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Original Article

PREVALENCE OF OCULAR MORBIDITIES AMONG SCHOOL CHILDREN IN RURAL AREA OF NORTH MAHARASHTRA IN INDIA

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ABSTRACT

The global initiative for the Elimination of Avoidable Blindness sets a major challenge to work relentlessly to avoid the preventable blindness. Effective methods of vision screening in school children are useful in detecting correctable causes of decreased vision. Present study was conducted with the objective of estimating the prevalence of ocular morbidity among school children in rural area. A cross sectional study was conducted among school going adolescents studying from 5th to 10th standard in the age group 10-16 years in rural area. The ocular examination of school children was done at the respective schools. All the data obtained was analyzed using the software StatistiXL version 1.8. Chi square test was used to observe the association of the ocular morbidities with respect to age, sex, education of father, occupation, class, and nutritional status. Prevalence of ocular morbidities was found to be 27.65 %. Refractive errors and Vitamin A deficiency were the most common ocular disorders. The prevalence of ocular morbidity showed significant association with socio-economic status ($\chi 2=29.8$, $p<0.001$), education and occupation of parents, while no significant association was found between ocular morbidity and sex of the school children ($\chi 2=0.162$, $p=0.687$), family type ($\chi 2=2.41$, $p=0.121$), and religion ($\chi 2=6.77$, $p=0.08$) of the school children. Nutritional status of children was significantly associated with the occurrence of ocular morbidity. High prevalence of ocular morbidity among school children in rural area was observed. Periodic screening of school children is very essential to improve the quality of eye-sight.

Key-words: Ocular morbidity, prevalence, school children

INTRODUCTION

A study of the pattern of ocular diseases in children is very important because, while some eye conditions are just causes of ocular morbidity, others invariably lead to blindness. Also while some conditions such as refractive errors and cataract are treatable others like measles and vitamin A deficiency are largely preventable.[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. Effective methods of vision screening in school children are useful in detecting correctable causes of decreased vision, especially refractive errors and in minimizing long-term visual disability. Children in the school-going age group (6-16 years) represent 25% of the population in the developing countries. [2] They fall best in the preventable blindness age group, are a controlled population that is, they belong

to a certain age group and are easily accessible and schools are the best forum for imparting health education to the children. Refractive errors have been listed, along with cataract, trachoma, onchocerciasis and childhood blindness, among eye problems whose prevention and cure should provide enormous savings and facilitate societal developments.[3] 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.[4] Information on epidemiology of ophthalmologic problems is available from various countries across the world including several parts of India. In India, most of the data are from urban area and very few from rural areas. Hence, present study was conducted with the objective of estimating the prevalence of ocular morbidity among school children in rural area of north Maharashtra in India.

MATERIAL METHODS

A cross sectional study was conducted among school going adolescents studying from 5th to 10th standard in the age group 10-16 years in field practice area of the department of Community Medicine of tertiary care teaching Hospital. Sample size was calculated by using formula $4pq/L^2$. Prevalence of ocular morbidity in previous study from rural area of India was 40.65. [5] Considering p=40, q=60 and allowable error (L) =10 % of p, required sample size was 600 for the present study. Hence two schools (total school children= 645) were selected out of five schools in this rural area. All school children were selected as study subjects those who were present on that day. A total of 622 school children (348 boys and 274 girls) were examined, representing 96.43% of the total school children. Informed consent from the parents of students was obtained with the assistance of school heads through their class teachers**.** The purpose of study was informed and explained to the children.

The data collection instrument was a pretested structured questionnaire. The Preliminary examination of school children was done at the respective schools. Detailed history, including family history, about the current problems and past problem was recorded. Beside the socioeconomic and demographic factors; Height and weight of the child was noted. Height was measured to the nearest 0.5 cm using a portable stadiometer. Weight was measured using an electronic weighing balance, to the nearest 0.1 kg. Body mass index for adolescents based on percentile was used to determine the nutritional status and its effect on occurrence of ocular morbidity. According to that criteria, school children were classified as Underweight- <5th percentile of body mass index (BMI), Normal weight- >5th to <85th percentile of BMI, Overweight- >85th to <95th percentile of BMI, and Obese- >95th percentile of BMI. [6]

