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Research Article

SCREENING FOR REFRACTIVE ERRORS: OUTCOME AMONG CHILDREN OF GOVERNMENT SCHOOLS IN DISTRICT KANGRA, HIMACHAL, NORTH INDIA

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A B S T R A C T

Background/aims- The main cause of visual impairment are uncorrected refractive errors in school-going children[1]. The current study focuses on the effectiveness of school eye screening in correcting refractive errors.

Methods-A cross sectional study was conducted, including 507 school children were examined from June 2015 to June 2016. Preliminary examination was carried out at their respective schools and detailed ophthalmic examination was done in ophthalmology department of tertiary centre**.**

Results-The major cause of ocular morbidity was refractive errors (34%) in government schools. The overall prevalence of refractive errors was 14%, amblyopia and squint 2.9% each. Low vision (visual acuity < 6/18) in the better eye was observed in 504 (99.9%) children and blindness (visual acuity <6/60) in 3 (0.3%) children. Results suggested that 94% of children were with uncorrected refractive error.

Conclusions- Refractive error is an important cause of preventable blindness among government school children. A school eye screening with periodic evaluation seems to be appropriate in this region of North India.

INTRODUCTION

Refractive error is one of the most common causes of visual impairment around the world and second leading cause of avoidable blindness[2].Vision impairment during childhood can affect communication, employment, quality of life and the effects are lifelong[3].The visual impairment due to refractive error is potentially curable if early attention is given[2]. The overall incidence of refractive errors was found to vary from 21% to 25% of patients attending eye outpatient departments in India[4.]. Children do not complain of defective vision, and they adjust to their poor vision by holding books close to the face, sitting close to black board in classroom, blinking excessively and frequent rubbing of eyes. So this affects learning ability, performance and adjustment in school, and overall development of a child. Later on, it may have a negative impact on social health and employment opportunities. So the effective methods of vision screening in school children are useful in detecting correctable uncorrected refractive errors and in minimizing long-term visual disability[5]. Moreover, schools provides best platform for effectively implementing the comprehensive eye healthcare programme[5,6].

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Pradesh. This study is of great importance as it will provide valuable data on prevalence of uncorrected refractive errors and early initiation of treatment and also enable those with low vision to choose appropriate vocation and training.

MATERIALS AND METHODS

The study was conducted in Kangra block, Himachal Pradesh, North India among school-going children of age 5-11 years from selected government schools from June 2015 to June 2016. Kangra is a most populous district, situated in eastern part of Himachal Pradesh. According to 2011 census, it has a total population of 1,510,075 with 94.29% in the rural area and 5.71% urban area [7]. A total 506 children of 14 government schools were screened in present study. It included 43% males and 57% females. Majority of children screened were from age group 8-9 years. Children studying in coeducational government schools did not differ much in terms of culture, religion, ethnic values and socioeconomic status. In government schools, school fees were minimal and students from all the socioeconomic strata got admissions. The principals of the selected schools were informed about the study and permission for the visit to the selected schools was sought personally.

The data collection instrument was a pretested semi structured interview cum examination proforma was used. All study subjects were interviewed as per attached proforma after getting written informed consent from the teacher/parent/guardian. First part of it included demographic

information, ocular complaints if any and school performance. Second part of it included the preliminary ophthalmic examination for diagnosing ocular morbidity.

Visual acuity was assessed using Snellen's vision chart with optotypes on each line at 6-meter fixation distance. Visual acuity testing was done monocularly with one eye covered with occulder and performed under normal daylight illumination. If the subject was not able to read the Snellen's types at a distance of 6 m, he/she was asked to move 1 m towards the chart till he/she was able to read the first line of the Snellen's chart. If the subject still could not read the chart from a distance of 1m, he/she was asked to count fingers at a distance of 1 m and vision recorded as 'FC at 1 m'. If subject could not count fingers at 1 m he/she was asked to count fingers at a distance of 1 foot and vision recorded as 'FC at 1 ft'. Suitable corrective lenses were applied in subjects with visual impairment and the best corrected vision was recorded. WHO-recommended definitions of visual disabilities were adopted in our study[9]. The cut off of uncorrected visual acuity for defining ocular morbidity due to refractive error in this study was taken as a visual acuity of ≤6/9 in the worst eye. Ocular motility was evaluated in all six cardinal positions of gaze and in nine diagnostic positions. Axis deviation was assessed with cover /uncover test and categorized as esotropia, exotropia, or hypertropia and the degree of tropia measured using Hirschberg test. All the children present in the class at the time of visit were examined in one sitting. All the study subjects were clinically examined with torch-light. Those who required special examination process were advised to come to department of ophthalmology, Medical College, Kangra where further evaluation and appropriate treatment was given with consent of parents or guardians.

