Research Paper

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Demographic Profile and Risk Factors of Ocular Morbidity in School Children of South India

Medical Science

KEYWORDS : School children, ocular morbidity, refractive error and south India

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ABSTRACT

Aim: School eye health services is one of the important aspect of school health services in which children can be screened for various systemic and eye diseases. Eye diseases in childhood are important causes of medical consultation and it affects learning ability, adjustment in school and personality. Any information on eye diseases in school children in south India is rare and sketchy. The basic aim of this study was to assess the prevalence, pattern and risk factor of ocular morbidity amongst school children of south India and to recognize avoidable causes of ocular morbidity.

Method: This is the cross sectional school survey was conducted in various government and private schools of rural and urban areas of Chitradurga district between July-2013 to Dec-2013. A total of 2945 school children between age group 5 to 16 years had under gone the complete ocular and physical examination.

Statistical analysis: Distribution of association was analyzed by Chi-square test. Variables that were significant on univariate analysis were entered in a multiple logistic regression analysis.

Results: 2945 children were screened and 755 (25.6%) children had ocular morbidity, out of 755 children 28% (N=254) had refractive error, which found to be the commonest cause of defective vision followed by vitamin A deficiency comprises 14% (N=126) and conjunctivitis 12% (N= 114). In this study we found that Age (11-16years), Place (rural), School (government), Religion (Hindu) and Gender (male) where independent risk factor of ocular morbidity in school going children.

Conclusion: Present study highlights important risk factors of ocular morbidity in school going children. Refractory error was commonest form of ocular morbidity.

Introduction

Eyes are the most important treasured organs of human beings. Much ocular morbidity (abnormal ocular conditions) originates in childhood and if undetected and not treated properly may result in severe ocular disabilities, in addition to affecting development, educational performance, social and employment opportunities. Childhood eye morbidity is defined as "Any eye disease or condition that requires ophthalmic care and treatment which if untreated can often progress to serious and sight threatening disease" [1]. Screening of the children for vision at the time school admission, periodical eye examination of the children is recommended for early rectification of impaired vision in school children. Schoolteachers should be trained for screening of defective vision in children. Children and parents should be educated regarding importance of ocular hygiene and early correction of refractive errors.

Blindness is one of the significant social problems in India [2]. In India total child population in 2010 was 345 million and number of blind children was 2,80,000. The prevalence of blindness declined to 1.4% than previous data after the vision 2020 was implemented [3]. Ocular morbidities include refractive errors, vitamin A deficiency, conjunctivitis, trachoma, ocular trauma, blephritis, stye, color blindness and pterygium. According to World Health Organization (WHO) statistics, there were 0.7 million of the world`s blind children living in South-East Asia region. (4) Blindness is one of the most significant social problems in India. A national survey on blindness 2001-02 showed that 7% of children aged 10-14 years have problems with their eyesight. (6) 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. (5, 7)

Data on causes and prevalence of ocular morbidity in children is essential for planning and evaluation of preventive and curative services for children in a given region. Information obtained from this study might be useful in improving the existing primary eye care facilities consequently reducing the prevalence of childhood blindness and severe visual impairment. School eye health services is one of the important aspect of school health services in which children can be screened for diseases such as refractive error, squint amblyopia, trachoma etc. With this background, the present study was conducted with the objective to determine the pattern and prevalence of ocular morbidity among the children attending school in the district of Chitradurga (south India) and which also compares the prevalence of ocular disease in children of government schools and private schools, rural and urban locality.

Material and methods

This is the cross sectional school survey was conducted in the field practice area of Department of Community Medicine, Basaveshwara Medical College and Hospital, Chitradurga between July 2013 to December 2013. School children aged between 5-16 years of the selected urban and rural schools were surveyed for ocular morbidity. A total of 32 schools were surveyed where 14 schools were private and 18 schools government. Permission for the survey was obtained from the school authorities before the study was started. Institutional ethical clearance was obtained before staring the study. A total of 2945 school children between age group 5 to 16 years had under gone the complete ocular and physical examination. The School was informed well in time for appropriate arrangements at a given date and time. A proforma was given to the children to get consent from the guardian or parents and some necessary information such as education of parents and socio-demographic profile. A home visit was also made to complete the information whenever required. Our survey Team consisted of an Ophthalmologist, Pediatrician, Optometrist, ophthalmic technician and two other staff. All the Children underwent comprehensive ocular and physical examination, which included detailed history of present and past ocular problems, along with relevant family history.

