

Original Article

Ocular Morbidity in School going Children of Kolar District, South India

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ABSTRACT

Background: Prevalence of blindness in children is estimated to be around 1.25/1000 in rural and 0.53/1000 in urban areas. School eye screening children is useful in detecting correctable causes of decreased vision, especially refractive errors and minimizing long-term visual disability. This information is important in planning eye care programs to reduce the burden of visual impairment among them. Our school eye health survey was implemented with the aim of prevention of blindness by early detection and treatment of eye health problems.

Materials and Methods: In this study 2680 children, aged 6-16 years from schools were screened for detecting ophthalmic problems. SPSS software and the Chi-square test were used for statistical analysis.

Results: Prevalence of ocular morbidities was 13.32%, among them refractive errors were 89.63%, allergic conjunctivitis 5.88%, Vitamin-A deficiency 5.6%, squint 3.92%, lid infections 3.64%, and amblyopia 2.24%. On correction 93.75% children improved to normal vision. Prevalence of allergic conjunctivitis and lid infections were significantly more in government schools ($P < 0.05$).

Conclusion: Refractive errors were the most common ocular morbidity followed by allergic conjunctivitis and Vitamin A deficiency. Identifying and treating these children along with health education and awareness about hygienic eye care will reduce the visual morbidity.

KEYWORDS: Ocular morbidity, School children, Health education

INTRODUCTION

Eyes are the most treasured organ of human beings. Of the 1.4 million blind children in the world, 1 million live in Asia. The prevalence ranges from 0.3/1000 children in affluent countries to 1.5/1000 children in very poor communities.^[1]

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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 eye sight.^[2] 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.^[3]

Globally refractive error is one of the most common causes of visual impairment and second leading cause of treatable blindness.^[4]

Population based studies have estimated the prevalence for blindness as 1.25 per 1000

children in rural and 0.53 in urban areas in age group of 5-15 years.^[5,6] But population based data concerning the prevalence of visual impairment due to uncorrected refractive errors and ocular diseases in adolescents not readily available.

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. The majority of blindness is either potentially preventable or curable.

Our school eye health survey was implemented with the aim of prevention of blindness by early detection and treatment of visual defects and eye health problems in school going children with components of health education. This paper describes the salient features of our programme and the results of our cross sectional study to determine the ocular morbidity pattern in school going children of Kolar.

MATERIALS AND METHODS

In this study two government and two private coeducational schools were selected randomly with proportionate representation from each category of schools. All the children from first standard to tenth standard (aged 5-16 years) were included in the study from the respective schools.

Ophthalmic examination included visual acuity, general external examination including motility and squint, anterior segment evaluation and an undilated fundus evaluation (done with a direct ophthalmoscope) in all eyes wherever possible. Visual acuity was measured at 6 m by ophthalmic technician using Snellen's chart and

'E' type chart, recorded as the smallest line read with one or no errors. Improvement with pin-hole was recorded if any. The cut-off of uncorrected visual acuity for defining refractive error, was taken as visual acuity of $<6/6$, in the worst eye.

All children presenting with visual acuity less than $6/6$ in either eye or any ocular pathology were subjected to detailed examination with help of slit lamp biomicroscopy and dilated fundus evaluation.

Pupils were dilated with 1% cyclopentolate for patients with visual acuity of $<6/6$ in either eye. Retinoscopy was done by a refractionist using a streak retinoscope. Dilated fundus examination was done by ophthalmologist. Patients who had refractive error were called for post mydriatic testing. Myopia was defined as spherical equivalent of at least $-0.50D$, hypermetropia as $+0.50D$ and astigmatism as cylindrical equivalent of at least $-0.5/+0.5$.^[7]

Drugs were dispensed to the needy patients at the end of examination. Children with documented strabismus and ptosis were evaluated and counseled for appropriate surgery where needed.

Glasses were prescribed to children with refractive error. Children having severe visual impairment not improving with glasses were counseled.

The data was analyzed using SPSS statistical software. The Chi-square test was used to test differences in proportions, considered significant at 5% level.

Our study was approved by the Ethics committee of our college and followed the tenets

of Declaration of Helsinki.

RESULTS

A total of 2680 children from 4 different schools (1115 in government and 1565 in private schools) were examined. Boys (53.0%) and girls (47.0%) had almost equal representation in

private schools, while it was 60.7% and 39.3% respectively in government schools (Table 1).

