ISSN: 2581 - 3633

International Journal of Medical Science and Advanced Clinical Research (IJMACR)

Available Online at: www.ijmacr.com

Volume – 2, Issue – 1, January - February - 2019, Page No. : 33 - 41

Ocular Morbidity in School Age Children of North Indian Population- A Hospital Based Retrospective Study

Dr. Vrij Bhushan[1], Dr. Navdeep Singh Dhoat[2*], Dr. Priyadershini Rangari[3]

[1,2*,3]Assistant Professor, [1]Department of Ophthalmology, Teerthankar Mahaveer University medical college and hospital, Moradabad, (Uttar Pradesh). [2*]Department of General Surgery, [3]Department of Dentistry, Sri Shankaracharya Medical College, Bhilai, Durg (Chhattisgarh).

Corresponding Author: Dr. Navdeep Singh Dhoat, Department of General Surgery, Sri Shankaracharya Medical College, Bhilai, Durg (Chhattisgarh) - PIN- 490020

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Background: One-third of India's blind lose their eyesight before the age of 16 years and many of them are under six when they become blind, early detection and treatment of ocular morbidity among children is important.

***Aim*:** To estimate the prevalence of ocular morbidity among school children of age 6-16 years in a tertiary hospital in north Indian population.

Materials and Methods: Government schools selected by stratified random sampling. About 2000 school children, studying primary to high school (6-16 years age group) were examined by heath camp conducted in the hospital campus in between September 2009 to June 2010 in Moradabad. A doctor did visual acuity and detailed ophthalmic examination. The Chi-square test was used to test differences in proportions.

Results: Overall prevalence of ocular morbidity among school children of age 6-16 years was 20% conjunctivitis (31.1%), ocular trauma (11.8%), Refractive errors (11.40%) constitute the major cause of ocular morbidity. The minimum risk was followed by trachomatous trichiasis (1.2%), uveitis (1.1%) and glaucoma (1.0%).

Conclusion: A high prevalence of ocular morbidity among high-school children was observed. The three most common causes of childhood ocular morbidity in this study were conjunctivitis, ocular injuries and refractive errors. These disorders require attention of all the health professionals for proper management or early referral because they can lead to visual impairment and blindness.

Keywords: Amblyopia, conjunctivitis, ocular morbidity, refractive errors, cataract, school children.

Introduction

Early years of life are most important in determining physical, intellectual, behavioral development and quality of life for a child. Visual impairment is a worldwide problem that has a significant socioeconomic impact. Childhood blindness is a priority area because of the number of years of blindness that ensues. Any ocular morbidity which originates in childhood and if gone undetected, may result in severe ocular disabilities or even blindness. Eye diseases in children are important causes of hospital visit, medical consultation and require prompt management. Ocular problems in children are unique and different from adults, not only due to their inability to express their problems, but also because of the potential to develop Amblyopia. Although most ocular morbidities are due to carelessness and ignorance, they cause impairment of vision or even blindness. Childhood blindness is second

only to cataract in terms of "blind years".[1,2] About 30% of blind population of India lose their eyesight before the age of 20 years and many of them are under 5 when they become blind. Hence strategies to manage pediatric ophthalmic disorders must be initiated as early as possible, with interventions at all the three levels of primary, secondary and tertiary eye care centers. School screening program under national program for prevention of blindness cover the children of school age group only while congenital diseases and infantile disorder Visual impairment is a worldwide problem that has a significant socioeconomic impact. Childhood blindness is a priority area because of the number of years of blindness that ensues. Data on the prevalence and causes of blindness and severe visual impairment in children are needed for planning and evaluating preventive and curative services for children, including planning special education and low vision services. The available data suggest that there may be a tenfold difference in prevalence between the wealthiest countries of the world and the poorest, ranging from as low as 0.1/1000 children aged 0-15 years in the wealthiest countries to 1.1/1000 children in the poorest.[1] It is estimated that the cumulative number of blind-person-years worldwide due to childhood blindness ranks second only after the cumulative number of blind-person-years due to cataract blindness.[2] Considering the fact that 30% of India's blind lose their eyesight before the age of 20 years and many of them are under five when they become blind, the importance of early detection and treatment of ocular disease and visual impairment among young children is obvious.[3]

