



Original Research Article

A cross-sectional study on pattern of ocular morbidity and the prevalence of refractive errors among school children of 11 to 16 years in the rural area of Maner, Patna Bihar, India

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Abstract

Background: Ocular morbidity is one of the recognized causes of poor performance and a source of performance anxiety among school children. Refractive error is one of the most common causes of visual impairment around the world and the second leading cause of treatable blindness.

Objective: To assess the magnitude of common ophthalmic morbid conditions as well as refractive error among rural schoolchildren and to determine the association between refractive error and variables such as Age, sex, type of family, religion, dietary habits, and daily activities such as watching television and using computers/smart phone.

Materials and Methods: This was a cross-sectional study conducted among 252 rural school students belongs to seventh to tenth standards between January to May 2018. Sample size was calculated to be 252. Probability proportionate to size of the population (PPS) technique was used for selection the study participants. Snellen chart was used to detect refractive error. χ^2 -test was used for statistical analysis and P value of <0.05 was taken as significant.

Result: Total number of respondents was 252. Overall prevalence of refractive error was 18.3. Refractive error was positively associated with school student belongs to nuclear type family, watching television and using computers or smart phone and not playing outdoor game or playing for less than one hour.

Conclusion: Parents, teachers and students, must be educated about the early detection of refractive error and correction with spectacles to prevent progression of visual impairment as well as preventive and promotive efforts need to be directed towards healthy lifestyle of future generation.

Keywords: Ocular morbidity, refractive error, prevalence, school students.

Introduction

The child of today is the adult citizen of tomorrow and leader of the community and country as a whole in different spheres of life. It worries us more learning that in the world today a child goes blind every minute. Over 90% of blind children receive no schooling and will be unable to realize their full potential. Thus, blindness in children accounts for one-third of the economic cost of blindness although it represents <4% of the overall magnitude.^[1] Many ocular diseases have their origin in childhood and the morbidity may go unnoticed and adversely affect the child's performance in school and may also cause severe ocular disability in the later part of life.^[2] The pattern of ocular diseases varies in different part of the world and is influenced by racial, geographic, socioeconomic and cultural factors.^[3] Ocular Morbidity is one of the recognized causes of poor performance of a child. It may be a source of performance anxiety among school children.^[4] Refractive error is one of the most common causes of visual impairment around the world and the second leading cause of treatable blindness.^[5] Refractive errors are usually present in the childhood and continue to the adult life.^[6] Undetected and uncorrected refractive errors are particularly a significant problem in school children.^[7] As children are not mature enough to point out the deficiency at an early stage or the parents have no idea on the gradually developing vision problem, uncorrected refractive error can have a dramatic impact on learning process and educational capacity.^[8] Considering the fact that 30% of India's blind lose their sight before the age of 20 years, the importance of early detection and treatment of ocular morbidity and visual impairment in young children is obvious.^[9] Inadequate infrastructure, funds, political will, national commitment and appropriate research are the barriers to eye care and blindness control. A simple school screening is a cost-effective and an easy method that plays a vital role to overcome such barriers, and helps in early detection, prevention and treatment of childhood

blindness/visual impairment. Early detection and management reduces the disease progression and can prevent visual disability. Schools form an effective media where mass communication can be done, and students can be taught about routine eye care and personal hygiene. Teachers of the schools should be briefed about common ocular problems and taught how to identify children with ocular problems, so that they can report the same to the child's guardian and necessary action can be taken in time.^[1] In the light of above facts and with very little data available on refractive error in children especially in Bihar and early detection of refractive error will thus prevent future progression of disease, the present study was conducted with the following objectives:

Objectives

1. To find out the magnitude of common ophthalmic morbid conditions in school children.
2. To find out the prevalence of refractive errors among school children.
3. To determine the association between refractive error and variables such as Age, sex, type of family, religion, dietary habits, and daily activities such as watching television and using computers/smart phone.

Material and Methods

Study design and setting: A cross-sectional study was carried out in five high schools (7th to 10th standard) located in rural area of Maner, belongs to Rural Health Training Centre Maner of Indira Gandhi Institute of Medical Sciences Sheikhpura, Patna, Bihar. 915 children studying in defined high schools were selected. All children from 7th to 10th standard from all selected schools were included as sample frame in this study.

Ethical consideration

Ethical clearance was obtained from the Institutional Review Board. Written informed consent was obtained from each study participant after they were introduced to the purpose of the study and informed about their rights to interrupt

the interview at any time. Confidentiality was maintained at all levels of the study. Patients who were found to have ocular complaint and refractive error were referred for further investigations and management.

Sample size and sampling design

Considering the prevalence of obesity of 17 per cent as reported by Singh V et al^[10], alpha error of 5 per cent, 5 per cent absolute allowable error and 10 per cent non response rate, sample size calculated was 249. Probability proportionate to size of the population (PPS) technique was used to decide the number of children to be studied from each school and then subsequently from each class and section. The required number of children from each section was selected by systematic random sampling. The rounding of fractional number at each stage resulted into the study of 252 children.