Ophthalmologists examined all the patients and optometrists did refraction. Pediatrician did complete physical examination. The patients underwent the following examinations: Visual acuity measurement was conducted with the help of Snellen's chart for distant vision in older and cooperative patients. Any child having visual acuity of 6/9 or worse was examined for refractive error. Ocular movements, Hirschberg test, cover– uncover

test was done for detection of squint. With help of torchlight, complete examination of cornea, conjunctiva, anterior chamber, iris, and pupil was done. Whenever needed examination of the anterior segment was done with slit lamp. Retinoscopy and subjective refraction was done for all the patients suspected of having refractive error and whenever needed Cycloplegic refraction and examination of fundus with direct ophthalmoscope was done.

Criteria's for inclusion of children for ocular morbidity:

- Visual acuity of <6/9 and improving with pinhole was considered to be refractive error.
- A probable diagnosis of amblyopia was made if the vision was <6/9, not improving with pin hole and no organic lesion was detected after complete ocular examination.
- Strabismus was diagnosed by recording corneal light reflex combined with extra ocular movements and cover-uncover tests. Recording Bitot's spot, Conjunctival and Corneal xerosis and night blindness considered Vitamin A Deficiency. The history of night blindness was obtained from the child.

All the cases were given appropriate treatment and referred to the affiliated tertiary care hospital for further management.

Statistical analysis:

The Descriptive statistics was used to describe frequency, mean, median, standard deviation and confidence intervals for variables- number of children, age, school (govt/ private), place (urban/ rural), diet, nutrition, religion and ocular morbidity by using SPSS software version 19. Comparisons of discrete variables were evaluated by using chi square analyses. P <0.05 was considered significant. Variables that were significant on univariate analysis were entered in a multiple logistic regression analysis as independent variables and outcome was dependent variable.

Results

The present study was conducted among school going children aged 5-16 years in Chitradurga district. In total, 2945 students were examined including 58.2% (N=1714) boys and 41.8% (N=1231) girls. Ocular morbidity was found in 755 students (25.6%) and rest 2190 (74.4%) was normal. Out of 755 students, 66.2% (N=500) were boys and 33.8% (N=255) were girls and 54.1% (N=409) students were lived in rural area and 45.9%(N=346) lives in urban area. Where as 91.1% (N=688) students were Hindu and 8.9% (N=67) belong to other community such as Muslim, Christian, and Sikhs etc as shown in table 1. Prevalence of ocular morbidity was more in the students of government schools (73.7%) as compared to private school students (26.3%) and more in the rural (54.1%, N=409) area than the urban area (45.9%, N=346) and these results found statistically significant (p<0.001) as shown in table 1.

Fifty five percent of children belong to 11-16 years and 45% belong to 5-10 years had ocular morbidity which was statistically significant (p<0.001) as shown in table 3 and 4. It was observed that when students were asked about types of ocular complaints 54.8% were having watering from eyes during reading and watching television while 45.2% had pain in eyes, which was found significant. These complaints might be due to refractive error.

Table 1: Demographic factors affecting ocular morbidity in school going children

Variables Absent		Ocular morbidity		p-value
		Present		
Gender	Boys	1214	500	<0.001
	Girls	976	255	
Place	Urban	1339	346	<0.001
	Rural	851	409	
Religion	Hindu	1894	688	<0.001
	Others	296	67	
Vit A deficiency	Absent	1715	601	0.455
	Present	475	154	
Type of family	Joint	1059	396	0.052
	Nuclear	1131	359	
Diet	Mixed	1629	540	0.124
	Veg	561	215	
Nutritional status	Malnutrition	737	285	0.041
	Normal	1453	470	
Type of school	Private	1055	198	<0.001
	Government	113	557	

Refractive error was the commonest cause of defective vision (28%, N=254), followed by vitamin A deficiency comprises 14% (N=126) and conjunctivitis 12% (N= 114) of study population having ocular morbidity. Squint and chalazion was seen in 10% (N=91) of students and 4% (N=35) of students had trauma and corneal opacity. Cataract is seen in only 2% (N=21) of students having ocular morbidity and color blindness in 5% (N=42) as shown in table 2 and depicted in figure 1 below. Refractive error was more common in boys (64.9%, N=165) and students of rural locality (79.9%, 203) as compared to girls (35.1%, N=89) and students of urban locality (20.1%, 51), which was statistically significant as shown in table 5 and 6.

In this study it was observed that vitamin A deficiency was high in boys (83.3%, N=105) as compared to girls (16.7%, N=21) and which was statistically significant (p<0.001). Vitamin A deficiency was more (N=77) in students who were having under nutrition (p<0.001) and vitamin A deficiency was high in vegetarians (N=84) as compared to students with mixed diet culture (N=42) there was a significant association between the vitamin A deficiency and diet as shown in table 7.