Children do not complain of defective vision, and may not even be aware of their problem. They adjust to the poor eyesight by sitting near the blackboard, holding the books closer to their eyes, squeezing the eyes and even avoiding work requiring visual concentration. This warrants early detection and treatment to prevent permanent disability. 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.[3]

Seventy-five per cent of all school age children are school-going children. The dropouts mostly belong to families with low socioeconomic status, minimal family education and economic necessity for wage earning to support the family.[4,5] Children in the school-going age group (6-16 years) represent 25% of the population in the developing countries. They offer significantly representative material for these studies as they fall best in the preventable blindness age group, are a controlled population i.e., they belong to a certain age group and are easily accessible and schools are the best forum for imparting health education to the children. Schools are also one of the best centers for effectively implementing the comprehensive eye healthcare program.[3] Hence, this study was conducted with the objective of estimating the prevalence of ocular morbidity among school children.

Materials and Methods

A hospital based descriptive cross-sectional study was done in the outpatient Department Of Ophthalmology, Teerthankar Mahaveer University Medical College, Moradabad, Uttar Pradesh. The study took place in between September 2009 to June 2010. All consecutive children with ocular disease seen in the eye unit for the first time were included in the survey. In this study 735 children were recruited up to the age of 15 years. Children above 15 years of age, repeated cases (cases within the study) and those presented for a medical check-up and had no ocular diseases were excluded from the study.

Demographic data, visual acuity, source and type of ocular disorder and the type of refractive error were included in the questionnaire. Ocular disorders were divided on

anatomical basis as disorders affecting conjunctiva, cornea, sclera, lens, uveal, retina, optic nerve, ocular muscles, nasolacrimal duct system, lids, orbit and refractive system. Visual acuity was measured at a distance of six meters using the Snellen E chart on presentation and was categorized as WHO classifications; ≥6/18, <6/18-6/24, <6/24-6/60, <6/60-3/60 and <3/60-NLP. Those children whose age is greater than 5 years and had decreased visual acuity not attributable to another cause at presentation, and all less than 5 years old underwent refraction.

Children were examined by Ophthalmologist. Anterior segment examination was done with slit lamp and torch. Posterior segment examination was performed after dilating pupil using direct and indirect ophthalmoscope and fundus camera. Intraocular pressure was checked with air puff non-contact tonometer. If the child had decreased vision the examiner sent him/her to vision centre/refraction clinic/ for refraction, the experienced optometrist under-took objective and subjective refraction and then rechecked with correction to confirm RE is the cause for the visual impairment.

Strabismus assessment was done using an occluder (cover uncover test). We only report one main diagnosis for each patient. Main diagnosis of patients in the study represent the diagnosis, condition, problem or other reason for the encounter/visit that is chiefly responsible for the outpatient services provided. The main diagnosis of bilaterally visual impaired children was taken as causes of bilateral visual impairment. It is unfortunate that all the 47 cases main reason for the outpatient service was trachoma. But active trachoma was not always chosen as main diagnosis in all cases.

Sixteen Government school students were observed in monthly routine health check up camp. The data collection instrument was a pretested structured questionnaire. It was pretested in a randomly selected coeducational school which was not included in the study. Queries from children were asked in Hindi language, while information was filled in English language by the principal investigator, a postgraduate in community medicine. Visual acuity (unaided) was assessed by using Snellen's chart, color blindness was checked by using Ishihara's chart, axis deviation was assessed by cover/uncover test and torch examination of the eye was done.

The first part of the questionnaire dealt with information regarding the child like age, sex, residential address, class in which studying and chief complaints related to eyes. Second part of the questionnaire included detailed examination of eye for diagnosing ocular morbidity and recording of vitamin A deficiency signs and their ocular manifestations. The cutoff of uncorrected visual acuity for defining ocular morbidity due to refractive error in this study, was taken as a visual acuity of <20/30 Snellen in the worst eye. Visual acuity worse than 20/400 was recorded as count fingers (CF at a certain number of feet), hand motion (HM at a certain number of feet), light perception (LP), or no light perception (NLP). The conversion of Snellen acuity to count fingers acuity was then obtained.[4] The WHO clinical staging for trachoma and xeropthalmia was used.[5,6] 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. Vitamin C deficiency was diagnosed if there was history of bleeding gums and on examination there were conjunctival hemorrhages. Congenital disorders were also looked for like heterochromia iridium, ptosis, irregular pupil, erected upper lacrimal puncta, congenital cataract.