Inclusion criteria

All the students' weather boys or girl belongs to 7th to 10th standard from defined schools and selected as per sampling method willing to participate in the study and given written consent.

Exclusion criteria

Anyone not fulfilling inclusion criterion.

Study questionnaire

A pre-designed and pre-tested semi structured questionnaire was used to interview the study participants to elicit the information on personal and family characteristics. The questionnaire was pre-tested on ten students each from two schools selected purposively from other area out of five schools included in the study. Necessary modifications were made in the questionnaire before the start of study.

Data collection

Consent of school authorities was obtained after explaining the objectives as well as the method of study. Data were collected between January to May 2018. Chief investigator herself asked about ocular complaint from selected children and thereafter by personal interview method information on personal and family characteristics were elicited, followed by the assessment for visual acuity was tested for distance vision using

Snellen's test type (Hindi) placed at a distance of 6 meters from the student and near vision using near vision test type (Hindi) with the student holding the chart in his/her hand at a distance of approximately 30 cms from the face.

Statistical analysis

Interpretation and analysis of the data were done using Epi-info 2018 v 7.2.2.6 Software (developed by Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia, USA) and Chi-square test was used for statistical significance. Odds ratio (OR) and 95 per cent confidence interval (95% CI) was calculated for each categorical risk factor. *P* value of <0.05 was taken as significant.

Result

A total of 252 children of seventh to tenth standard participated in the study. From Table 1, it was evident that students had varied ocular problems. The most frequently reported was eye pain 24.2% followed by Watering from eye while reading or watching TV/mobile 22.2% and Headache while reading 19.0%, Blakbord not seen properly 15.5%, difficulty in reading books 11.1%. Also, 4.1% of the students reported difficulty in seeing at night (Table 1).

The age ranged from 11yr to 16 years. Of them, 154 (61.1%) were boys and 98 (38.8%) were girls (Table 2). Among the students, 79.4% were Hindus and 67.5% belonged to nuclear family. Overall, 46 (18.3%) children were suffering from refractive errors. The proportion of refractive errors was higher (19.6%) among 14 to 16 years age group as compared to 11 to 13 years age group. But the difference was not statistically significant (Table 3). Overall prevalence of refractory error was 18.3 while the proportion of refractive errors among boys and girls were 17.5 and 19.4 per cent respectively (Table 2).

On univariate analysis, the risk of refractive errors was significantly higher among children belongs to nuclear family than from joint family (OR=2.6629; 95% CI=1.1801-6.0088), using computer/smart phone use for more than 2 hours per day than not using computer/smart phone for

longer time (OR=2.8600; 95% CI=1.4776-5.5358), Watching TV for more than two hours per day than children not watching TV for that long period per day (OR=3.0613; 95% CI=1.1514-8.1394), children playing outdoor less than one hour or not playing at all as compared to

those playing more than one hour per day (OR=2.1136; 95% CI=1.1199-3.9892). Other factors like age, gender, religion and eating habit of the children were not significantly associated with refractory error (Tables 3).

Table 1: Self-reported ophthalmic symptoms

ophthalmic symptoms (Multiple response)	Boys N (%)	Girls N (%)	Total N (%)
1. Headache while reading	21 (43.7)	27 (56.3)	48 (19.0)
2. Watering from eye while reading or watching TV/mobile	31 (55.4)	25 (44.6)	56 (22.2)
3. Content of blackboard not seen clearly	23 (58.9)	16 (41.1)	39 (15.5)
4. Difficulty in reading books	12 (42.9)	16 (57.1)	28 (11.1)
5. Pain in eye	27 (44.3)	34 (55.7)	61 (24.2)
6. Difficulty in seeing at night	5 (45.4)	6 (54.6)	11 (4.4)

Total sample was 252 and episodes of ocular complaint was 243. So magnitude of ocular complaints were calculated agenst 252.

Table 2: Prevalence of refractive errors among school going children

Refractive error	Boys N (%)	Girls N (%)	Total N (%)
1. Normal	127 (82.5)	79 (80.6)	206 (81.8)
2. Previously diagnosed	12 (7.8)	8 (8.2)	20 (7.9)
3. Newly diagnosed	15 (9.7)	11 (11.2)	26 (10.3)
Total	154	98	252

Table: 3 Correlates of refractive errors among school going children: univariate analysis

