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Original Research Article

Comparative Study to Estimate the Prevalence of Ocular Morbidities among School Children in Bihar

Ashutosh Kumar Anand[1], Arjun Choudhary[2]

[1]Senior Resident, Department of Ophthalmology, Anugrah Narayan Magadh Medical College & Hospital, Gaya, Bihar, India.
[2]Professor and HOD, Department of Ophthalmology, Anugrah Narayan Magadh Medical College & Hospital, Gaya, Bihar, India.

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Corresponding author: Dr. Ashutosh Kumar Anand
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Abstract

Aim: To estimate the prevalence of ocular morbidities among school children in Bihar**.**

Material & Methods: This comparative study was designed to estimate the prevalence of ocular morbidities among school children in Anugrah Narayan Magadh Medical College & Hospital, Gaya, Bihar, India, over a period of one year. Children who were not able to bring back the signed consent form from parents or were absent on the day of screening were excluded from the study. For the analysis, children were divided into 2 groups, Group 1 (5-10 years) and Group 2 (11-15 years), based on age.

Results: Myopia was the major contributor, as it was higher in children from urban school compared to the ones studying in rural setting (P = 0.001). The statistical difference was mainly contributed by red-green color deficiency (P = 0.537) and conjunctival disorders (P = 0.631).

Conclusion: Vitamin A deficiency prevalence was much higher indicating missed opportunities for vitamin A supplementation at a younger age. Refractive error was more prevalent in the urban population as well in the older age group (11–15 years), indicating a need for frequent eye screening.

Keywords: Mobile eye unit, ocular morbidity, prevalence, school children, vitamin A deficiency

Introduction

The World Health Organization (WHO) estimates that 19 million children under 15 years of age are visually impaired. Uncorrected refractive error (RE) was the main cause of visual impairment (VI) in 12 million children. [1] RE includes myopia, hyperopia, and astigmatism. [2] The magnitude of RE is a factor and changes in refractive status as children grow warrant frequent reassessment and management. [3]Unfortunately, undetected VI in children can have a lifelong impact on learning ability, academic performance, personality, and quality of life. [4]Therefore, in children, early detection and treatment of RE is essential. The WHO also recommends vision screening of "12–13" and "15–16" years old schoolchildren and to provide refractive services. [5]

Ametropia or refractive error is the term for any refractive condition other than emmetropia or condition in which parallel rays of light fail to converge to a sharp focus on the retina with accommodation at rest. Refractive error includes myopia, hyperopia, and astigmatism. [6] A refractive error is determined by a mismatch between the two factors: refractive power of the cornea and the lens, and axial length of the eye, which usually occurs during childhood when the eyes are growing. [7]

The prevalence of childhood blindness is very difficult to ascertain, and there is not enough reliable data from developing countries. In India, there have been few published studies from northern, southern, eastern, and western parts of India. But there has been a lack of comprehensive data on ocular comorbidities from central India, especially, in school‐going children. The previous studies have found that there have been dismally low referral rates after school screening, leading to attrition bias. [8]

Material & Methods:

This comparative study was designed to estimate the prevalence of ocular morbidities among school children in Anugrah Narayan Magadh Medical College & Hospital, Gaya, Bihar, India , over a period of one year. Institutional Ethics Committee approval was obtained and the study was conducted in full accord with the tenets of the Declaration of Helsinki. Children in the age group 5–15 years from urban and rural schools were included for the evaluation.

To achieve a confidence interval of 95% with a precision of 2%, the sample size calculated was 1172 from 13 randomly selected primary and middle schools, based on a prevalence of ocular morbidity of 21%. The school principal was approached 2 days prior to the day of screening and written permission was obtained.

Children who were not able to bring back the signed consent form from parents or were absent on the day of screening were excluded from the study. For the analysis, children were divided into 2 groups, Group 1 (5-10 years) and Group 2 (11-15 years), based on age.

A well-equipped and well-lit mobile eye unit was utilized for comprehensive evaluation. The mobile eye unit comprised of vision drum, trial box, retinoscope, slit-lamp bio-microscope, applanation tonometer and also has a non-mydriatic fundus camera installed in it. The study field staff included 1 ophthalmologist (Principal investigator), 2 optometrists, and 1 outreach coordinator. Optometrists were guided about the assessment pattern and initial evaluation was done by them.

History was noted in the study proforma. Any relevant point mentioned by the class in charge regarding the ocular health of the child was also noted. Visual acuity (VA), both aided and unaided, was assessed by Snellen’s chart available in both English and Hindi. Distance VA was measured with a pinhole to assess possible refractive error. Near vision was assessed by reduced Snellen’s chart for near. All children with VA <6/9 had undergone dry retinoscopy and subjective correction. Cycloplegic refraction was not done at the school level. Color vision was tested using the Ishihara Plates in children with visual acuity better than 20/200 in broad‐daylight.

