Original Article

Pattern of ocular morbidities: A cross-sectional study on school-going children in Shillong city

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Abstract

Introduction: India is plagued by ocular morbidities in school-children. However, there exists paucity of studies, school health check-ups, and health education in the north-eastern region. This study aimed at estimating the prevalence and pattern of various ocular morbidities in school-going children of Shillong. **Methodology:** It was a school-based cross-sectional study done in Shillong, Meghalaya among 540 school-going children from class VI to X. Data were analyzed using SPSS version 23. **Results:** The most common ocular morbidity was refractive error (57.4%) followed by vitamin A deficiency (38.1%), color blindness (3.1%), nevus (3%), manifest squint (2.2%), ptosis (2.2%), conjunctivitis (0.9%), stye (0.4%), etc., There was statistically significant association ($P = 0.0192$) among the variations of presence of ocular morbidities in the various age groups, among students attending Government or Private schools ($P = 0.0430$), and socio-economic status ($P = 0.012$). The prevalence of ocular morbidities was found to have highly significant association with the educational status of both the father ($P = 0.0001$) and mother ($P = 0.001$). In addition, the occupational status of the father ($P = 0.0472$) and the mother ($P = 0.0251$) were significantly associated with the prevalence too. **Conclusion:** The prevalence of ocular morbidities was found to be much higher than in other places of the country, which may be because of environmental factors and lifestyle combined with a lack of awareness and timely diagnosis and an absence of robust school health program. A regular screening along with specific health education campaigns can go a long way in decreasing the same.

Keywords: Adolescent health, eye problem, low vision, ophthalmic diseases, school-based screening

Introduction

Ocular morbidity is a common public health problem in the developing world; however, it is generally neglected unless there is impairing visual loss. In the year 2010, an estimated 285 million people worldwide were visually disabled, of whom nearly 39 million were blind and 246 million were with low vision,[1,2] approximately 90% of them were living in developing countries. Approximately, 80% of blindness is avoidable; however, a large portion of those affected remain blind for want of access to affordable eye care. An estimated 19 million children are visually impaired. Of these, 12 million are visually impaired due to refractive errors (REs), a condition that should be easily diagnosed and corrected, whereas 1.4 million are irreversibly blind for the rest of their lives. Out of these 1.4 million, 1 million reside in Asia alone. While in developed countries, the prevalence is 0.3/1000 children; in developing countries, it stands at 1.5/1000.[3] Although India had launched the National Program for Prevention of Blindness was introduced in 1976,[4] still, the prevalence of childhood blindness/low vision is 0.80/1000 children.[5] Unfortunately, 30% of the blind population of India lose their sight before they turn twenty.[6]

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Received: 31-03-2019 **Revised:** 31-03-2019 **Accepted:** 15-04-2019

Access this article online

Quick Response Code:

Website: www.jfmpc.com

DOI: 10.4103/jfmpc.jfmpc_268_19

How to cite this article: Sarkar A, Medhi GK, Bhattacharyya H, Pala S, Gogoi S. Pattern of ocular morbidities: A cross-sectional study on school-going children in Shillong city. J Family Med Prim Care 2019;8:2124-8.

These facts point out the necessity of screening visual problems in unaware children in whom timely intervention is of utmost importance as it might ameliorate the quality of their lives along with deterring visual problems to be a barrier to their academic performance or all-round development. Schools are important loci where large number of children can be screened, treated/referred, followed-up, and as they also offer an efficient platform for imparting health education to the students and train teachers on how to detect vision problems. Hence, they are both cost-effective and easily accessible media. Keeping this in mind, the present study was designed to estimate the prevalence and pattern of various ocular morbidities in school-going children of Shillong.

Materials and Methodology

Study population and period

A school-based cross-sectional study was conducted in the city of Shillong, the capital of Meghalaya among school-going children from class VI to X. For better representation, students were selected from both Private and Government schools. In India, schools are either Government run or Private run and generally parents from the better financial condition, higher education level, and occupational status prefer to enroll their wards in Private schools as they are better equipped and managed than Government schools. The overall results and extra-curricular activity are better in Private schools. The difference in the student's background, curriculum, performance pressure, and infrastructure of these schools could well lead to variation in the spectrum of ocular morbidities or their proportions.

