ORIGINAL RESEARCH

Prevalence of refractive error in school going children in east Nimar (M.P)

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ABSTRACT
Background: Considering the fact that 30% of India's blind, lose their sight before the age of 20 years. Commonest avoidable cause of visual impairment is Refractive Error(RE) and thus the importance of early detection and treatment is the simplest and most effective forms of eye care. **Purpose:** To assess the prevalence of refractive error in school going children in East Nimar (M.P.). **Materials & Methods:** A cross sectional study was conducted in January 2023 for a period of one month. Study includes 2000 Students of 5- 15 years age group studying in Government schoolsof East Nimar district. Students were screened for defective vision with the help of Snellen's chart and confirmation by refraction at Nandkumar Singh ChauhanGovt Medical College& Associate Hospital Khandwa .Relevant data such as Demographic details, past and current medical illness, and medication history etc. was collected and documented using suitably designed data collection format. **Results**: 2000 government school children of 5- 15 years age group in Government schools of East Nimar district were examined. 55.7% of the study population was boys and 44.3% were girls. The prevalence of uncorrected refractive error was 11.30%. The prevalence of Myopia, Hypermetropia and Astigmatism in children was 8.15%, 3.15%, 4.8% respectively. Children 13 to 15years were most likely to have uncorrected myopia. Hypermetropia was associated with younger age group. No significant association was found between R.E. and sex.
Key-words: Refractive Error (R.E.); Prevalence; Hypermetropia; Myopia; School Children; Astigmatism

INTRODUCTION

Ametropia is defined as state of refraction, where parallel rays of light from infinity are focused either in front or behind the retina after passing through the diopteric power of the eye when the accommodation is at rest.[1]

Globally 19 million children below the age of 15 years are visually impaired, of which 12 million are due to refractive errors, a condition that can be diagnosed and corrected easily. [2, 3] About 1.4 million children diagnosed with blindness in the world[4], among these 70-90% live in the low resource countries of Asia and Africa. Uncorrected refractive errors are responsible for about 19.7% of blindness. About 13% of Indian population is in the age group of 7-15yrs. And about 20% of children develop refractive error by the age of 16 years.[5]

Mostly ocular morbidity originates in childhood and if gone undetected, may result in severe ocular disabilities.[2]If children are diagnosed and treated early, there is a great prospect for higher education, better understanding and prosperous life.[3]

School children constitute a vulnerable group for refractive errors which leads to a detrimental effect on the academic, social, psychological and later the functional potential of the individual as well as the society. So they form the target group which should be screened adequately for timely detection of eye diseases and prevention of blindness.

School eye screening is a cost-effective method that plays a vital role in early detection, prevention and treatment of childhood blindness/ visual impairment. We aim to study the prevalence and causes of refractive errors among children, with a view to amassing data that can be used as aid to plan interventional measures which can stem the tide of avoidable blindness in the upcoming years.

Keeping all these facts in view, a need was felt to carry out a survey of Prevalence of Refractive Error and associatedSocio-Demographic profile of school children in various schools.

MATERIALS AND METHODS

This was a cross sectional study carried out in the government schools of East Nimar District M.P. The study population comprised of 2000 school going children between 5-15 years age group from the randomly selected government schools. The Institutional Ethical Committee of Nandkumar Singh Chauhan Govt. Medical college& Associate Hospital Khandwa gave written permission to conduct this study. The principals of the selected schools were informed about the study and permission for the visit to the selected schools was sought personally. They informed the parents of the student regarding the study and permission was taken from the guardian of the student, to be examined. The research protocol adhered to the provision of the Declaration of Helsinki for research involving human beings.

Inclusion criteria includesall willing students from selected school along with consent of their parents /teachers/caretaker. b) Students who were co-operative and c) Students of age group 5 to 15 years only.Exclusion Criteria includes Students of age< 5yr and > 15 years and any other ocular comorbities

A pilot study was conducted in schools and a questionnaire was finalized in order to collect information from the students. The first part of the questionnaire dealt with information regarding Age, Sex, Residential address, Number of family members, Parent's occupation, Socio economic status,

Second part of the questionnaire included Ocular complaints, (if any, and detailed examination of eye for diagnosing ocular morbidity). Visual acuity was examined by Snellen's chart after explaining the procedure to the children.

Child was made to sit at a distance of 6 meters from the chart.Child's one eye was covered with a plain occluder and asked to start reading from the top of the chart, going through the next line up to the last line which the child is able to read. The same was repeated for the other eye. In cases of poor visual acuity (<6/9), Pinhole vision testing is done. Pinhole vision testing is done to differentiate refractive error from posterior chamber pathology (The visual acuity improves with pinhole if there is refractive error but it remains the same in posterior chamber pathology).Children in lower grades who were not able to read Snellen's letter chart, an "E" chart/" C" chart/Pictorial chart can be used.Near vision was tested with the help of Jaeger's chart keeping the distance of 25-30cm from the eyes of the subjects. External appearance of eye was examined using torch to find out ocular morbidities like ocular adnexa, lids, conjunctiva, cornea, anterior chamber and iris abnormalities, lens, squint, ocular movements and ocular injury.Both direct and consensual light reactions were checked.Extra ocular movements were checked all cardinal positions of gaze.

The Hirschberg's test, cover-uncover test, retinal examination was done. Diagnosis of patients who had a refractive error was assessed with post cycloplegic refraction and fundus examination.