Overall prevalence of ocular morbidity among school children of age 5-16 years was 13.3% (n=357). Among the children having ocular morbidity, refractive errors (89.6%) constituted the major cause of ocular morbidity followed by

Table 1. Gender wise breakdown of students in selected Schools

Schools	Boys (%)	Girls (%)	Total (%)
Government Schools			
Janta School	508(63.2)	296(36.8)	804
Gokul School	169(54.3)	142(45.7)	311
Total	677(60.7)	438(39.3)	1115
Private Schools			
RLJ School	431(53.6)	373(46.4)	804
Vidya Jyothi School	398(52.3)	363(47.7)	761
Total	829(53.0)	736(47.0)	1565

Table 2. Prevalence of ocular morbidity in Government and Private Schools

Ocular Morbidity	Government	Private	Total	Confidence Interval at 95%	Chisquare value	p value
Refractive Error	135(12.1)	185(11.8)	320(11.9)	10.77 - 13.22	0.05	0.82
Conjunctivitis	18(1.6)	3(0.2)	21(0.8)	0.51 - 1.19	16.95	<.001***
Vitamin A Deficiency	15(1.3)	5(0.3)	20(0.7)	0.48 - 1.15	9.25	0.002**
Squint	11(1.0)	3(0.2)	14(0.5)	0.31 - 0.87	5.92	0.06
Blepharitis	12(1.1)	1(0.1)	13(0.5)	0.28 - 0.83	13.82	<.001***
Amblyopia	7(0.6)	1(0.1)	8(0.3)	0.15 - 0.59	6.96	<.01**
Congenital anomalies	2(0.2)	0(0)	2(0.1)	0.02 - 0.27	2.81	0.17
Others	8(0.7)	2(0.1)	10(0.4)	0.2 - 0.69	6.09	0.02
Total	153(13.7)	204(13.1)	357(13.3)	12.09 - 14.66	0.27	0.61

Table 3. Gender-wise distribution of ocular morbidity

Ocular Morbidity	Boys	Girls	Total	Confidence Interval at 95%	Chi square value	p value
Refractive Error	182(12.1)	138(11.7)	320(11.9)	10.77 - 13.22	0.07	0.79
Conjunctivitis	15(1.0)	6(0.5)	21(0.8)	0.51 - 1.19	2	0.16
Vitamin A Deficiency	10(0.7)	10(0.9)	20(0.7)	0.48 - 1.15	0.13	0.72
Squint	9(0.6)	5(0.4)	14(0.5)	0.31 - 0.87	0.37	0.54
Blepharitis	9(0.6)	4(0.3)	13(0.5)	0.28 - 0.83	0.9	0.34
Amblyopia	2(0.1)	6(0.5)	8(0.3)	0.15 - 0.59	3.17	<.05*
Congenital anomalies	2(0.1)	0(0)	2(0.1)	0.02 - 0.27	1.56	0.3
Others	3(0.2)	7(0.6)	10(0.4)	0.2 - 0.69	2.8	0.09
Total	203(13.5)	154(13.1)	357(13.3)	12.09 - 14.66	0.07	0.78

Table 4. Age-wise ocular morbidity in government and private schools

	GOVERNMENT SCHOOLS					PRIVATE SCHOOLS				
	5 to 7	8 to 10	11 to 13	14 to 16	P value	5 to 7	8 to 10	11 to 13	14 to 16	P value
N	214	241	297	363		307	388	379	491	
Refractive Error	27(12.6)	28(11.6)	38(12.8)	42(11.6)	0.95	29(14.0)	42(10.8)	47(12.4)	67(13.6)	0.29
Conjunctivitis	8(3.7)	4(1.7)	4(1.3)	2(0.6)	0.03*	0(0)	0(0)	3(0.8)	0(0)	0.02*
Vit A	9(4.2)	2(0.8)	3(1.0)	1(0.3)	<0.001***	4(1.9)	1(0.3)	0(0)	0(0)	0.007**
Squint	6(2.8)	3(1.2)	2(0.7)	0(0)	<0.01**	3(1.4)	0(0)	0(0)	0(0)	0.006**
Blepharitis	7(3.2)	1(0.4)	2(0.7)	2(0.6)	0.007**	0(0)	1(0.3)	0(0)	0(0)	0.38
Amblyopia	1(0.5)	4(1.7)	0(0)	2(0.6)	0.11	0(0)	1(0.3)	0(0)	0(0)	0.386
Congenital anomalies	2(0.9)	0(0)	0(0)	0(0)	0.04*	0(0)	0(0)	0(0)	0(0)	
Others	5(2.3)	2(0.8)	1(0.3)	0(0)	0.01	0(0)	0(0)	0(0)	2(0.4)	0.223

conjunctivitis (5.9%), Vitamin A deficiency (5.6%), squint (3.9%), blepharitis (3.6%) and amblyopia (2.2%).