After checking the questionnaire for errors the data was entered into a computer database and analyzed using statistical software INOVA version 22. The Chi-square

test was used to test differences in proportions. Differences were considered to be statistically significant at the 5% level.

Results

This study was conducted on 2000 childrens from16 government schools of age 6-16 years were from first to tenth class in urban population. These children were investigated in routine monthly health checkup camps held by the Teerthankar Mahaveer University medical college and hospital, Moradabad, Uttar Pradesh.

The data was collected from emergency inpatients registers, indoor admission registers, outpatient registers and minor operation theater registers of the department of ophthalmology. Data on patient age, gender, occupation, date of admission, etiology of disease/ trauma if any, presenting complains, and the treatment offered to them were analyzed. All data obtained in the study were recorded and analyzed using the Statistical Package for Social Sciences for Windows, Version 21. Numerical variables were given as mean and standard deviation (SD), while categorical variables were given as frequencies (*n*) and percentages.

Patients were grouped into 6-9 years, 10-13 years and 14-16 years age group. Age and sex distribution was studied among both the groups as shown in Table 1.

Overall prevalence of ocular morbidity among school children of age 6-16 years was 20% conjunctivitis (31.1%), ocular trauma (11.8%), Refractive errors (11.40%) constitute the major cause of ocular morbidity. The minimum risk was followed by trachomatous trichiasis (1.2%), uveitis (1.1%) and glaucoma(1.0%).

There was female preponderance for overall prevalence of ocular morbidity in Table 2. However, prevalence of color blindness was significantly ($P<0.05$) more among females (3.9%) as compared to females (0.53%). Females (39.5%) presented with significantly more complaints related to eyes like defective vision, watering of eyes, pain in and around eyes, redness of eyes as compared to males (18.9%). Nearly half (41.9%) of the males who had been diagnosed as suffering from one or other ocular disorder, were asymptomatic. Self-reported ocular symptoms by females were more sensitive (100%) and less specific (87%) as compared to males (sensitivity 58%, specificity 97%).

Discussion

This study was conducted in government school childrens in routine monthly health checkup camps held by the Teerthankar Mahaveer University medical college and hospital, Moradabad, Uttar Pradesh in urban population, confirms the high prevalence of overall ocular morbidity and refractive errors among high school students in urban North Indian area and 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 the younger population.

Overall prevalence of ocular morbidity among school children of age 6-16 years was 20% [Table 2]. Conjunctivitis (35.1%), ocular trauma (11.8%), Refractive errors (11.40%) constitute the major cause of ocular morbidity. The minimum risk was followed by trachomatous trichiasis (1.2%), uveitis (1.1%) and glaucoma (1.0%).

Similar prevalence of ocular morbidity among government (30.7%) and private schools (32.7%) was observed. Prevalence of refractive errors in government schools (21.5%) and private schools (22.6%) was also similar. However, the prevalence of conjunctivitis was significantly more (1.5%) among government school children as compared to children (0.1%) in private schools ($P<0.05$). For the rest of the ocular morbidities prevalence did not vary significantly with type of school. There was

no sex preponderance for overall prevalence of ocular morbidity [Table 2]. However, prevalence of blindness was significantly (P<0.05) more among females (3.9%) as compared to males (0.53%). Females (39.5%) presented with significantly more complaints related to eyes like defective vision, watering of eyes, pain in and around eyes, redness of eyes as compared to males (18.9%). Nearly half (41.9%) of the males who had been diagnosed as suffering from one or other ocular disorder, were asymptomatic. Self-reported ocular symptoms by females were more sensitive (100%) and less specific (87%) as compared to males (sensitivity 58%, specificity 97%).Overall prevalence of ocular morbidity decreased significantly with age in government schools. However, it increased up to 10-12 years then declined significantly in private schools also (P<0.05). Prevalence of squint decreased significantly after 10 years of age in both the schools (P<0.05). Prevalence of refractive errors increased significantly after 10 years of age in school children.

