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RESEARCH ARTICLE

PREVALENCE OF REFRACTIVE ERROR, SQUINT AND COLOUR VISION DEFECTS AMONG SCHOOL CHILDREN IN RAJIV INTERNATIONAL SCHOOL, MATHURA

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ABSTRACT

Objectives: To determine the prevalence of refractive error, color vision defects and squint in age group 6-16yr.
Study Design and Setting: cross sectional study done in School of Mathura city.
Study Period: September 25 th to 28th September 2017.
Results: A total of 1000 students were subjected to eye check up, where a total of6-16years age group with (M:F ratio=0.97:1.Ocular morbidity was detected in 290(29%) ocular disorders. Out of 1000 students 246 had refractive error, the most common ocular morbidity which accounted to 24.6% of total was ref error and uncorrected ref error was in 17.7%, followed by 2.7% squint cases,1.7% of colour vision defective cases
Conclusion: This study shows the recent prevalence of most common ocular morbidities which include refractive error, were very high which demands yearly school eye check up to be made compulsory to improve the quality of eye-sight.

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INTRODUCTION

School eye health services is one of the important aspect of school health services in which children can be screened for various eye diseases such as refractive error, squint, amblyopia, cataract, defective colour vision etc. Mostly ocular morbidity originates in childhood and if undetected may result in severe ocular disabilities, in addition to affecting development, educational performance (World Health Organization, 1999). Children in the school-going age group (6-16 years) represent 25% of the population in the developing countries. India has an estimated of 320,000 blind children, more than any other country in the world[2].Even though this represents a small fraction of the total blindness, the control of blindness in children is one of the priority areas of the World Health Organization's (WHO).

VISION 2020

The Right to Sight is a global initiative launched by WHO in 1999 to eliminate avoidable blindness like cataract, xerophthalmia, refractive error, trachoma and other causes of childhood blindness by year 2020 (Park, 2007). Periodic screening of all children helps in early identification of visual defects and their correction by spectacles. If children are diagnosed and treated early there is great scope for higher education, better understanding and prosperous life. Many people are affected by colour blindness but many of them remain undetected as they simply adapt to the environment to certain extent and also because of unawareness of the disease.
Colour blind individuals have difficulty incomprehension because of increased reaction time, Will only experience a few hundred shades of colour, versus those with normal vision that experience millions of shades.

- Learning disability
- Unfit for certain jobs like traffic policemen, defence personnel, electrician, electronic engineer, artist which require proper perception of colours which may lead to lesser efficiency in work as well as may cause accident So it is important to look at the prevalence of colour blindness in children and identify the problems associated with it.

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Keeping the above aspects in mind the following study has been carried out to find out the prevalence of colour blindness in school children and to make parents and their teachers aware of this disease so that they can modify their teaching methods and choosing and adjusting with suitable profession. Tananuvat N *et al.;* described an 8.7 % prevalence of refractive errors in school children in Chiang Mai (Thailand) They observed a 4.2 %prevalence of abnormal colour vision, along with prevalence of strabismus of 6.2%, and of amblyopiaof1.4%. Most cases of amblyopia were due to uncorrected refractive. Mehari ZA *et al.;* reported 9.5 per cent prevalence of visual impairment with 6.3% prevalence of refractive errors in Ethiopian schoolchildren. Myopia was the most prevalent refractive error; accounting for 6.0 per cent, followed by compound myopic astigmatism 1.2 per cent, then simple myopic astigmatism 0.5 per cent, mixed astigmatism 0.26 per cent and finally hyperopia 0.33 percent.The prevalence of manifest strabismus in the study group was 1.1 percent (Mehari, 2013). Robaei D *et al.;* observed uncorrected visual impairment in the better eye of 1.3% children and worse eye of 4.1% children in 6 year old Australian schoolchildren. The prevalence was higher in girls than boys and among children of lower socioeconomic status. Refractive error was the most frequent cause of visual impairment, accounting for 69.0%, followed by amblyopia (22.5%). Astigmatism was the principle refractive error causing visual impairment and was frequently uncorrected. Presenting visual impairment (using current glasses if worn) was found in the better and worse eyes of 0.9% children and 2.8% children respectively. This was mainly due to under corrected or uncorrected refractive error (Robaei, 2006). Vyas DB *et al.;* screened 5- to 7-year-old Asian- Pacific Islander schoolchildren in Southern California and found myopia (8.9%) and astigmatism (15.8%) asthe majority of visual disorders. Color-vision deficiency was prevalent among 2.8% of male children, extraocular muscle imbalance among 3.0% of children, and amblyopia among 1.0% of children. All other conditions were present in less than 4% of children screened (Vyas, 2001).