Table 2: Distribution of ocular morbidity in school going children

Ocular morbidity	N=755	%
Refractive error	254	28
Conjunctivitis	114	12
Vitamin A deficiency	126	14
Squint	91	10
Chalazion	89	10
Cataract	21	2
Trauma	35	4
Corneal opacity	35	4
Stye	63	7
Congenital disorder	35	4
Color blindness	42	5

Conjunctivitis was more in the students who live in rural area (83.3%, N=95) as compared to the students of urban area (16.7%, N=19) and the relation between the conjunctivitis and place of living found to be significant (p<0.001) as shown in table 5 and 8. Age, place, religion, diet, nutrition, school and gender found to be a significant risk factor (p<0.05) for ocular morbidity in school going children on univariate analysis.

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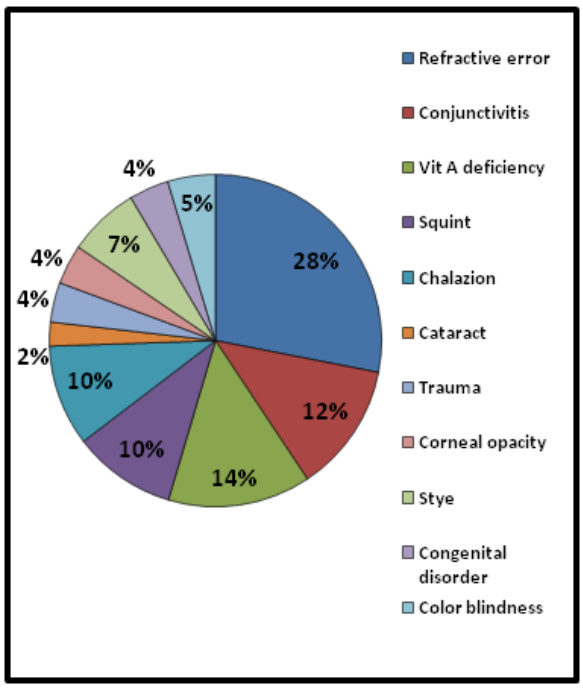
Figure1: Distribution of ocular morbidity in school going children



However, as several of these parameters can interact with each other and having confounding influences, we considered it appropriate to perform multivariate analysis as well. Multi-variate analysis of these risk factors showed Age (11-16years), Place (rural), School (government), Religion (Hindu) and Gender (male) where independent risk factor of ocular morbidity in school going children as depicted in the table 9 below.

Table 3: Age group distribution of the study subjects by ocular morbidity

Ocular morbidity	5-10 years	11-16 years	P-value
Refractive error	137	117	0.747
Conjunctivitis	58	56	0.648
Vitamin A deficiency	63	63	0.495
Squint	49	42	0.865
Chalazion	27	62	<0.001
Cataract	7	14	0.070
Trauma	21	14	0.402
Corneal opacity	14	21	0.122
Stye	21	42	0.002
Congenital disorder	16	19	0.722
Color blindness	14	28	0.010

Discussion

In this cross sectional study total 30.7% (N=755) of students were having ocular morbidity and these results were consistent with various studies elsewhere [8, 9, 10]. On the other hand various other studies in India and outside India showed lower prevalence of ocular morbidity [11]. These variations probably are due to different socio economical, nutritional and geographical variations amongst study participants. We observed the much higher proportion of ocular morbidity in boys as compared to girls and there was a statistical significance in ocular morbidity with respect to gender (p<0.001). Study by Pankaj et al also observed the similar results. In this study we found there was significant higher incidence of ocular morbidity between the age group of 11 to 16 years (55.1%) as compared to group of 5 to 10 years (10). These results are consistent with the study by Rathod et al [12]. In present study ocular morbidity was high in Hindus as compared to other religion, this information is consistent with the ocular morbidity pattern seen in elsewhere [8, 13].

Table 4: Distribution of ocular morbidity with respect to age

Variable		5-10 years	11-16 years	P-value
Ocular morbidity	Present	337	418	<0.001
	Absent	1223	967	

Ocular morbidity was higher in government schools and students of who live in rural area as compare to private schools and students of urban area. Desai et al observed similar finding in the study where 12.9% of government schools students were having ocular morbidity while in private schools student was 9.8% [7]. This was probably due to the poor hygiene in the rural area and rate of malnutrition was high in the rural school students. In this study it was found that ocular morbidity was high in student belong to lower socioeconomical status (class V).