Population-based data concerning prevalence of ocular morbidity among children are not readily available for India. For the available studies results are not comparable because of different methodologies/criteria used in those studies. The prevalence of ocular morbidity of 20% among school children of age 6-16 years in this study is similar to a study conducted in Delhi, where prevalence was reported to be 34.04% in the 5-14 years age group.[7] However, higher prevalence of ocular morbidity has been reported from neighboring states like Haryana (58.8% in 4-18 years) and Rajasthan (71.7% in 4-16 years) and also from Hyderabad in South India (43.5% in 3-16 years).[8,9,10] It was because of the higher prevalence of trachoma and conjunctivitis found in these two northern states and of refractive errors found in South India. Moreover, the range of age groups covered in the above mentioned studies was also more as compared to the present study. Lower prevalence (15%) of ocular morbidity has been reported from Kolkata, West India among school children of 5-13 years, because of lower prevalence of refractive errors (2%) and smaller age group covered in that study.[11] Review of international studies revealed lower prevalence of 15.6% of ocular morbidity in children aged 7-19 years in rural area of Tanzania, Africa.[12] International differences in prevalence may also be explained by racial and ethnic variations, partly due to different lifestyles and living conditions in addition to different methodologies used.

Higher prevalence of conjunctivitis 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.[13]

Poor vision in childhood affects performance in school or at work and has a negative influence on the future life of a child. Moreover, planning of the youth's career is very much dependent on visual acuity, especially in jobs for the navy, military, railways and aviation. Refractive errors are the most common reasons of the outpatient visit to an ophthalmic surgeon or an ophthalmic assistant. The overall incidence has been reported to vary between 21% and 25% of patients attending eye outpatient departments in India.[14] Similar prevalence of refractive errors has been observed among children of 12-17 years in Ahmadabad city.[15] 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, because of higher case detection rate in that study by an optometrist.[10] However, low prevalence of refractive errors of 2% has been reported from Eastern India by Datta *et al.*, among primary school children of 5-13 years, which could not be explained.[11] Internationally, lower prevalence of refractive

errors (2.7-5.8%) has been reported among children of age 5-15 years from Africa, Finland, Chile and Nepal as compared to the present study.[12,19,20,21] 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.

Similar prevalence of color blindness has been observed in an earlier study conducted in this part of the country.[19] Comparable results (2.9% in 4-16 years) have also been reported from Rajasthan.[9] However, lower prevalence of color vision defects (0.11%) has been reported by Pratap *et al.*, from North India.[20,23] A different study population (children who attended eye care centre in the last 18 months) in their study may explain this. Children are less likely to attend eye care centers for color blindness.

Prevalence of squint as reported by Pratap *et al.*, of 2.8% of primary squint and that of paralytic squint as 0.42%, is comparable with the results of the present study.[20,23] 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.[8,9,11,21] Studies done abroad also revealed lower prevalence of squint (0.5%) by Wedner *et al.*, among children of 7-19 years in Tanzania, Africa.[12]

Vitamin A deficiency up to an extent of 5.4-9% in 4 to 16 years has been reported from Rajasthan and Kolkata respectively as compared to 1.8% in the present study.[9,11] This can be explained by lower socioeconomic status associated with unhealthy dietary pattern of children in those studies. Prevalence of vitamin A deficiency decreased with age in the present study, which is comparable to the Desai *et al.*, study.[9] The prevalence of night blindness (0.41%) in the present study is comparable to results of earlier studies showing prevalence to vary from 0.29-0.3% in Haryana and North India.[8,10] Internationally, Wedner *et al.*, reported the prevalence of night blindness as 5.3% and bitot's spots as 0.6% among school children of age 7-19 years in Tanzania.[12] Since their study was done in the rural area, where children belonged to low socioeconomic status and had poor nutritional status, prevalence of vitamin A deficiency was high.