Ishihara's isochromatic chart was used to identify the cases of red-green color blindness. Modified Prasad`s classification was used to calculate socio-economic class. [7] Examinations were performed in the respective school compounds. The visual acuity was tested by Snellen's chart for far vision keeping it at six meters distance from the subjects, and near vision was tested with the help of Jaeger's chart keeping the distance of 25-30cm from the eyes of the subjects. In cases of poor visual acuity (<6/9), a pinhole vision was taken to differentiate refractive errors from posterior chamber pathology. Visual acuity of 6/9 in any one eye was taken as a sign of visual impairment. The refractive errors were screened. Children with visual acuity of 6/9 to 6/18, 6/24 to 6/60 and less than 6/60 in the better eye were categorized as having mild visual impairment, moderate visual impairment and severely visually handicapped respectively. The subjects who had visual acuity equal or less than 6/12 and other ocular problems were referred. Examination of the eyelid margins and cilia, bulbar and tarsal conjunctivae, the cornea and anterior segment was done using a pen-torch and a 2x magnifying loupe. Latent squint was diagnosed by cover-uncover test. ICD-10 codes were used for the purpose of classification of diseases. A short talk supported by charts, posters, audio and audiovisual tapes, etc, regarding eye health education was given to children after general and ophthalmic examination.

Statistical Analysis: All the data obtained was entered into Microsoft Excel and analyzed using the software StatistiXL version 1.8. Data are expressed as means±SDs for continuous variables and as frequencies and percentages for categorical variables. Contingency Chi square test was used to observe the association of the ocular morbidities with respect to age, sex, education of father, occupation, class, and

nutritional status, p-value <0.05 was considered significant.

RESULT

Table 1: Socio-demographic profile of school going children

Variables	No. (n=622)	%
Boys	348	55.95
Girls	274	44.05
Socio-economic status		
Class I	46	7.40
Class II	145	23.31
Class III	167	26.85
Class IV	187	30.06
Class V	77	12.38
Type of family		
Nuclear	262	42.12
Joint	360	57.88
Education of mother		
Illiterate	23	3.7
Primary	219	35.2
Secondary	165	26.52
Higher secondary	105	16.89
Graduate & more	110	17.69
Education of father		
Illiterate	14	2.25
Primary	196	31.50
Secondary	121	19.45
Higher secondary	141	22.70
Graduate& more	150	24.10
Occupation of Parents		
Cultivators/farmers	231	37.13
Landless Labourers	142	22.83
Service (Private/Government)	174	27.99
Others	75	12.05
Religion		
Hindu	472	75.89
Muslim	111	17.85
Christian	18	2.89
Others	21	3.37
Nutritional status		
Underweight- <5th percentile of BMI	180	28.94
Overweight- >85th to <95th percentile of BMI	94	15.12
Obese- >95th percentile of BMI.	18	2.89
Normal	330	53.05

The age of the subjects ranged from 10 years to 16 years with mean age 13.5 ±1.7 years. The total number of schools children were 622 (348 boys and 274 girls) from grade six to grade ten. Ocular morbidities were observed in a total of 172 (27.65%) students. Very few of the students examined complained of eye problems like itching, watering of eyes, redness of eyes and blurring of vision while others were not even aware that they had eye problems.

Uncorrected refractive errors constituted the most important cause of subnormal vision. The commonest cause of ocular morbidity in the present study was refractive errors with a prevalence of 10.12%. Among the children with refractive errors, mild visual impairment was seen in 79% of children, while moderate and severe visual impairment were seen in 19 % and 2 % of children respectively. Out of 63 children with refractive errors, 27(42.85%) children were using spectacles. Vitamin A deficiency was the second common ocular disorder seen in 44 (25.58 %) students. Out of the 44 cases of vitamin A deficiency 22(50%) school children were having Bitots spot, 19(43.19%) were having conjuctival xerosis and 3(6.81 %) were having night blindness. Blepharitis (eyelid abnormalities) was observed in 6 (0.96%) children. External eye conditions such as Chalazion (2.90%) Stye (1.74%), Ptosis (0.58%), and were also observed in few school children.