Variables	Study population (252) N (%)	Refractive error		Odds Ratio	p- value
		Present [46 (18.3%)] N (%)	Absent [206 (81.7%)] N (%)		
1. Age					
11 - 13	140 (55.6)	24 (17.1)	116 (82.9)	0.8464 (0.4460-1.6063)	0.6096
14 - 16	112 (44.4)	22 (19.6)	90 (80.4)	1	
2. Gender					
Boys	154 (61.1)	27 (17.5)	127 (82.5)	0.8840 (0.4612-1.6944)	0.7101
Girls	98 (38.9)	19 (19.4)	79 (80.6)	1	
3. Type of family					
Nuclear	170 (67.5)	38 (22.4)	132(77.6)	2.6629 (1.1801-6.0088)	0.0152
Joint	82 (32.5)	8 (9.8)	74 (90.2)	1	
4. Religion					
Hindu	200 (79.4)	37(18.5)	163 (81.5)	1.0845 (0.4862-2.4191)	0.8428
Muslim	52 (20.6)	9 (17.3)	43 (82.7)	1	
5. Computer/smart phone use					
≥ 2 housper day	72 (28.6)	22 (30.6)	50 (69.4)	2.8600 (1.4776-5.5358)	0.0013
< 2 housper day	180 (71.4)	24 (13.3)	156 (86.7)	1	
6. Watching TV					
≥ 2 hous per day	191 (75.8)	41 (23.8)	150(76.2)	3.0613 (1.1514-8.1394)	0.0195
< 2 hous per day	61 (24.2)	5 (11.1)	56 (88.9)	1	
7. Outdoor games:					
≤1hour per day	119 (47.2)	31 (26.0)	88 (74.0)	2.1136 (1.1199-3.9892)	0.0193
≥1hour per day	133 (52.8)	19 (14.3)	114 (85.7)	1	
8. Eating habits:					
Vegetarian	161 (63.9)	31 (19.3)	130 (80.7)	1.2082 (0.6131-2.3809)	0.5843
Non vegetarian	91 (36.1)	15 (16.5)	76 (83.5)	1	

Discussion

Poor vision in childhood affects performance in school or at work and has a negative influence on the future life of a child. Moreover, planning of the youth's career has a strong relation with visual acuity. Refractive errors are the most common reasons for a visit to an ophthalmic surgeon or an ophthalmic assistant.^[11]

In this study it is evident that students had varied ocular problems. The most frequently reported was eye pain 24.2% followed by Watering from eye while reading or watching TV/mobile 22.2% and Headache while reading 19.0. Also, 4.4% of the students reported difficulty in seeing at night. Parmar A. et al. reported headache was the single most common symptom reported by 38.58% children.^[12]

In the present study over all prevalence of refractive errors was 18.3% (Table 3). Singh V et al. reported 17.36%^[10], Parmar A. et al.^[12] reported 29.5%, Vidusha KSS et al. reported 10.5%^[13] Jayanth et al. reported 10.12%.^[14] Singh et al. reported 13.09%,^[15] Shresta et al. reported 8.6%^[16], Pavithra et al. reported 7.03%.^[17] Dhulani et al. in Jaipur reported 30.39%.^[18]

The study shows the prevalence of refractive error was found more (19.6%) in 14-16 year age group compared to 11-13 years age group but this is statistically non-significant. Parmar A. et al.^[10] reported significantly higher prevalence in older children than younger one. Study by Pavithra et al. in Bangalore^[17], Vidusha KSS et al. Vidusha KSS et al.^[13] where refractive error increased significantly with increased in age. In Saad et al. study prevalence of refractive error was significantly higher among subjects aged >12 years^[19]

Result of this study shows prevalence of refractive errors among girls was 19.4% and 17.5% were boys. But the association between the refractive errors and gender was not statistically significant similar results were observed in Singh et al.^[15], Prema et al.^[20], Vidusha KSS et al.^[13] where prevalence of refractive errors was more common in females than males and association was

statistically not significant. Whereas refractive error was significantly associated with female gender in study done by Seema et al.^[21], Pavithra et al.^[17], Saad et al.^[19], Sun et al.^[22] but this high prevalence in female might be due to the higher rate of growth in girls and also because girls attain puberty earlier than boys. Parmar A. et al.^[12] reported refractive error was significantly more among boys.

In this study prevalence of refractive error among students from nuclear family was significantly more (22.4%) than children belongs to joint family (9.8%). Kumar P et al. made similar observation in his study.^[23] This study shows refractive error was more in Hindus (18.5%) as compared to Muslims (17.3%) but observed difference was not statistically significant. Similar observation was found by Kumar P et al.^[23] and Bhattacharya RN, et al.^[24]

In present study it was observed that watching TV and/ or Smart phone for longer time every day positively associated with refractive error. Similar observation reported by more recent studies have demonstrated a positive correlation between the presence of myopia and prolonged work requiring near vision use.^[25, 26, 27, 28, 29, 30] Dixit R. et al did not find any significant association between screen usage and refractive error.^[31]

In this study it is observed that playing outdoor game is significantly negatively associated with refractive error. Similar observation made by Rose et al.^[32] and Khan A N et al.^[33] concluded in their study that higher levels of total time spent outdoors, rather than sport per se, was associated with lesser incidence of myopia.

Conclusion

Refractive error among children is a common problem. Now a day, it is increasing due to Educomp smart classes in school or use of laptops, TV viewing and computers or mobiles and playing outdoor game less. Early diagnosis of refractive errors through screening for vision at the time of school admission and periodic eye screening of the students is essential to provide

early correction of impaired vision. Parents, teachers and students, must be educated about the early detection of refractive error and correction with spectacles to prevent progression of visual impairment as well as preventive and promotive efforts need to be directed towards healthy lifestyle of future generation.

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