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Research article

Prevalence of ocular morbidity among school going children (6-15years) in rural area of Karnataka, South India

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ABSTRACT

Background: School children are affected by various eye disorders like refractive errors, squint, Vitamin A deficiency and eye infections. Most children do not complain of defective vision, as they may not recognize such conditions as a problem. Uncorrected refractive errors form the primary cause for visual impairment and blindness in India. This warrants early detection and treatment of these problems to prevent future blindness. **Aims**: The study was conducted with the objective of estimating the prevalence of ocular problems among school going children in rural area and to create 'eye-health awareness' among them. **Method:** This was a cross-sectional study of school children of two schools in rural area of Karnataka state. The students were screened for eye disorders by visual acuity testing, anterior segment torch light examination and fundus examination with undilated pupil. Those children identified with ocular disorders were subjected for detailed examination at our tertiary care hospital. **Results:** A total of 1300 children were examined. The prevalence of ocular morbidity was 44.77%. Vitamin A deficiency was the commonest morbidity (33.8%) and uncorrected refractive error was the second commonest morbid condition (5.6%). **Conclusion**: Ocular disorders among school going children can be easily identified by regular eye screening programmes, promptly treated can be protected from future complications and childhood blindness can be prevented. The eye health awareness among children and school teachers should be improved.

Key words: Eye screening, ocular disorders, refractive errors, rural area, school children

1. INTRODUCTION

School health is an important aspect of any community health program. The school age is a formative period, physically as well as mentally, transforming the child into a promising adult. Health habits formed at this age will be carried to adult age, old age and even to the next generation. Poor vision in childhood affects performance in school and has negative influence on the future life of the child. Integration of vision screening and refractive services for school student with screening for health issues is recommended by World Health Organization [1,2]. The relationship between scholastic performance and health status of children, in particular, eye and ear health is well established.

School children are affected by various eye disorders like refractive errors, squint, Vitamin A deficiency and eye infections. Uncorrected refractive errors form one of the important causes of visual impairment and blindness in most developing countries including India. This along with Vitamin A deficiency forms a major preventable cause of blindness in the young age group i.e. <20years. Considering the fact that 30% of India's blind lose their sight before the age of 20years, the importance of early detection and treatment of ocular morbidity and visual impairment in young children is obvious [3].

Children do not complain of defective vision, and may not even be aware of the condition. They try adjusting to the problem of defective vision by sitting in the front benches, holding the books close to their eyes, squeezing the eyes. This is my self experience during school days and it was only because of my teacher who brought it to my parents' notice that I got examined and treated with spectacle correction.

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The earliest signs of refractive errors are strainful eyes with or without redness by evening, with watering and headache. These complaints of the child to the parents go unnoticed due to lack of awareness, more so in the rural areas.

This warrants early detection and treatment of ocular problems to prevent future blindness. Effective methods of vision screening in school children are useful in detecting correctable causes of decreased vision, especially refractive errors [4].

School children form a sizeable segment of the community. Children in school going age group (6-15years) represent 25% of the population in developing countries [5]. They are easily accessible and schools are the best forum for imparting health education to the children. Schools are also one of the best centres for effectively implementing the comprehensive eye health care programme [4]. The importance of visual acuity was identified for the first time in United States during Second World War [6] and in India; Mukherjee *et al* [7] stated the importance of early detection and treatment of refractive errors to prevent permanent disability.

Magnitude and causes of uncorrected refractive errors differ in the urban and rural areas of India. Therefore refractive eye services are to be modified according to the situation in various areas of developing countries [8].

More over data about these ocular problems are not available in this rural part of our country. Hence the study was conducted with the primary objective of assessing the prevalence of ocular problems among school going children in rural area, secondarily to provide appropriate treatment and also to create 'eye-health awareness' among school children in rural area.

2. MATERIALS AND METHODS

2.1. Sample size

A pilot study was conducted to estimate the prevalence of ocular morbidity among school children. The prevalence was 25% in the pilot study. Sample size was calculated by using the formula $4pq/L^2$. Considering p=25, q=75 and allowable error (L) =10% of p, required sample size was 1200 for the study. Adding 10% to the allowable error we arrived at a final sample size of 1320. Hence two schools were selected randomly of the six schools in the field practice area of Department of Community Medicine, Sri Devaraj Urs Medical College, Kolar with student strength of 715 and 605.

2.2. Study setting

All the students in the two schools were included in the study considering the absentees on the days of examination. The principals and teachers of the schools were informed and explained about the study and permission for the visit was obtained in advance. Official written permission to conduct study was also taken. The principals in turn communicated to the parents and written consent was taken in their school diaries. They were ensured strict confidentiality and informed consent was taken from each participant.