The study was conducted for a period of 4 months from June to October in 2017.

Sample size

The minimum sample size (N) required for the study was calculated using the formula $N = Z_\alpha^2 pq/l^2$ where, Z_α=1.96 at 5% significance level, *P* = proportion or prevalence of interest, q = 100-p, l = allowable error taken here as 5%. Prior to the start of the study, a pilot study was done on 50 students, and the prevalence of ocular morbidity (*P*) was found to be 77.5% among them, substituting this in the above equation a sample size of 440 was calculated. Taking a non-response rate of 20%, the required sample size would be 528, which was rounded up to 540.

Sampling

The schools included in the study were selected by convenient sampling - two Private schools and two Government schools: 50% (270) of the calculated sample size (N) was collected from Private and 50% from Government schools. Because there were five classes, 20% of N was selected from each class by using simple random sampling with the help of an attendance register.

Ethical issues

The principals of the selected schools were informed about the study, and permission for the visit to the selected schools was sought personally. The parents were informed regarding the study, and their consent was taken through school diaries.

Inclusion and exclusion criteria

All the students studying in Class VI to X who were present in the school on the day of examination and who were both willing to participate in the study and whose parents gave consent were included in the study. Absentees were excluded from the study.

Study tool

The data collection instrument was a pre-tested semi-structured questionnaire. Queries from children were asked in English or Hindi or other local languages, whereas information was filled in the English language. Visual acuity (unaided) was assessed by using Snellen's chart, color vision was checked by using Ishihara's chart, manifest squint was assessed by Hirschberg's test, latent squint was checked by cover-uncover test, and torch examination of the eye was done. The first part of the questionnaire dealt with information regarding the child such as age, sex, residential address, class in which studying, chief complaints related to eyes, associated family history, and other relevant questions. The second part of the questionnaire included a detailed examination of eye for diagnosing ocular morbidity. Examinations were performed in the respective school compounds in adequate lighting.

Operational definitions

Refractive error (RE) was diagnosed when the uncorrected visual acuity of 6/9 or worse in any one eye, measured using the Snellen chart at 6-meter distance. Pinhole vision was done to differentiate REs from pathological conditions. *Defective color vision or color blindness* was defined as the inability to read four or more plates using a 38 plate Ishihara chart. Vitamin A deficiency was defined as a history of night blindness or presence of conjunctival xerosis or Bitot spots or corneal xerosis or corneal ulcer on clinical examination. Manifest squint was diagnosed when corneal reflex seen at pupillary margin (15° deviation) or at limbus (45° deviation) on performing Hirschberg test. *Latent squint* was defined as demonstration of esophoria or exophoria on Cover-Uncover test. *Trachoma*[7] and *Xeropthalmia* was diagnosed according WHO clinical staging.[8] Other ocular diseases such as conjunctivitis, stye, chalazion, pterygium, ptosis, irregular pupil, etc., were diagnosed on clinical examination.

Data analysis

All the data were entered in Microsoft Excel 2016 and analyzed using IBM Statistical Package for Social Sciences (SPSS) version 23. Descriptive statistics such as frequencies and percentages were calculated and appropriate statistical tests such as the Chi-square tests were applied to detect any significant association at 95% confidence interval. While finding the association of presence of ocular morbidity with parent's education and occupation, the parents who had expired were excluded.

Results

Of the 540 students examined, 51.1%(276) were boys and 48.9% (264) were girls. The mean age of the students was 14.4 ± 1.9 years. Christianity 60.9% (329) was the predominant religion. Majority of the students' fathers were graduates or postgraduates (28.3%), whereas the mothers were high school pass (26.8%). Most respondents belonged to upper middle class 45.2% (244). It was found out that majority of the mothers were housewives 57% (301) and most 27.9% (142) of the fathers were businessman [Table 1]. The prevalence of ocular morbidities (76.3%) was found to be quite high, and it was found that 412 students had some form of ophthalmic disease or at times even more than one. The most common ocular morbidity was RE (57.4%) followed by vitamin A deficiency (38.1%). Other existent diseases were color blindness (3.1%), nevus (3%), manifest squint (2.2%), ptosis (2.2%), conjunctivitis (0.9%), stye (0.4%), etc., [Table 2].