MATERIALS AND METHODS

The Study conducted was at a private school Rajiv international school Mathura (U.P.). Total 1000 children aged 6-16 yrs were examined after taking consent from the school teachers and principal. Institutional and appropriate permissions from the school authorities were taken. Students examined were able to understand and follow instructions while doing refraction testing and could be easily examined. Complete eye examination of both eyes was carried out in all students and free of cost referral and treatment was provided at KDMC, MATHURA.

Eye examination of each student included

- Torch light examination of the eye & adnexa Visual acuity for distance vision –separately for each eye with a Snellen chart at distance of6 m.
- In children already prescribed spectacles, visual acuity was tested with glasses.
- Visual acuity was tested by a single experienced optometrist to avoid inter-observer variation.
- Ocular deviation (phoria and tropia)-determined using the cover test.
- Fundus examination using direct ophthalmoscopy Students having visual acuity 6/9 or less were further evaluated at KDMC MATHURA
- These students underwent cycloplegic refraction. In age group of 6-10years homatropine was used and in age group >10 years cyclopentolate was used for cycloplegic refraction and fundus examination. Retinoscopy and post mydriatic test were carried out in all such students. Children were given final prescription based on post mydriatic test and subjective acceptance.
- Amblyopic children were given full refractive correction. Amblyopic patients were called for follow up every 3 months. Patching was advised when best corrected visual acuity<6/12 & as per age.
- Students & their parents were taught convergent exercises in students with anomalies of convergence at KDMC.
- Students with other eye abnormalities like strabismus,etc. were referred and treated at KDMC Mathura.
- Colour vision Via Ishihara's plates and diagnosis – Based on clinical assessment mostly and with diagnostic procedures when required and if preliminary assessment required further work up then such students were referred to Ophthalmology OPD.
- The students were tested for colour vision deficiency using Ishihara's Type Tests for Colour Blindness, 25 Plates Edition. The colour vision testing plates was held at 75 cm from the student and tilted at right angle to the line of vision.The test was done in adequate lighted room resembling natural day light. Students were asked to read the numbers seen on the test plates and answer were noted down and if preliminary assessment required further work up then such students were referred to Ophthalmology.

RESULTS

Sex Distribution

SEX	NO (%)
MALES	521(52.1%)
FEMALES	479(47.9%)

Among the 1000 children examined 521were boys and 479 were girls in the age group of 6-16 years.

Age Wise Distribution

AGE	NO(%)
6-8YRS	**162(16.2%)**
8-10YRS	**247(24.7%)**
10-12YRS	**183(18.3%)**
12-14YRS	**227(22.7%)**
14-16YRS	**181(18.1%)**

Distribution of Uncorrected and Bcva

V/ A	WITHGLASSES	UNAIDED	BCVA
6/6	823(82.3%)	31(17.5%)	91(36%)
6/9-6/12	72(7.2%)	15(8.4%)	83(33%)
6/18-6/60	64(6.4%)	12(6.7%)	51(20%)
<6/60	41(4.1%)	11(6.2%)	21(8.5%)
	1000	69	246

Distribution of uncorrected and bcva distribution of refractive error

Among 1000, 69students were using prescription spectacles. Of these students 33(47%) had astigmatism, 29 (42%) had myopia

and had 7 (10%) hypermetropia. Of the students with astigmatism 18 had simple myopic astigmatism, 12students hah simple hypermetropic astigmatism and 3had compound astigmatism. The distribution of refractive errors 177 students had uncorrected refractive errors. Of these 177 students 72(40%) had astigmatism (51had simple myopic astigmatism, 13 had simple hypermetropic astigmatism and 8 had compound astigmatism). 69(38%) students had myopia and 36 (20%) students had hypermetropia.

Distribution of refractive Error

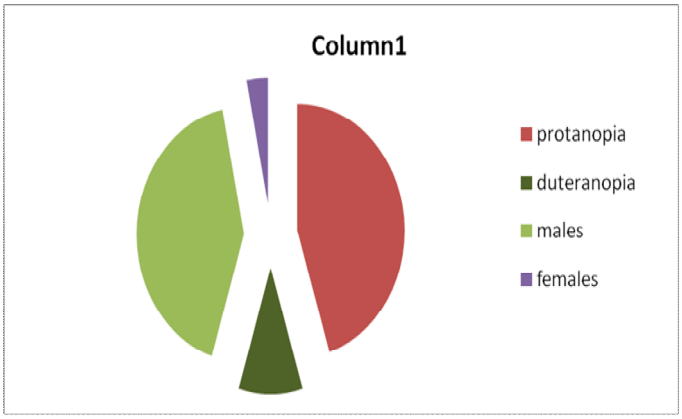
Type or RE	Uncorrected	Corrected
ASTIGMATISM	72(40%)	33(47%)
MYOPIA	69(38%)	29(42%)
HYPERMETROPIA	36(20%)	7(10%)

