class teachers and volunteers. So, some error of this primary screening is not unusual. Another limitation is, it is a single school study. It will be more fruitful if the total screening program was completed by the ophthalmic personnel & in multiple school.

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