Further evaluation was performed by an ophthalmologist. Extra-ocular movements, Hirschberg corneal reflex test, and cover-uncover tests were done for squint assessment. Slit-lamp biomicroscopy was used to evaluate the anterior segment including lids, lacrimal sac, conjunctiva, cornea, anterior chamber, pupil, iris, and lens. Un-dilated fundus evaluation for a child not improving on refractive correction was done by Non-Mydriatic Fundus Camera. Whenever required, a dilated fundus examination with indirect

ophthalmoscopy was done following the instillation of tropicamide (0.8%) + phenylephrine (5%) eye drops by the ophthalmologist.

Statistical analysis

After checking the questionnaire for errors, the data was entered into Microsoft Excel® Spreadsheet for statistical analysis. The data was analyzed using SPSS version 16.0 for Windows (IBM® SPSS). The Chi-square and Mann-Whitney U tests were used to test the association of factors and differences in proportions, respectively. A *P* value of less than 0.05 was considered to be statistically significant.

Results:

Ocular morbidity was noted more in urban children (154) as compared to rural children (136) although this difference was statistically insignificant (*P* = 0.26) [Table 1]. However, the difference in refractive error was statistically significant between both the groups (*P* = 0.001). Myopia was the major contributor, as it was higher in children from urban school compared to the ones studying in rural setting (*P* = 0.001).

On the gender‑based assessment of ocular morbidity patterns, a statistically significant difference (*P* < 0.001) was noted in boys as compared to girls [Table 2]. The statistical difference was mainly contributed by red‑green color deficiency (*P* = 0.537) and conjunctival disorders (*P* = 0.631).

When ocular morbidity was analyzed in the aforementioned two age groups, group 2 had a higher prevalence of ocular morbidity as compared to group 1 but this difference was statistically insignificant (*P* = 0.363) [Table 3]. Refractive error was the only factor that attained a statistically significant difference (*P* < 0.001).

Table 1: Prevalence of various ocular morbidities based on area

Ocular morbidity	Area		P value
	Urban (n=660)	Rural (n=512)	
Ocular Morbidity	154	136	0.26
Refractive error	46	19	0.001
Squint	2	1	0.538
Vit A deficiency	61	54	0.66
Conjunctival disorder	8	3	0.38
Corneal disorder	4	1	0.60
Cataract	0	0	0.38
Lid disorder	13	6	0.252
Retinal disorder	3	1	0.429
Amblyopia	4	1	0.07
Red green color deficiency	20	21	0.101

Table 2: Prevalence of ocular morbidity based on gender

Ocular morbidity	Gender		P value
	Boys (n=605)	Rural (n=567)	
Ocular Morbidity	175	152	0.36
Refractive error	22	45	0.162
Squint	2	0	0.043
Vit A deficiency	53	70	0.427
Conjunctival disorder	8	5	0.631

Corneal disorder	3	1	0.361
Cataract	0	0	1
Lid disorder	6	11	0.532
Retinal disorder	2	4	0.571
Amblyopia	3	1	0.430
Red green color deficiency	31	64	0.537

Table 3: Various ocular morbidities based on age groups

Ocular morbidity	Age Group		P value
	Group 1 (n=620)	Group 2 (n=552)	
Ocular Morbidity	**175**	**152**	**0.363**
Refractive error	22	45	0.162
Squint	2	0	0.043
Vit A deficiency	53	70	0.427
Conjunctival disorder	8	5	0.631
Corneal disorder	3	1	0.361
Cataract	0	0	1
Lid disorder	6	11	0.532
Retinal disorder	2	4	0.571
Amblyopia	3	1	0.430
Red green color deficiency	31	45	0.537

Discussion:

Warkad et al. [9] in the Odisha province in India reported a 38% prevalence of myopia among 6-17 years of age group. Alsaqr et al. 10] reported a 53.3% prevalence of myopia among 12–20-year-old Saudi children in Riyadh. The findings of our study concur with these studies showing the wide variation in the prevalence of myopia.

Dandona et al [11] reported findings from a predominantly rural Mahabubnagar district of India while our study was randomized among urban and rural settings of 5 states of Nigeria with comparable socio-economic status. Recent studies suggest that known genetic factors explain 35% of myopia, [12] and that education can potentiate these effects. Lack of time spent outdoors, parental education and myopia are other important risk factors, with a systematic review suggesting that there is a 2% reduction in the progression of myopia with every hour spent outdoor. [13]

Kumar P et al. and Sharma S et al. reported that refractive error was more common in the students who have a history of watching TV/or computer for more than 3 hours.[14-15]The presence of refractive error was significantly associated with a positive family history, as seen in other studies.[16-18]

Ganekal et al. [19] reported a similar prevalence of 1.1% of amblyopia. However, a higher prevalence of 8.6% was reported by Gupta et al. [20] which was non-comparable with the present study. Retinal disorders which usually go undiagnosed and unreported were found to be 0.4% prevalent which mainly included morbidities like choroidal coloboma (0.32%) and optic atrophy (0.08%).

Conclusion:

Vitamin A deficiency prevalence was much higher indicating missed opportunities for vitamin A supplementation at a younger age. Refractive error was more prevalent in the urban population as well in the older age

group (11–15 years), indicating a need for frequent eye screening.

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