2.3. Study design

It was a cross sectional study in two stages. In the first stage the general data regarding the age, sex, address, parents, was collected using a pre-tested structured questionnaire. Information was obtained from the children in the local language and entered in English language in the questionnaire. The students were screened for eye disorders by visual acuity testing, anterior segment torch light examination and fundus examination with undilated pupil. Visual acuity was assessed using Snellen's chart; color blindness was checked by using Ishihara's chart. Vitamin A deficiency was diagnosed if there was history of night blindness, or on examination there were signs of conjunctival xerosis, Bitot's spots, corneal xerosis, or keratomalacia. Examinations were performed in the schools. All the children present at the time of visit were examined. Those children absent were informed about the same and made to undergo examination on a scheduled day. This eye screening was performed at the school itself by the doctors who were trained with the requisite skills by an eye specialist (ophthalmologist) at our hospital.

In the second stage those children identified with ocular disorders were subjected for detailed examination at our tertiary care hospital by specialists on a scheduled day for further evaluation, classification and quantification of types of ocular problems, appropriate medical treatment and suitable spectacle correction.

The data was analyzed using EpiInfo. The chi-square test was used to test differences in proportions. The difference was considered to be statistically significant if $p<0.05$.

3. RESULTS

A total of 1300 children (20 students were absent in spite of our persistent efforts) were examined for ocular morbidity belonging to two schools.

Table1
Gender distribution of assessed children in the schools

Gender	Total	Percentage
Males	790	60.77
Females	510	39.23
Total	1300	100

Table2
Distribution of children according to age groups

Age group	Total	Percentage
6-10years	690	53.08
11-12years	350	26.92
13-15years	260	20.00
Total	1300	100.00

Table 1 shows the gender distribution of the study population. The overall proportion of boys (60.77%) was more compared to that of girls (39.23%). Table 2 shows that the proportion of children in younger age groups was more compared to older age groups. Table 3 shows proportion of ocular morbidity among study population. Vitamin A deficiency was the chief morbidity among the children (33.8%) followed by refractive errors (5.6%) and conjunctivitis (2.3%). The least problem was squint of 0.7%. Table 4 shows that ocular morbidity was least among primary school children (41.3%) followed by middle school and high school children with 42.9% and 56.5%, respectively.

Table 3
Distribution of ocular morbidities among study group

Ocular morbidities	Total	Percentage
Vitamin A Deficiency	439	33.77
Refractive Error	72	5.54
Conjunctivitis	30	2.31
Squint	08	0.61
External Hordeolum	17	1.31
Blepharitis	16	1.23
No problem	718	55.23
TotalMorbid	582/1300	44.77

Table 4
Distribution of Ocular morbidities according to age groups

Ocular Morbidities	6-9years Primary school	10-12years Middle school	13-15years High school	Total
Vitamin A deficiency	253	110	76	439
Refractive error	07	20	45	72
Conjunctivitis	10	07	13	30
Squint	04	02	02	8
External Hordeolum	08	04	05	17
Blepharitis	03	07	06	16
Total	285	150	147	582
Overall morbidity	285/690 (41.3%)	150/350 (42.9%)	147/260 (56.5%)	582/1300 (44.77%)

Table 5
Ocular morbidities of school children according to Gender

Ocular morbidities	Boys (%)	Girls (%)	Total
Vitamin A deficiency	190(24.05)	249(81.11)	439
Refractive error	40(5.06)	32(10.42)	72
Conjunctivitis	18(2.28)	12(3.91)	30
Squint	05(0.63)	03(0.98)	08
External Hordeolum	12(1.52)	05(1.63)	17
Blepharitis	10(1.27)	06(1.95)	16
No problem	515(65.19)	203(39.80)	718
Total morbid	275/790 (34.81)	307/510 (60.20)	582/1300 (44.77)

Vitamin A deficiency was highest in the primary school children (57.3%) and least among high school children (17.3%). This difference was found to be not statistically significant. On the contrary refractive error increased as age increased i.e. 9.7% among primary school, 27.8% among middle school and a maximum of 62.5% among high school children. This was highly significant statistically (χ^2=95.85, p<0.001). Middle school children were least affected with conjunctivitis and external hordeolum. Table 5 shows that total ocular morbidity was more among girls (60.20%) as compared to the boys (34.81%). Vitamin A deficiency was commonest among both boys and girls and was more among the girls (56.72%) as compared to the boys (43.28%). This difference was highly significant (χ^2=85.04, p<0.001). Refractive errors were slightly more among the boys (55.56%) as compared to girls (44.44%). This difference was not statistically significant.

