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Original Research Article

Ocular morbidity and its relation to classroom lighting among middle-school students of government high schools in Goa

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ABSTRACT

Background: School children form an important target group for a Nation and any ocular morbidity in this age group has huge physical, psychological and socio-economical implications. Research studies have shown that illumination has a significant effect not only on scholastic performance of the students, but also on their physical and mental health. The current study was carried out to assess the prevalence of ocular morbidities among students of high schools of Sanquelim Taluka in Goa, and to assess possible association between ocular morbidity and level of classroom and blackboard illumination.
Methods: Students of class 6, 7 and 8 of eight randomly selected schools were interviewed using a semi-structured questionnaire for personal details and visual symptoms. Visual acuity testing was done using Snellen's chart. Classroom and blackboard illumination were assessed separately using standard calibrated digital Lux meter (LX-10101B).
Results: Using Snellen's chart, 83 (18%) of the study subjects were found to have visual morbidity. The measurement of illumination levels showed that out of the 24 classrooms and blackboards evaluated, 15 (62.5%) classrooms and 9 (37.5%) blackboards had inadequate illumination. Classroom illumination was found to have significant association (p=0.04) with visual morbidity.
Conclusions: A significant number of classrooms (62.5%) and blackboards (37.5%) had below recommended illumination levels. Regular evaluation of infrastructure should be done to ensure adequate artificial illumination of the classrooms.

Keywords: Ocular morbidity, School children, Classroom illumination

INTRODUCTION

School children form an important target group for a Nation and any ocular morbidity in this age group has huge physical, psychological and socio-economical implications.[1] If these are not detected and treated, may lead to severe ocular disabilities, apart from affecting children's scholastic performance. An estimated 19 million children are visually impaired worldwide. Of these, 12 million children are visually impaired due to refractive errors, a condition that could be easily diagnosed and corrected. 1.4 million are irreversibly blind for the rest of their lives and need visual rehabilitation interventions for full psychological and personal development.[2]

Considering the fact that 30% of India's blind lose their sight before the age of 20 years and many of them are under five when they become blind, the importance of early detection and treatment of ocular diseases and

visual impairment in young children is obvious. In fact an effective blindness prevention programme must have as a key component, the screening of children. School going children therefore form an important large target group which is easy to approach and also adaptable to Health Education imparted.[3] Hence this present study was conducted in school children.

Standards regarding the minimum illumination levels in school classrooms vary between countries, ranging from 240 to 500 lux.[4-6] Research studies have shown that illumination has a significant effect not only on scholastic performance of the students, but also on their physical and mental health.[7] The present study was carried out to assess the prevalence of ocular morbidities among school students of high schools of Sanquelim Taluka in Goa, and to assess possible association between ocular morbidity and level of classroom and blackboard illumination.

METHODS

The present school-based cross-sectional study was conducted in Government High Schools of Sanquelim Taluka in Goa over a period of three months from October 2016 to December 2016. Institutional Ethics Committee approval was obtained prior to commencement of the study. Informed written consent was taken from respective principals of the selected schools for the study who informed the parents of the students regarding the study prior to interviewing and examining the students.

All students of class 6, 7 and 8 of the eight randomly selected schools were included in the study. Students with congenital eye problems, history of ocular trauma or surgical procedure in the past were excluded from the study. To ensure equal duration of exposure to illumination, students not studying in the same school for at least last 3 years were excluded from the study.

A total of 460 students were interviewed using a semi-structured questionnaire to obtain details regarding personal characteristics and visual symptoms. Visual acuity testing was done using standard Snellen's chart and a score of <6/9 in either or both eyes was taken as a case of visual morbidity.[8] Classroom and blackboard illumination was assessed separately using standard calibrated Lux Meter (LX-10101B).

All the study participants with visual morbidity and symptoms were further evaluated by an ophthalmologist attached to primary health centre, Sanquelim and if needed were referred to affiliated tertiary care centre for further management.

Data was entered and analysed using SPSS software version 22.