The prevalence of ocular morbidity showed significant association with socio-economic status ($\chi2=29.8$, $p<0.001$), education and occupation of parents, while no significant association was found between ocular morbidity and sex of the school children ($\chi2=0.162$, $p=0.687$), family type ($\chi2=2.41$, $p=0.121$), and religion ($\chi2=6.77$, $p=0.08$) of the school children. (Table 3) Nutritional status of children was significantly associated with the occurrence of ocular morbidity. ($\chi2=5.24$, $p=0.02$)

DISCUSSION

The morbidity in any survey depends a lot on the surveyed areas and calculations based on such surveys may not be applicable to another area. However, such local surveys are useful in assessing the overall disease pattern of the country. Children and adolescents comprise a major proportion of Indian population and are important as they are the future of country's development. A study of the pattern of ocular diseases in children is very important because while some eye conditions are just causes of

ocular morbidity, others invariably lead to blindness. An ungainly aspect in the natural history of blinding diseases is that people generally tend to ignore their symptoms until it is too late. Childhood eye disorders can contribute to the burden of blindness in a society. The majority of the causes for ocular morbidity, sub-normal and low vision as well as blindness were either preventable or treatable.

Table 2: Distribution of ocular morbidity amongst school going children

Ocular morbidity	ICD Code	Boys (%) N=94	Girls (%) N=78	Total (%) 172
Refractive errors	H 52.7	38(40.42)	25(32.05)	63(36.62)
Vitamin A Deficiency	E 50	21(22.34)	23(29.48)	44(25.58)
Conjunctivitis	H 10.9	7(7.44)	9(11.53)	16(9.30)
Squint	H 50.9	5(5.31)	6(7.69)	11(6.39)
Injury	S 05	5(5.31)	1(1.28)	6(3.48)
Blepharitis	H 01.0	4(4.25)	2(2.56)	6(3.48)
Pterygium	H11.009	2(2.12)	3(3.84)	5(2.90)
Chalazion	H 00.1	3(3.19)	2(2.56)	5(2.90)
Trachoma	A 71.9	2(2.12)	3(3.84)	5(2.90)
Color blindness	H 53.5	2(2.12)	1(1.28)	3(1.74)
Subconjunctival haemorrhage	H 11.3	2(2.12)	1(1.28)	3(1.74)
Stye	H 00.0	2(2.12)	1(1.28)	3(1.74)
Corneal opacity	H 17.9	1(1.06)	-	1(0.58)
Ptosis	H02.409	-	1(1.28)	1(0.58)

In this study the prevalence of ocular morbidities was found to be 27.65 %. Another study reported a similar prevalence of 26.5 per cent among school children in north India. [8] However, a school based study in rural Delhi reported that more than 40 per cent of the children had one or more eye diseases. [5] In a study from rural area of Tanzania, Africa lower prevalence of 15.6% of ocular morbidity was reported in children aged 7-19 years. [9] The difference may be due to different study areas. The commonest cause of ocular morbidity in the present study was refractive errors with a prevalence of 10.12%. Refractive error is one of the most common causes of visual impairment around the world and the second leading cause of treatable blindness. [10] Similar prevalence of refractive errors has been observed among children of 12-17 years in Ahmadabad city. [11] In another study from South India, higher (32%) prevalence rate of refractive errors among school children of age 3-18 years as compared to the present study was observed. [12] Out of 63 children with refractive errors, 27(42.85%) children were using spectacles the rest were not aware of the presence of the problem. Barriers to the use of corrective spectacles include: parental awareness of the vision problem, attitudes regarding the need for spectacles, spectacle cost, cosmetic appearance, and concerns that wearing glasses may cause progression of refractive error. [13] From a public health perspective; vision screening is an appropriate strategy to reduce vision impairment. Most of this impairment is caused by refractive error, for which treatment is simple, effective, and inexpensive. In the present study, the prevalence of night blindness (0.48%) does not exceed WHO standards but the prevalence of Bitot`s spot (3.53%) suggests a public health problem of vitamin A deficiency as per the WHO criteria. [14]

In the present study (10 to 16 years) prevalence of conjunctivitis was 2.57%. Slightly higher prevalence has been reported by Kumar R et al (2004) who observed 4.6% prevalence in urban and rural school children (5-14 yrs) of Delhi. [15] Trivedi et al (2006) observed 5.1% prevalence in children (7-15 yrs) of urban and rural areas of Gujarat. [16] Higher prevalence of conjunctivitis has been reported in other part of India. [17] The difference in prevalence in these studies may be due to seasonal variation of conjunctivitis, variation may also occur because of short duration of the illness. In present study; prevalence of trachoma was 0.8%. It seems that trachoma ceases to be an important cause for blindness. There was also an association between the occurrence of ocular disorders and the lower socio-economic class, which had higher prevalence of ocular disorders ($p < 0.001$).