Higher (3-17.5%) prevalence of conjunctivitis has been reported in other parts of India.[8,9,11,20] However, Robinson *et al.*, reported 1.5% prevalence of conjunctivitis among children of 1-17 years in North America, which is similar to this study.[22] Variation in the prevalence of conjunctivitis can be explained by difference in socioeconomic status, personal hygiene of children and seasonal variations of occurrence of conjunctivitis. Low prevalence of congenital disorders was found to be the same as it has been observed in other studies from India.[8,9]

Marginal difference in the prevalence of ocular diseases among males and females in the present study is comparable to results of the study by Sehgal *et al.*, in Delhi (males 46.1% and females 48.3%).[7] However, Khurana *et al.*, reported higher prevalence in females (73.5%) as compared to males (49.4%) in Haryana.[8] In their study, prevalence of infectious diseases like trachoma, conjunctivitis and blepharitis was high among females because of increased use of common ocular cosmetic material. Prevalence of vitamin A deficiency was found to be more among males as compared to females in this study contrary to the results of other studies.[9,11] This difference was more appreciable with prevalence of night blindness. However, being subjective, the symptom of night blindness cannot be relied upon completely. Color blindness is a sex-linked disease hence it was found to be significantly higher amongst males in this study.

In almost all studies conducted in India, the prevalence of ocular morbidity decreased with age, the results of our

study also confirmed this finding in an urban North Indian hilly area.[9,11] The decrease in prevalence of ocular defects with increasing age of children may be due to age dependence of eyeball and improved ophthalmic hygiene as a result of health education. Higher prevalence of refractive errors in the younger (6-10 years) age group could be because of high prevalence of age-related hypermetropia in young children as is also observed from other studies in North India.[9,14,15]

The results of the study strongly suggest that screening of school children for ocular problems should be done at regular intervals and it should be one of the prime components of the School Health Program. For this, school teachers should be oriented and trained in identifying common eye problems among school children so that these children can be referred for prompt treatment. They should also impart awareness regarding ocular hygiene among school children. In this manner the incidence of preventable causes of blindness among school children will be minimized. Identification of color vision defects with concurrent vocational counseling should also be done at the earliest in school children to save the child from frustration later on and help him to choose a suitable vocation.

Conclusion

It was concluded that high prevalence of ocular morbidity among high school children was observed in urban north Indian population. Conjunctivitis, ocular trauma and refractive errors were the most common ocular disorders. It is a difficult task to detect and treat children with ocular morbidity because they are unable to articulate their problems and sometimes were not cooperative for examination and treatment. However, it is important to approach children with the same pattern with which one would approach an adult. School health programs should focus on the ocular health of children. Health education activities should be intensified in schools and also in the community regarding signs and symptoms of ocular disorders. Finally, the aim of all blindness control programs should be to propagate awareness in the masses of eye care and to teach the essentials of ocular hygiene and eye healthcare.

References

1. Gilbert CE, Anderton L, Dandona L, Foster A. Prevalence of visual impairment in children: A review of available data. Ophthalmic Epidemiol. 1999;6:73–82.
2. Foster A. Worldwide blindness, increasing but avoidable. Semin Ophthalmol. 1993;8:166–70.
3. Danish Assistance to the National Programme for Control of Blindness. New Delhi, India: Vision screening in school children. Training module. 1.
4. Bhagyalakshmi J. Presenting Educational Science: What next?" Yojana. 2001;45:48–9.
5. Thylefors B, Dawson CR, Jones BR, West SK, Taylor HR. A simple system for assessment of trachoma and its complications. Bull World Health Organ. 1987;65:477–85.
6. Sommer A. Field guide to the detection and control of xerophthalmia. 2nd ed. Geneva: WHO; 1982.
7. Sehgal K, Kant L, Jain BK, Lal K. Prevalence of Eye diseases in a semi urban area. Indian J Public Health. 1984;28:189–93.
8. Khurana AK, Sikka KL, Parmar IPS, Aggarwal SK. Ocular morbidity among school children in Rohtak city. Indian J Public Health. 1984;28:217–20.
9. Desai S, Desai R, Desai NC, Lohiya S, Bhargava G, Kumar K. School eye health appraisal. Indian J Ophthalmol. 1989;37:173–5.
10. Kalikivayi V, Naduvilath TJ, Bansal AK, Dandona L. Visual impairment in school children in Southern India. Indian J Ophthalmol. 1997;45:129–34.