Distribution of Colour Blindness

Colour blind	Male	Female
17	15	2
No %	1.5%	0.2%

Distribution of Protanopia and Deuteranopia

Total	Protanopia	Deuteranopia	NO
males	13	3	94.11%
females	1	0	5.8%



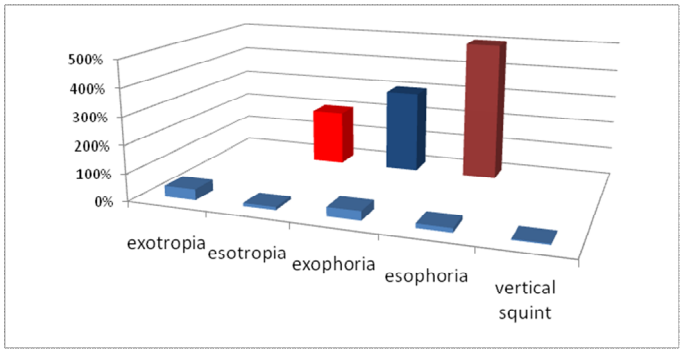
Two types of color blindness was seen in our study protanomaly and deuteranomaly. Protanomaly (82.35%) was more prevalent than deuteranomaly (17.64%). Protanomaly was observed in 14 students out of 17 color blind students accounting to 82.35% of total color blind students. Among 14 protanopes, 13 were males and 1was female. Deuteranomaly was observed in 3 students out of 17 color blind students.

Distribution of Strabismus

Type	Cases (27)(%)
exotropia	11(40%)
esotropia	3(11.1%)
exophoria	9(33.3%)
esophoria	4(14.8%)
vertical squint	1(3.7%)

Out of these 23 were males and 4were female

Strabismus was diagnosed by recording corneal light reflex combined with extraocular movements and cover -uncover tests Latent squint was found to be more common than manifest squint, exodeviation being more prevalent.



DISCUSSION

The present study shows that main cause of impaired vision in school children are Uncorrected refractive errors even in urban areas. The prevalence of uncorrected refractive errors in the present study was 17.7%. Results were comparable to the study of Kalikivayi et al (1997). In our study the single most common refractive error was astigmatism followed by myopia. Hypermetropia was least common of all as shown in Table. Our results were comparable with the study conducted by Rai et al. in Rupandehi district Nepal on primary school children. They found that the commonest refractive error among school children was astigmatism , followed by myopia (26%) and then hypermetropia (19%). (Rai, 2015), Pavithra et al. in Bangalore, (2013), Sethi S et al. among school children of Ahmedabad, (Sethi, 2000), and S Matta et al. among the adolescents attending outpatient department of ophthalmology in New Delhi,[12] concluded that myopia was the most common refractive error among school children followed by astigmatism and hypermetropia. A study conducted by Medi K et al. in Kampala district showed that the commonest refractive error was astigmatism (52%), followed by hypermetropia (37%) children and myopia (11%) (Medi, 2002).

In this study prevalence of squint was found 2.7%, age wise distribution was nearly same to all the age groups and males had higher preponderance of squint (85.71%) among squint cases while only 14.29% were females .Kumar Rajesh et al (Kumar, 2007) (2007)320.5%, Ayanniyi AA et al (Ayanniyi, 2010). (2010)33 0.4%, and Singh harpal (Kumar, 2007), (2011)7 0.3%. these results are more or less comparable to this study. Of 1000 students examined 17 had defective colour vision thereby showing a prevalence of 1.7%while it constituted 5.86% of total ocular morbidity. In our study prevalence of colour blindness 3.07%among boys and 0.20% among girls.Musa et al[17] in their study reported a prevalence of color blindness of 8.72% in boys and 0.33% in girls among young Jordanians. Male children tend to have higher CVD frequency which reinforces the fact of X-linked recessive nature of the trait (i.e.,the single X-chromosome in males is predominant to color blindness, while females with two X-chromosomes can act as dosage compensation and decreases the risk of the disease).

Conclusion

The magnitude of ocular morbidity was 29%.and Refractive error was observed in significant percentage among the school going children at Mathura, which should be corrected in time before 12 years of age to avoid development of permanent visual disability in the form of anisometric amblyopia. Newly diagnosed cases of ocular morbidity were very high which

demaThe data from the present study in an urban private school indicates that there is a shortage of basic eye care and health awareness in parents and teachers even in urban areas. It emphasizes the need for universal eye examination of all school going children.

Early detection and correction of vision problem is found to have educational and behavioral benefits, and certainly enhances Quality of Life. yearly school eye check up to be made compulsory to improve the quality of eye-sight.. Uncorrected refractive errors and other visually impairing conditions in school children can hinder education, personality development and career opportunities. Additionally, they can impose significant economic burden on the family and society.

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