Table 3: Association of ocular morbidity

Variables	Ocular morbidity		Total(n=622)	χ2 value	p value
	Yes	No			
Sex					
Boys	94(15.11)	254(40.83)	348(55.94)	0.162	0.687
Girls	78(12.54)	196(31.51)	274(44.06)		
Socio-economic status					
Class I	22(3.53)	24(3.85)	46(7.39)	29.8	<0.001
Class II	34(5.46)	111(17.84)	145(23.31)		
Class III	27(4.34)	140(22.50)	167(26.84)		
Class IV	57(9.16)	130(20.90)	187(30.06)		
Class V	32(5.14)	45(7.23)	77(12.37)		
Type of family					
Nuclear	81(13.02)	181(29.09)	262(42.12)	2.41	0.121
Joint	91(14.63)	269(43.24)	360(57.87)		
Education of mother					
Illiterate	12(1.92)	11(1.76)	23(3.69)	40.9	<0.001
Primary	35(5.62)	184(29.5)	219(35.2)		
Secondary	47(7.55)	118(18.97)	165(26.52)		
Higher secondary	49(7.87)	56(9)	105(16.88)		
Graduate & more	29(4.66)	81(13.02)	110(17.68)		
Education of father					
Illiterate	09(1.44)	05(0.08)	14(2.25)	38.8	<0.001
Primary	43(6.91)	153(24.59)	196(31.51)		
Secondary	55(8.84)	66(10.61)	121(19.45)		
Higher secondary	38(6.10)	103(16.55)	141(22.66)		
Graduate and more	27(4.34)	123(19.77)	150(24.11)		
Occupation of Parents					
Cultivators/farmers	48(7.71)	183(29.42)	231(37.13)	14.21	0.003
Landless Labourers	53(8.52)	89(14.30)	142(22.82)		
Service (Private/Government)	45(7.23)	129(20.73)	174(27.97)		
Others	26(4.18)	49(7.87)	75(12.05)		
Nutritional status					
Normal	104(16.72)	226(36.33)	330(53.05)	5.24	0.022
Malnutrition	68(10.93)	224(36.01)	292(46.94)		
Religion					
Hindu	129(20.73)	343(55.14)	472(75.88)	6.77	0.08
Muslim	38(6.10)	73(11.73)	111(17.84)		
Christian	2(0.32)	16(2.57)	18(2.89)		
Others	3(0.48)	18(2.89)	21(3.37)		

Vitamin A deficiency was highest among lower socio-economic class. The father's occupational status, which is an index of socio-economic status, showed significant relationship to the occurrence of ocular diseases amongst the students. Table 3 illustrates a significant decreasing prevalence of ocular diseases as one climbs up the socio-economic ladder ($p < 0.001$). This may be due to better economic stability of medium and higher class which ultimately leads to improved nutrition and hygiene of the adolescents. There was significant association found between parents` education and development of ocular morbidity. Similar to present study, Dandona et al (2002) found a significant association between father's education and prevalence of refractive error. [18] Among 622 children, 180(28.94%) children were underweight-- <5th percentile of BMI. A significant association was found between malnourished children and ocular morbidity. Ahmed F et al (2006) have reported similar observations in their study among school adolescents. [19]

Eye care needs special emphasis in so far as visual impairment, and eye disorders with

blinding potential need to be detected and remedied in time, as they would not only affect the learning abilities of the child, but may lead to permanent disablements.

CONCLUSION

It was concluded that high prevalence of ocular morbidity among school children was observed in rural area of north Maharashtra in India. Refractive errors and Vitamin A deficiency were the most common ocular disorders. Prevention, early recognition and prompt treatment of ocular diseases by regular screening of students would definitely reduce ocular morbidity so that they can attain their full potential in the course of their education. Periodic screening of school children is very essential to improve the quality of eye-sight.

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