11. Datta A, Choudhury N, Kundu K. An epidemiological study of ocular condition among school children of Calcutta Corporation. Indian J Ophthalmol. 1983;31:505–10.
12. Wedner SH, Ross DA, Balira R, Kaji L, Foster A. Prevalence of eye diseases in primary school children in a rural area of Tanzania. Br J Ophthalmol. 2000;84:1291–7.
13. Conjuctivitis. Community Eye Health. 1999;12:20.
14. Goswami A, Ahmed E, Shaha PL, Roy IS. An epidemiological pattern of cases of refractive errors. J Indian Med Assoc. 1978;72:227–8.
15. Sethi S, Kartha GP. Prevalence of refractive errors in school children (12-17 years) of Ahmadabad City. Indian J Community Med. 2000;25:181–3.
16. Laatikainen L, Erkkila H. Refractive errors and other ocular findings in school children. Acta Ophthalmol. 1980;58:129–36.
17. Maul E, Barroso S, Munoz SR, Sperduto RD, Ellwein LB. Refractive error study in children: Results from La Florida, Chile. Am J Ophthalmol. 2000;129:445–54.
18. Negrel AD, Maul E, Pokharel GP, Zhao J, Ellwein LB. Refractive error study in children: Sampling and measurement methods for a multi-country survey. Am J Ophthalmol. 2000;129:421–6.
19. Sharma V. Prevalence and pattern of color vision defects in school going children by ishiara plates. 1997.
20. Pratap VB, Lal HB. Pattern of paediatric ocular problems in North India. Indian J Ophthalmol. 1989;37:171–2.
21. Chaturvedi S, Aggarwal OP. Pattern and distribution of ocular morbidity in primary school children of rural Delhi. Asia Pac J Public Health. 1999;11:30–33.
22. Robinson B, Acron CJ, Millar CC, Lyle WM. The prevalence of selected ocular diseases and conditions. Optom Vis Sci. 1977;74:79–91.
23. Mehari: Pattern of childhood ocular morbidity in rural eye hospital, Central Ethiopia. BMC Ophthalmology 2014 14:50.

Tables

Table 1: Age and Gender Wise Distribution of Children

Age Groups	Male		Female		Total	
	No	%	No	%	No	%
6-9	312	15.6	304	15.2	616	30.8
10-13	356	17.8	342	17.1	698	34.9
14-16	360	18.0	326	16.3	686	34.3
Total	1028	51.4	972	48.6	2000	100

Table 2 Distribution of childhood eye disease by gender (n =400)

Type of ocular morbidity	Male	Female	Total	%	Confidence interval at 95%	*P*-value
Conjunctivitis	66	74	140	35.1	34.5-35.6	0.6
Keratitis	19	23	42	10.5	9.7-11.3	0.08
Active trachoma	13	12	25	6.4	6.0-6.8	0.3
Sty/Chalazion/Blephritis	11	14	25	6.3	6.0-6.6	
Trachomatous trichiasis	2	3	5	1.2	0.95-1.45	
Cornea opacity	3	4	7	1.8	1.7-1.9	0.06
Refractive Error	21	24	45	11.4	10.5-12.3	0.3
Ocular trauma	20	27	47	11.8	11.0-12.6	0.007
Cataract	4	7	11	2.7	2.35-3.05	0.3
Amblyopia	5	8	13	3.2	2.85-3.55	1.0
Strabismus	3	4	7	1.8	1.55-2.05	0.5
Uveitis	2	2	4	1.1	0.85-1.35	0.4
Nasolacrimal duct obstruction	4	5	9	2.2	1.85-2.55	
Glaucoma	1	3	4	1.0	0.75-1.25	
Others	4	6	10	2.5	2.15-2.85	