There was a statistically significant association (P = 0.0192) between the variations of presence of ocular morbidities in the various age groups. The prevalence of ocular morbidities in Government schools was 80%, which was significantly higher (P = 0.0430) than Private schools (72.6%). The prevalence of ocular morbidities was found in the upper lower class, and the increment was statistically significant (P = 0.012). The prevalence of ocular morbidities was found to have highly significant association with the educational status of both the father (P = 0.0001) and mother (P = 0.001). In addition, the occupational status of the father (P = 0.0472) and the mother (P = 0.0251) was significantly associated with the prevalence too [Table 3].

Table 1: Profile of the students

Variables	No. of students (*n*)	Percentage (%)
Sex (*n*=540)		
Boys	276	51.1
Girls	264	48.9
Age (in completed years) (*n*=540)		
11	36	6.7
12	79	14.6
13	78	14.4
14	79	14.6
15	80	14.8
16	93	17.3
17	95	17.6
Socio-economic status (*n*=540)		
Upper Class	34	6.3
Upper Middle Class	244	45.2
Lower Middle Class	127	23.5
Upper Lower Class	131	24.3
Lower Class	4	0.7
Religion (*n*=540)		
Hinduism	167	30.9
Islam	11	2.1
Christianity	329	60.9
Others	33	6.1
Education of Father (*n*=509)‡		
Professional	13	2.4
Graduates and Post-Graduates	144	28.3
Higher secondary pass	108	21.3
High school pass	131	25.8
Middle school pass	52	10.2
Primary school pass	25	4.9
Illiterate	36	7.1
Education of Mother (*n*=530)‡		
Professional	6	1.1
Graduates and Post-Graduates	118	22.3
Higher secondary pass	74	14.0
High school pass	142	26.8
Middle school pass	87	16.4
Primary school pass	48	9.0
Illiterate	55	10.4
Occupation of Father (*n*=509)‡		
Professional	84	16.5
Government service	118	23.2
Driver	47	9.2
Businessman	142	27.9
Laborer	43	8.4
Unemployed	22	4.3
Others*	53	10.5
Occupation of Mother (*n*=530)‡		
Professional	58	11.0
Government service	52	9.8
Others†	30	5.7
Landlady	17	3.2
Shopkeeper	32	6.1
Laborer	38	7.2
Housewife	301	57.0

*Others include salesman, farmer, and shopkeeper. †Others include maid, farmer, and shopkeeper ‡Others expired so not considered

Discussion

In this study, the prevalence of ocular morbidity was found to be 76.3% among school children of age 11–17 years, which is higher than the studies conducted in Chennai among 5–15 years old school children (55.1%)[9] and, in Surendranagar among 10–16 years ones (45.5%).[10] Differences in prevalence may be explained by ethnic variations, partly because of lifestyle and living conditions in addition to different methodologies used. RE was found to be the most common ocular morbidity (57.4%), followed by vitamin A deficiency (38.1%), which is comparable to another study conducted among 10 to 16 year old school-goers[11] where RE was found to be the most common ocular morbidity (36.62%) followed by vitamin A deficiency (25.58%); as well as a study conducted by Kumar *et al.* where leading cause of ocular morbidity was found to be RE (6.22%), followed by vitamin A deficiency (2.77%).[12] However, the prevalence of both RE (57.4%) and vitamin A deficiency was found to be much higher (38.1%) than in the other studies.[9-12] It was seen that ocular morbidity was significantly more (P < 0.05) in females (81.8%) than males (71.0%). This was contrast to the studies done in northern Maharashtra[11] and Puducherry,[13] where they found higher prevalence in males (55.9% and 6.6%, respectively) than females (44.4% and 6%, respectively). In our study, the age wise distribution