Similar prevalence of ocular morbidity among government (13.7%) and private schools (13.1%) was observed. Prevalence of refractive errors was also similar (Table 2). However, the

prevalence of conjunctivitis, Vitamin A deficiency, blepharitis and amblyopia were significantly more among government school children as compared to children in private schools ($P<0.05$). Children presenting with visual acuity of 6/9 to 6/18, 6/24 to 6/60 and less than 6/60 in the worse eye were categorized as

having mild visual impairment, moderate visual impairment and severely visually handicapped respectively.

Subnormal vision (without glasses) was found in 320 (11.9%) children. More number of boys had visual impairment than girls (boys 182/1506, 12.1%, girls-138/1174, 11.7%). This difference was not statistically significant. Among the children with visual impairment, mild visual impairment was seen in 85.9% of children, while moderate and severe visual impairment were seen in 11.6% and 2.5% of children respectively. Out of 320 children with subnormal vision, 147 children (46%) were aware of their visual problem and 93 (29%) children were using spectacles. More boys were using spectacles compared to the girls (boys 59 Vs girls 34). Among the rest 54 children who were aware of their visual problem, the reason for not using spectacles was explored. The reasons for not using spectacles expressed by children were unwillingness of parents (n=26; 48%), unwillingness of children (n= 14; 26%), financial constraint (n=12; 22%) and perception of non-improvement with any treatment (n=2; 4%).

For simplicity in documentation children with astigmatism were grouped into myopia or hypermetropia by converting their cylindrical power to its spherical equivalent. After conversion, it was found only 4% of children had hypermetropia and 96% had myopia. Among the children with myopia, only 8% had myopia of >3 diopter; and 92% <3 diopter.

Best corrected visual acuity improved to 6/6 in 300 (93.8%) children. Vision improved to mild visual impairment range (final vision: 6/9 to

6/18) in 15 children (4.7%), and moderate visual impairment (final vision: 6/18 to 6/60) in 4 children (1.25%). Only one child remained bilaterally severely visually impaired due to congenital abnormality i.e. retino-choroidal coloboma with nystagmus.

There was no sex preponderance for overall prevalence of ocular morbidity (Table 3). However, prevalence of amblyopia was significantly ($P<0.05$) more among females (0.5%) as compared to males (0.1%).

Overall prevalence of ocular morbidity decreased significantly with age in government and private schools (Table 4). There was an association between age group and ocular morbidity in private schools, government schools or combined when conjunctivitis, Vitamin A deficiency and squint were taken into consideration. The association was significant ($P<0.05$). All the three morbidities were more prevalent in the age group of 5-7 years. Prevalence of blepharitis was significantly higher ($P<0.05$) in the age group of 5-7 years in government schools.

DISCUSSION

Childhood blindness is a priority area because of the number of years of blindness that ensues. It is estimated that the cumulative number of blind-person-years (number blind \times length of life) worldwide due to childhood blindness (i.e. 75 million) ranks second only after the cumulative number of blind-person-years due to cataract blindness.^[1] Children and adolescents comprise a major proportion of Indian population and are important as they are the future of country's development.^[8]

School children constitute a particular

vulnerable group, and uncorrected refractive errors can have detrimental effect on the academic, social and later the functional potential of individuals.

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. Schools are one of the best centers for effectively implementing the comprehensive eye healthcare program.^[9]

Population based data concerning the prevalence of visual impairment due to uncorrected refractive errors and ocular diseases in children are not readily available for India. Of particular importance are refractive errors, which are common and easily correctable, usually with spectacles.^[7]

To our knowledge, there is no study available in the literature dealing with prevalence and pattern of refractive errors and eye diseases among school going children in Kolar. This information is important in planning appropriate eye care programs to reduce the burden of visual impairment among the younger population.

The proportion of children who are blind or visually impaired due to refractive errors can be used to assess the level of development of eye care services in a country.^[7]

In this study the overall prevalence of ocular morbidities was found to be 13.32 %. The majority of which were either preventable or treatable. This prevalence is comparable to the reports from Gujarat and Delhi, but higher than many of the other reports.^[5,11-15] It was lower than other studies reported in India and in Neighboring country Nepal.^[10,16,17]

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. Lower prevalence of ocular morbidity in current study compared to other studies may be due to improved living conditions compared to past, with better availability of health services.

Marginal difference in the prevalence of ocular diseases among boys (13.5%) and girls (13.1%) in the present study is comparable to results of the study in Shimla and Delhi.^[10] However, Khurana *et al.*, reported higher prevalence in girls (73.5%) as compared to boys (49.4%) in Haryana.^[18] In their study, prevalence of infectious diseases like trachoma, conjunctivitis and blepharitis was high among girls because of increased use of common ocular cosmetic material.