4. DISCUSSION

The present study shows high prevalence of ocular morbidity among school children in rural areas. This shows the need to implement the eye checkup compulsorily in the school health appraisal programme.

In the present study, prevalence of ocular morbidity was 44.77% comparable to the one reported by Chaturvedi *et al* (more than 40%) in rural Delhi [9] and Kalikivayi *et al* (43.5%) at Hyderabad [10] but a lower prevalence was reported by Rajesh Kumar *et al* (24.6%) from Delhi [11], Jayanth D and Malathi K (27.65%) from rural Maharashtra [12] and Madhu Gupta and others (31.6%) from Shimla [13]. Least prevalence of 13% was reported by Prajapati P *et al* among adolescents of Gandhinagar district [3] and 15.6% by Wedner SH *et al* in rural Tanzania [14]. The prevalence of ocular morbidity varies at different places due to different factors prevailing at different places.

Vitamin A deficiency was the commonest ocular morbidity (33.8%) which manifested as bitot spots and conjunctival xerosis. In a study at rural north Mahrashtra by Jayant D and Malathi, 25.58% Vitamin A deficiency was reported [12] and 29.3% was noted by Prajapati *et al* at Gandhinagar [3]. MausamiBasu *et al* reported 11.83% of conjunctival xerosis among students at Surat [15] and Bhattacharya *et al* observed 8.16% Vitamin A deficiency among primary school students in Darjeeling district [16] but S.Mahapatro *et al* noted least prevalence 2.25% Vitamin A deficiency in Bhubanesar [17].

In the present study, Vitamin A deficiency was more among primary school children and decreased as they reached high school. This was probably due to better eating habits as the child grew up. The reason for high prevalence of Vitamin A deficiency in our study may be that the study was done in rural area where majority of them belonged to low socioeconomic status and also under nutrition was seen.

Vitamin A deficiency manifestations in eye were more among girls as compared to boys which was highly significant statistically (p<0.001). This may be due to the fact that male children are given more importance with respect to diet in terms of types of food given.

Uncorrected refractive error was the second common morbid condition (5.6%) among the children comparable to the study by Jayant D and Malathi K in rural Maharashtra [12] and S Mahapatro *et al* at Bhubanesar [17]. Madhu Gupta *et al* at Shimla had identified refractive error as the commonest morbidity among children (22%) [13] in their study and Prajapati *et al* also had observed it as the commonest with a prevalence of 40.1% in their study at Gandhinagar [3]. Higher prevalence of refractive error of 32% has been reported by Kalikivayi in a study from South India [10] and 61% among children in rural population of India by Dandona R *et al* [18]. In a study at Pune among adolescent school children Col ADatta *et al* noted 21.19% of refractive error [19].

In our study, refractive error increased with age and this was statistically significant. Similar pattern has been noted by S Mahapatro *et al* at Bhubanesar [17] and also by Goh PP *et al* in Malaysia [20]. Screening for refractive errors is an integral part of School health problem. Unfortunately it is not taken seriously and children suffering with refractive errors are still high.

Prevalence of conjunctivitis was 2.3% in our study, similar to the one reported by Jayant D and Malathi K (2.57%) at rural Maharashtra [12], but more than that studied in Shimla (0.8%) by Madhu Gupta *et al* [13] and less than that by Prajapati (3.8%) *et al* at Gandhinagar [3], and Kumar R *et al* (4.6%) in urban and rural Delhi [21]. This high prevalence may be explained by the fact that most of the children were from lower socioeconomic status and so more likely for the poor personal hygiene.

The study showed an increase in morbidity with age. This may be due to the fact that the dropout rate from school was high due to poverty, and refractive error related to habits like prolonged study hours, watching television, increased bad reading posture and hygienic practice related problems like blepharitis, external hordeolum also increased.

5. CONCLUSIONS

The study clearly indicates the prevalence of ocular morbidity among school going children in rural Karnataka, India is high. Vitamin A deficiency and refractive errors are the most common ocular disorders identified which are the preventable and treatable causes of childhood blindness and visual impairment identified by the World Health Organization under Vision 2020 programme. Both these conditions can be easily identified by regular eye screening programmes and promptly treated so that the future citizens of our country are protected from becoming blind. The awareness among school teachers should also be improved and they should play an active role in identifying the ocular problems and referring them for timely management.

Lastly, it is high time that we identify one month in a year and designate it as "Child's Eye Health and Safety Month" to conduct eye screening for morbidities among school children, their management and to spread awareness regarding Eye Health.In India importance is given when a program is conducted in a campaign mode, but when it is integrated into regular health services the programme loses its importance. A strict monitoring of school health programme has to be implemented with accountability and suitable action needs to be taken.

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