Table 5: Distribution of ocular morbidity with respect to locality

Ocular morbidity	Urban	Rural	P-value
Refractive error	51	203	<0.001
Conjunctivitis	19	95	<0.001
Vitamin A deficiency	46	80	0.700
Squint	49	42	0.509
Chalazion	40	49	0.017
Cataract	14	7	0.380
Trauma	14	21	0.038
Corneal opacity	28	07	0.006
Stye	42	21	0.125
Congenital disorder	14	21	0.038
Color blindness	35	07	<0.001

A significant association was found between mother's literacy and ocular morbidity. As it may be due to illiteracy may lead to poverty, ignorance and leading various diseases including ocular morbidity. Mother's literacy is more important as compared to father's literacy with respect to ocular morbidity as mother is usually with the child, looking after him, taking care in illness as compared to father. Refractive error was the major ocular morbidity (28%) observed in this study followed by the vitamin A deficiency and conjunctivitis. Studies from developed and developing countries quote the similar distribution of ocular morbidity [11, 14, 15].

Table 6: Demographic factors affecting Refractive error in school children

Variables Absent		Refractive error		P-value
		Present		
Gender	Boys	1549	165	0.022
	Girls	1142	89	
Place	Urban	1634	51	<0.001
	Rural	1057	203	

Religion	Hindu	2361	221	0.735
	Others	330	33	
Diet	Mixed	1973	196	0.183
	Veg	718	58	
Nutrition	Malnutrition	908	114	<0.001
	Normal	1783	140	
School	Private	1244	9	<0.001
	Government	1447	245	

Vitamin A deficiency was more in the students with vegetarians as (N=84) compared to students with mixed diet culture (N=42). A significant association was found between types of diet and ocular morbidity in school children (p<0.001).

Table 7: Demographic factors affecting Vitamin A deficiency in school children

Variables Absent		Vitamin A deficiency		P-value
		Present		
Gender	Boys	1609	105	<0.001
	Girls	1210	21	
Place	Urban	1615	70	0.700
	Rural	1204	56	
Religion	Hindu	2456	126	<0.001
	Others	363	0	
Diet	Mixed	2127	42	<0.001
	Veg	692	84	
Nutrition	Malnutrition	945	77	<0.001
	Normal	1874	49	
School	Private	1211	42	0.033
	Government	1608	84	

A study by Pankaj et al observed the prevalence of ocular morbidity among vegetarian students was 19.05% (24 out of 126) as compared to mixed diet i.e. 10.07% (110 out of 1031). The mixed diet contains non-vegetarian diet like meat, chicken which is rich source of nutrients specially vitamin A (10). In this study we found that vitamin A deficiency was more in malnourished students (N=77) and this result was consistent with results of the study by Deshpande et al [13]. There was a significant difference among students of under nutrition and normal nutrition with respect to the ocular morbidity (p<0.001).

Table 8: Demographic factors affecting Conjunctivitis in school children

Variables Absent		Conjunctivitis		P-value
		Present		
Gender	Boys	1642	72	0.274
	Girls	1189	42	
Place	Urban	1666	19	<0.001
	Rural	1165	95	
Religion	Hindu	2482	100	0.988
	Others	349	14	
Diet	Mixed	2084	85	0.822
	Veg	747	29	
Nutrition	Malnutrition	972	50	0.036
	Normal	1859	114	
School	Private	1250	3	<0.001
	Govt	1581	111	

Table 9: Multivariate analysis

Variables	Beta weight	S.E	df	P-value	OR	95% C.I for OR
Age (11-16 years)	0.476	0.087	1	0.000	1.6	1.3 to 1.9
Gender (Male)	-0.434	0.090	1	0.000	0.6	0.5 to 0.7
Religion (Hindu)	0.557	0.145	1	0.000	1.7	1.3 to 2.3
School (Govt)	0.961	0.093	1	0.000	2.6	2.1 to 3.1
Place (Rural)	0.217	0.100	1	0.029	1.2	1.0 to 1.5

All cases with signs of vitamin A deficiency were given therapeutic doses of vitamin A concentrate orally. All cases of inflammatory condition were advised and treated accordingly. Vision could be corrected to 6/6 in most of the cases with defective visual acuity. In the cases with refractive error, correcting glasses were prescribed after performing post-mydriatic test.

Conclusion

In our study we found that refractive error was the most common ocular morbidity in school going children followed by vitamin A deficiency and conjunctivitis. Ocular morbidity was more common in children of rural area and those studying in government school and belong to class V socioeconomical status. In this study we observed that Age (11-16years), Place (rural), School (government), Religion (Hindu) and Gender (male) where independent risk factor of ocular morbidity in school going children. Majority of the ocular diseases observed were either preventable or treatable. If these morbidities are not attended at the right time they may progress to severe disabilities or blindness and may also affect the child's performance in the school. A total approach in a school eye health program must include teacher orientation and health education of children in addition to screening for eye diseases. Periodic screening of school children is very essential in every locality to improve the quality of eyesight and enhance the children's scholastic performance.

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