Data thus collected was entered into Epiinfo 3.2 version software. Descriptive analysis was done; quantitative variables were tested with Chi-square t test for assessing the level of significance. Differences were considered to be statistically significant at the 5% level.

RESULTS

A total of 506 school children of age group 5-11years were screened for ocular morbidity which included 43% males and 57% females from 14 government schools.

Table 1 Gender breakdown of students in selected schools

SCHOOLs	Government (No. of Children)
MALE	218 (45.3%)
FEMALE	289 (55.9%)
TOTAL	507 (51.2%)

Refractive error was major cause of visual impairment accounting 34%, amblyopia (8%), squint (8%), followed by other causes like infective eye diseases (18%), conjunctivitis (17%), vitamin A deficiency (13%), and miscellaneous eye disorders (6%). The overall prevalence of refractive errors 14%, amblyopia and squint 2.9% each.

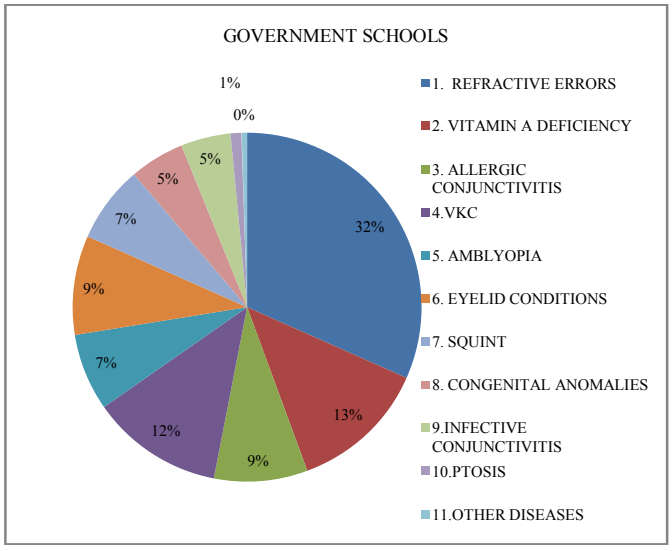

Figure 1 Prevalence of refractive errors and other ocular diseases in government school going children in age group 5-11yrs in dist. Kangra

The overall prevalence of refractive errors 12%, amblyopia and squint 2.8% each.

Table 2 Prevalence of refractive errors and other ocular diseases in government school going children in age group 5-11yrs

Ocular diseases	No.of Children	Perecenage
1. Refractive Error	64	14%
2. Vitamin a Deficiency	25	5%
3. Allergic Conjunctivitis	17	3.4%
4. VKC	14	2.8%
5. Amblyopia	14	2.9%
6. Squint	14	2.89
7. Congenital Anomalies	10	2%
8. Infective Conjunctivities*	1	0.2%

Myopia was found in 3.4% and hypermetropia in 9.6%. Higher prevalence of refractive errors in younger age group (5-10years) was seen because there was high prevalence of age-related hypermetropia (8.5%) in young children. This relation was found to be statistically significant.

Table 3 Relation between age and spectrum of refractive errors

AGE	Myopia	Hypermetropia	TOTAL
5-6yrs	4	8	12
6-7yrs	3	19	22
7-8yrs	2	22	24
8-9yrs	10	18	28
9-10yrs	6	19	25
10-11yrs	1	6	7
11-12yrs	7	3	10
TOTAL	33	95	128

Majority of primary school children had visual acuity in normal range 6/6 -6/ 18 in either eye. Whereas, three children (0.1%) had moderate visual impairment with visual acuity in range <6/18-6/60 and none had severe visual impairment with vision in range <6/60-3/60.

Table 4 Best corrected visual acuity (BCVA) in the better eye in Snellen's notation

	NO. OF CHILDREN	PERCENTAGE
Group 1-6/6 -6/18	999	99%
Group2- <6/18-6/60	1	0.1%

There was no gender difference for prevalence of refractive errors. There was significant relation between age and refractive error.

Results suggested that 5 (8%) children had already corrected refractive error with glasses as compared to 57 (95%) children with uncorrected refractive error.

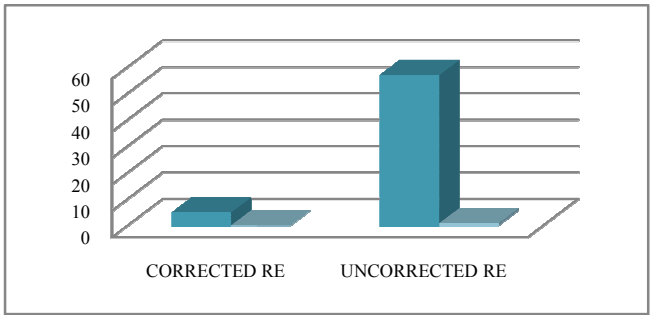

Figure 2 Children with corrected and uncorrected refractive error (R.E.) in government schools

In this study, school performance was significantly affected by uncorrected Refractive errors. Majority of children (45.1%) had average school performance and 16.1 % had poor school performance.