RESULTS

Of the 460 study participants, 240 (52.2%) were boys and 220 (47%) were girls. Visual acuity among different age groups showed that 29.1% of students in age group of 14 years had vision less than 6/9 (Table 1).

Table 1: Visual Acuity among different age groups.

Age in years	Visual acuity		Total
	>6/9 (%)	<6/9 (%)	
12 (% within age)	134 (80.7)	32 (19.3)	166
13 (% within age)	182 (87.5)	26 (12.5)	208
14 (% within age)	61 (70.9)	25 (29.1)	86
Total	377 (82)	83 (18)	460

Visual acuity testing using Snellen's chart showed ocular morbidity among 83 (18%) of the students included in the study population.

Table 2: Frequency of symptoms of eye strain among students in the present study.

Symptoms of eye strain	Frequency (%)
Visual symptoms	
Unclear view in class	38 (8.3)
Double image	28 (6.1)
Blurred image	30 (6.5)
Watering of eyes	114 (24.8)
Pain around eyes	104 (22.6)
Redness of eyes	20 (3.4)
Non visual symptoms	
Headache	166 (36.1)
Unsatisfied with sleep	10 (2.2)
Tired feeling	4 (0.9)

The most commonly reported symptom of eye strain was headache which was reported by 166 (36.1%) of the study participants followed by watering of eyes which was reported by 114 (24.8%) of the study participants (Table 2).

Table 3: Association between classroom illumination and visual morbidity.

Classroom illumination	Visual morbidity		Total	P value	Unadjusted odds ratio (95% CI)
	Present	Absent			
Inadequate (<300 lux)	59	223	282	0.04	1.7 (1.01 to 2.84)
Adequate (>300 lux)	24	154	178		
Total	83	377	460		

Table 4: Association between blackboard illumination and visual morbidity.

Blackboard illumination	Visual morbidity		Total	P value	Unadjusted odds ratio (95% CI)
	Present	Absent			
Inadequate (<200 lux)	40	172	212	0.67	1.11 (0.69 to 1.78)
Adequate (>200 lux)	43	205	248		
Total	83	377	460		

The measurement of illumination levels showed that out of the 24 classrooms and blackboards evaluated, 15 (62.5%) classrooms and 9 (37.5%) blackboards had inadequate illumination as per Indian Standards of Interior Illumination.

Classroom illumination was found to have significant association [OR=1.7 (1.01 to 2.84), p=0.04] with visual morbidity (Table 3). Whereas, blackboard illumination was not significantly associated [OR=1.11 (0.69–1.78), p=0.67] with visual morbidity (Table 4).

DISCUSSION

In this study, 18% of the rural middle-school students had visual acuity of less than 6/9. These findings are similar to the study conducted by Madhavi et al which showed total prevalence of ocular morbidity of 10.11% and by Naik et al in Ahmednagar, which noted a prevalence of 9.66%.[9-10] Whereas some studies have shown the prevalence of visual morbidity among the school students higher than that found in the present study.[11-12]

A significant number of classrooms (62.5%) and blackboards (37.5%) had illumination levels below recommended norms.[13]

The most commonly reported symptoms of eye strain were headache which was reported by 166 (36.1%) of the study participants followed by watering of eyes which was reported by 114 (24.8%) of the study participants in the present study, the findings which were similar to a study carried out in South India by Joseph et al which reported 27 (28.7%) had headache and 22 (23.4%) had watering of eyes.[14]

CONCLUSION

It is recommended that school students should be regularly examined and evaluated for any visual morbidity. Regular screening of children in school is an effective way of detecting ocular morbidities such as refractive errors and thus minimizing the impact of disabilities in long term. Through appropriate IEC activities, parents as well as teachers should be educated and made aware of the visual morbidities and its consequences if left untreated. Since low levels of illumination has been a factor in development of asthenopia or eye strain, regular evaluation of infrastructure should be done to ensure adequate artificial illumination of the classrooms.

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