Table 2: Pattern of ocular morbidity (*n*=540)

Morbidity	Frequency* (*n*)	Prevalence (%)
Refractive errors	310	57.4
Vitamin A deficiency	206	38.1
Conjunctivitis	5	0.9
Manifest squint	12	2.2
Color blindness	17	3.1
Ptosis	12	2.2
Nevus	16	3.0
Stye	2	0.4
Corneal opacity	1	0.2

*Multiple morbidities existed in some students, total students who were found to have various ocular morbidities was 412

of ocular morbidity showed that maximum prevalence of eye diseases was present in higher age group (85.3%) than in the lower age group (77.8%). Similar findings were observed by Panwar *et al.* in Haldwani district of Nainital.[14] It was also observed that the prevalence was found to be significantly higher ($P < 0.05$) in Government schools as compared to Private schools, which was similar to a study done by Bansal *et al.* on school going children of South India.[15] Significant association ($P < 0.05$) was observed with socio-economic status with prevalence of ocular morbidities, which was similar to a study conducted in Maharashtra.[11] The prevalence of ocular morbidities was found to have highly significant association with the educational status of both the father ($P = 0.0001$) and mother ($P = 0.001$). In addition, the occupational status of the father ($P = 0.0472$) and the mother ($P = 0.0251$) was significantly associated with the prevalence too. This was similar to the study conducted by Deshpande *et al.*[11]

Limitations

Because the present study was school-based and conducted in urban areas, the results may not be reproducible in the community and rural schools.

Conclusion

The most common cause of ocular morbidity was elicited to be RE followed by vitamin A deficiency both of which are preventable and treatable cause of blindness. A simple school screening was effective and easy method for early detection of ocular problems and was found to be lacking in these schools. A team of trained family physicians and optometrists can screen at least once in a year as early detection and management reduce 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. In the present study, specific health education supported by charts and posters regarding eye health education was given to children after the examination.

Table 3: Association of various study variables with the ocular morbidity

Variables	Ocular Morbidity		χ^2	*P*
	Yes (%)	No (%)		
AGE (in completed years), *n*=540				
11	28 (77.8)	8 (22.2)		
12	55 (69.6)	24 (30.4)	15.14	0.0192
13	64 (82.1)	14 (17.9)		
14	51 (64.6)	28 (35.4)		
15	59 (73.8)	21 (26.2)		
16	74 (79.6)	19 (20.4)		
17	81 (85.3)	14 (14.7)		
SEX, *n*=540				
Boys	196 (71.0)	80 (29.0)		
Girls	216 (81.8)	48 (18.2)	7.45	0.006
TYPE of SCHOOL, *n*=540				
Private	147 (54.4)	123 (45.6)		
Government	163 (60.4)	107 (39.6)	1.94	0.1638
SOCIO-ECONOMIC STATUS, *n*=540				
Upper Class	20 (58.8)	14 (41.2)		
Upper Middle Class	177 (72.5)	67 (27.5)	12.82	0.0122
Lower Middle Class	99 (78.0)	28 (22)		
Upper Lower Class	111 (84.7)	20 (15.3)		
Lower Class	3 (75.0)	1 (25)		
EDUCATION of MOTHER, *n*=530*				
Professional	4 (66.7)	2 (33.3)		
Graduates and Post-Graduates	74 (62.7)	44 (37.3)	21.49	0.001
Higher secondary pass	62 (83.8)	12 (16.2)		
High school pass	104 (73.2)	38 (26.8)		
Middle school pass	75 (86.2)	12 (13.8)		
Primary school pass	40 (83.3)	8 (16.7)		
Illiterate	43 (78.2)	12 (21.8)		
EDUCATION of FATHER, *n*=509*				
Professional	5 (38.5)	8 (61.5)		
Graduates and Post-Graduates	86 (59.7)	58 (40.3)	58.0	0.0001
Higher secondary pass	76 (70.4)	32 (29.6)		
High school pass	117 (89.3)	14 (10.7)		
Middle school pass	47 (90.4)	5 (9.6)		
Primary school pass	22 (88)	3 (12)		
Illiterate	33 (91.7)	3 (8.3)		
OCCUPATION of FATHER, *n*=509*				
Professional	59 (70.2)	25 (29.8)		
Government service	79 (66.9)	39 (33.1)	12.75	0.0472
Others†	43 (81.1)	10 (18.9)		
Driver	38 (80.9)	9 (19.1)		
Businessman	116 (81.7)	26 (18.3)		
Laborer	32 (74.4)	11 (25.6)		
Unemployed	19 (86.4)	3 (13.6)		
OCCUPATION of MOTHER, *n*=530*				
Professional	35 (60.3)	23 (39.7)		
Government service	37 (71.2)	15 (28.8)	14.44	0.02
Others‡	26 (86.7)	4 (13.3)		
Landlady	15 (88.2)	2 (11.8)		
Shopkeeper	27 (84.4)	5 (15.6)		
Laborer	31 (81.6)	7 (18.4)		
Housewife	229 (76.1)	72 (23.9)		