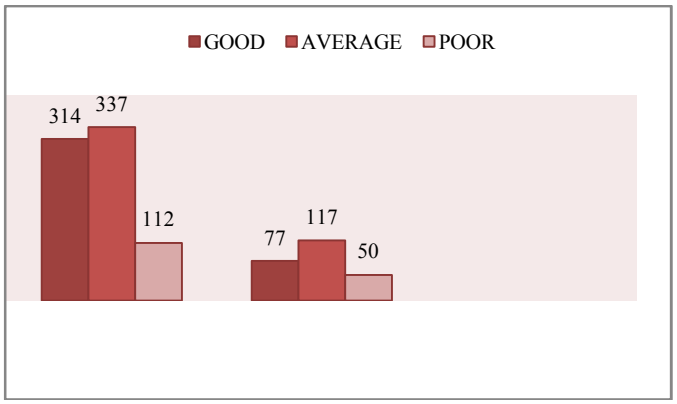

Figure 3 School performance of children with out and with refractive error

DISCUSSION

Although vision is very important for all ages but it is more so in case of children as it plays a key role in their mental, physical and psychological development[8]. Screening school children is arguably the second largest national programme for control of blindness in India after cataract surgery[9]. Various studies done in India and other developing countries quoted the spectrum of various types of refractive disorders as leading cause of visual impairment in school-going children [9]. Similarly in this study, prevalence of refractive error was most common cause of ocular morbidity, seen in 14 % children (Table-2), which is higher than the study conducted by Gupta *et al*. in U.P. [10], and Kumar *et al*. in Delhi[11], who reported prevalence 6.8% and 5.4% respectively. In contrast, the study done by Biswas *et al*.[12] in West Bengal found higher prevalence of refractive errors (23%). Similarly, higher prevalence of refractive errors has been observed among school going children in Shimla[5]and Ahmedabad[13]. International studies from Africa[14], Nepal[15] and Nigeria[16] noted lower prevalence of refractive errors in range of 2.7-5.8% among children of age 5-15 years as compared to the present study. These differences may also be explained by the different diagnostic criteria used by different authors, racial or ethnic variations in the prevalence of refractive errors, and different lifestyles or living conditions.

The current study showed prevalence of squint in 2.9% children (Table -2), which is comparable to the prevalence 1.3% observed by Shrestha *et al*. in Kathmandu valley [17]. In comparison to this study lower prevalence of squint was reported by Gupta *et al*[5], who observed the prevalence 2.5% whereas similar prevalence was foundin previous studies conducted in North India by Pratap *et al*[18]. Similarly, studies conducted in West Bengal and Delhi also observed higher prevalence of squint (7.4% in 5-15 years) than the current study[19,20]. Whereas, lower prevalence was found by Desai *et al*[6] in Rajasthan (0.2%) and Khurana *et al*[21] in Haryana (0.6%) in 4-18 years age group. Studies done abroad revealed lower prevalence of squint (0.5%) by Wedner *et al*., among children of 7-19 years in Tanzania, Africa[14]. In the present study prevalence of amblyopia was found to be 2.9% (Table-2) which is much higher than reported from other studies[13,16,]. The most common cause for amblyopia noted by these studies was refractive error which was similar to this study. As per result of current study, majority of primary school going children had visual acuity in normal range 6/6 -6/18 (Table-4). Only one child (0.1%) had moderate visual impairment with visual acuity in range <6/18-6/60 in better eye, which was much lower than observed in the study conducted by Rustagi *et al*.[1] in rural Delhi, reported vision < 6/60 in 0.93% children. However, this result of present study is comparable to similar studies conducted among rural and urban school-aged children from other parts of India[9]. Results showed that prevalence of refractive errors in government schools (14%) and 95% children were with uncorrected refractive errors (Figure-2). The current study also included school performance of every child and its relation with refractive error was also determined. Results suggested that school performance was significantly affected by uncorrected refractive error. Majority of children (44%) had average school performance (figure 3).

The current work confirms the high prevalence of uncorrected refractive errors 95% among government school going children in North Indian and highlights the urgent need to implement appropriate eye care programs targeting school children. Thus, it will reduce the burden of visual impairment due to uncorrected refractive errors among school children in this region of North India.

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