The commonest cause of ocular morbidity in the present study was refractive errors (11.9%). Prevalence of visual impairment in our study was similar to data published from Andhra Pradesh (APEDS Study).^[19] The prevalence of refractive errors in school children ranges from 1% to 23.3%. About 60-80% of visual impairment may be due to refractive error alone.^[20] The wide variability may be due to the sampling frame and non representative population. The low prevalence in our study may be explained by the fact that it was done in an urban area where health facilities are easily approachable.

Internationally, lower prevalence of refractive errors (2.7-5.8%) has been reported from various studies.^[21-24] These differences may be explained by the different diagnostic criteria

used by different authors, racial or ethnic variations in the prevalence of refractive errors, different lifestyles or living conditions.^[10]

In the present study refractive error in boys was seen in 12.1% cases against 11.7% in girls. In the visual impairment group less than 1/4th had moderate to severe visual impairment (11.6% moderate and 2.5% severe visual impairment) 96% of all refractive errors were myopes and 4% were hyperopes. The low prevalence of hypermetropia in our series may be due to the age group of children studied and cycloplegic refraction being done.

Out of all the children having visual impairment, only one fourth were using refractive correction; which highlights the lack of awareness about the need for refractive correction. More boys were observed to use spectacle, probably due to cosmetic reason and parent's interest. Socioeconomic conditions were also possibly contributing to the under-use of the corrective measures. Barriers to the use of corrective spectacles include: parental lack of 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.^[8]

Though best corrected visual acuity improved in 93.75%, it is higher than the reports from other studies in Andhra Pradesh, Delhi and Gujarat.^[5,6,11] In the remaining cases visual impairment was primarily due to corneal scar, and congenital anomalies like nystagmus, coloboma of iris and retina etc which masked the improvement in vision with correction.

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. However, a few factors should be considered in establishing screening programs: First, vision screening should take place by adequately trained personnel who can perform refraction of reasonable quality in children identified with vision impairment. Second, provision of good-quality, low cost spectacles and low vision care must be provided on large scale in our country and it should reach remote rural areas if our program of vision 2020 is to be successful. Third, an attempt should be made to include all school-aged children, not just school-attending children, because all the children in developing countries do not attend schools. Fourth, target populations should be prioritized using available population-based data on the age distribution of refractive error.

Higher prevalence of conjunctivitis and blepharitis (1.5-17.5%) has been reported in other parts of India as compared to our study.^[3,15,25,26] Variation in the prevalence of these infections can be explained by difference in socioeconomic status, personal hygiene of children, seasonal variations of occurrence of these diseases and geographical location.

Vitamin A deficiency up to an extent of 5.4-9% in the 4 to 16 years age group has been reported, as compared to 0.7% in the present study.^[3,15] This can be explained by lower socioeconomic status associated with unhealthy dietary pattern of children in those studies. Our low prevalence can also be explained by availability of better health services nowadays, facilitating early detection and treatment. Prevalence of vitamin A deficiency decreased

with age in the present study, which is comparable to the study by Desai et al.^[3]

High prevalence of conjunctivitis, blepharitis and Vitamin A deficiency in children studying in government schools as compared to private schools as observed in this study could be because many of the students in government schools belong to lower socioeconomic status and are more likely to have poor personal hygiene.^[10]

Prevalence of squint as reported by Wedner et al., of 0.5% among children of 7-19 years in Tanzania, Africa is similar to the results of our study.^[21] However, higher (7.4% in 5-15 years) and lower (0.2-0.6% in 4-18 years) prevalence of squint has been reported from Haryana, Rajasthan, West Bengal and Delhi.^[3,15,27]

Low prevalence of congenital disorders was found to be the same as it has been observed in other studies from India.^[3,18]

In almost all studies conducted in India, the prevalence of ocular morbidity decreased with age, the results of our study also confirmed this.^[3,13,15,18] The decrease in prevalence of ocular defects with increasing age of children may be due to improved ophthalmic hygiene as a result of health education.

CONCLUSION

The current work, conducted in Kolar confirms the high prevalence of overall ocular morbidity and refractive errors among school students in urban South Indian area. It highlights the urgent need to implement at school level, health facility-based, cost-effective strategies, and appropriate eye care programs targeting school children to reduce the burden of visual

impairment among them.

Screening of school children for visual impairments as a part of school health not only should be a key component of an effective blindness prevention programme but also an easy approach for a large-scale screening.

Epidemiological studies are required to identify the quantum of refractory errors. Efforts are to be focused on primary prevention of blindness and timely correction of refractory errors to prevent irreversible visual loss. Primary teacher and parents are also to be educated and made aware of early detection of refractory errors. In this context, Information, Education and Communication (IEC) amongst people in primary health care play pivotal role in prevention and early detection of refractory errors.

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