*Parent expired and their education was not considered. †Others include salesman, farmer, and shopkeeper. ‡Others include maid, farmer, and shopkeeper

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Global data on visual impairments 2010. World Health Organization. Available from: http://www who int/blindness/globaldatafinalforweb pdf. [Last accessed on 2019 Feb11].
2. Resnikoff S, Pascolini D, Etya'ale D, Kocur I, Pararajasegaram R, Pokharel GP, *et al.* Global data on visual impairment in the year 2002. Bull World Health Organ 2004;82:844-51.
3. WHO Disease control and prevention of visual impairment. In: Waddell A, Heseltine E, editors. Vision 2020 Global Initiative for the Elimination of Avoidable Blindness: Action Plan 2006-2011. Geneva, Switzerland: WHO press; 2007. p. 9-39.
4. National Programme for Control of Blindness, Ministry of Health and Family Welfare, Government of India. NPCB. 2017. Available from: http://npcb.nic.in/index1.asp?linkid=29&langid=1. [Last accessed on 2019 Feb 05].
5. Jose R. Present status of the national programme for control of blindness in India. Community Eye Health J 2008;21:103-4.
6. Bhalerao SA, Tandon M, Singh S, Dwivedi S, Kumar S, Rana J. Visual impairment and blindness among the students of blind schools in Allahabad and its vicinity: A causal assessment. Indian J Ophthalmol 2015;63:254-8.
7. Thylefors B, Dawson CR, Jones BR, West K, Taylor HR. A simple system for assessment of trachoma and its complications. Bull World Health Organ 1987;65:477-85.
8. Sommer A. Field Guide to the Detection and Control of Xerophthalmia. 2nd ed. Geneva: WHO; 1982.
9. Stanly AM. Devasena MA. Ocular morbidity screening among school children in Chennai. Int J Adv Med 2015;2:337-40.
10. Parmar A, Kartha G, Baria M. A study on the prevalence of ocular morbidities amongst school children (10-16 years) of Surendranager district. Int J Res Med 2014;3:90-4.
11. Deshpande JD, Malathi K. Prevalence of ocular morbidities among school children in rural area of North Maharashtra in India. Natl J Community Med 2011;2:249-54.
12. Kumar P, Pore P, Dixit AK, Jha AK, Ahmad A, Chauhan N. Demographic profile of ocular morbidity in school children in India. Scholars J Appl Med Sci 2013;1:645-52.
13. Vishnuprasad R, Bazroy J, Madhanraj K, Prashanth HR, Singh Z, Samuel AK, *et al.* Visual impairment among 10-14-year school children in Puducherry: A cross-sectional study. J Family Med Prim Care 2017;6:58-62.
14. Panwar N, Sharma V, Titiyal GS. Prevalence and causes of ocular morbidity in school children of Haldwani. Indian J Clin Exp Ophthalmol 2016;2:118-22.
15. Bansal A, Krishnappa K, Datti NP, Guruprasal BS, Guha J. Ocular morbidity in school going children of Kolar district, South India. J Clin Biomed Sci 2012;2:175-84.