Myopia was defined as the spherical equivalent of at least -0.50 Dioptre(D). Hypermetropia is defined as +0.50D. Astigmatism as cylindrical equivalent of at least -0.5/ +0.5.Astigmatism was diagnosed only when the error was more than 0.50 Dioptre. Amblyopia if the vision was 6/12 or worse after a cycloplegic refraction and meticulous fundus examination done through dilated pupils. The visual acuity, types of refractive error and correction was noted down. The data was entered in Microsoft XL spreadsheet and analysis was done using the statistical package for social sciences (spss 17 version). Chisquare/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups.

RESULT

The study population comprised of 2000 students, out of which the study group had 55.7% boys and 44.3% girls and 26.8, 48.7 and 24.5% of the children belonged to the age group of 13-15 years, 9-12 years and 5-8 years respectively. All the children were screened for defective vision with the help of Snellen's chart and 226 (11.3%) children were observed to have refractive error.Myopia was found in 163 (8.2%)and Hypermetropia in 63(3.1%) while astigmatism was found in 97(4.8%) of children. Among these 1924(96.2%) were Hindus and 76(3.8%) were Muslim.   888 (44.4%)belongs to joint and 1112(55.6)to nuclearFamily type.

Children in Socioeconomic status classification were distributed among categories as LC 136(6.8%), LM 222 (11.1%), MC 407(20.3%), UC 313(15.6%), and UM 922 (46.1%). Dietary pattern includes non-veg 1244(62.2%) and vegetarian 756 (37.8%) children. While 223(11.1%)were malnourished, 88(4.4%) obese, 68(3.4%) overweight and rest children were of normal nutritional status

 The Prevalence of Refractive Error in this study was found to be 11.3%. The association of refractive error was statistically significant (p=.005) with age where higher refractive error(14.3%) was seen in the age group of 9-12 years followed by 13-15 years(12.5%) and among children of 5-8years was (4.1%). Among age group 5-8 years, proportion of hyperopia was more than myopia 4.1% vs. 0.0%, whereas among age group 13-15, proportion of myopia was more than Hypermetropia 12.5% vs. 0.0%

The association of refractive error was statistically significant (p=.005) with diet where proportion of RE was more in non-vegetarian diet compared to vegetarian 13.9% vs. 7.0%. Similarly significant association was found between family type and RE (p=0.005) (joint 7.1% vs. Nuclear 14.7%)

Significant association was found between mother education and Refractive errors where lessRefractive errorsproportion was found having higher mothereducation status(graduatevs illiterate) (6.6% vs

11.4%).While higher Refractive errorsproportion was found with fathers higher education status Insignificantassociation was found between refractive error and gender (p value =0.992), religion (p=0.829), S.E.STATUS (p= 0.674), family occupation(p= 0.756).

Table1: Frequency of type of refractive errors in study population

		Frequency	Percent
RE	HYPERMETROPIA	63	3.1
	MYOPIA	163	8.1
	NORMAL	1774	88.7
	Total	2000	100.0

Table 2: .Frequency of astigmatism in study population

	Frequency	Percent
ASTIGMATISM	97	4.8
NORMAL	1903	95.2
TOTAL	2000	100

Table 3: Association of refractive errors and age

Age group	Refractive errors	Normal	Total
5-8	20(4.1%)	470(95.9%)	P VALUE = 0.000
9-12	139(14.3%)	836(85.7%)	
13-15	67(12.5%)	468(87.50%)	
TOTAL	226(11.3%)	1774(88.7%)	

Table 4: Association of refractive errors and sex

Sex	Refractive errors	Normal	Total
F	101(11.4%)	785(88.6%)	P VALUE = 0.636
M	125(11.2%)	989(88.8%)	
TOTAL	226(11.3%)	1774(88.7%)	

Table 5: Association of type of refractive errors and age

Age group	Hypermetropia	Myopia	Normal	Total
5-8	20(4.1%)	0(0%)	470(95.9%)	P VALUE = 0.005
9-12	43(4.4%)	96(9.8%)	836(85.7%)	
13-15	0(0%)	67(12.50%)	467(87.50%)	
TOTAL	63(3.1%)	163(8.1%)	1774(88.7%)	

Table 6: Association of type of refractive errors and sex

Sex	Hypermetropia	Myopia	Normal	Total
F	36(4.1%)	65(7.3%)	785(88.6%)	P VALUE = 0.663
M	27(2.4%)	98(8.8%)	989(88.8%)	
TOTAL	63(3.1%)	163(8.1%)	1774(88.7%)	

Table 7: Association of astigmatism and age

Age Group	AST	No Astigmatism	Total
5-8	6(1.2%)	484(98.8%)	P VALUE = 0.005
9-12	76(7.8%)	899(92.2%)	
13-15	15(2.8%)	520(97.20%)	
TOTAL	97(4.8%)	1903(95.2%)	

Table 8: Association of refractive errors and family type

Family type	Refractive errors	Normal	Total
JOINT	63(7.1%)	826(92.9%)	P VALUE = 0.00
NUCLEAR	163(14.7%)	948(85.3%)	
TOTAL	226(11.3%)	1774(88.7%)	

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DISCUSSION

Early detection of ocular morbidity will thus prevent further progression of disease. In recent years though there is increasing awareness of the need for such preventive measures, but with advancement of technologies and higher standard of living mobiles and TVs is in every house and so easily accessible by school age children's. Also unfortunately with the outbreak of the novel coronavirus in December 2019 brought a nationwide lockdown in India from March 2020[6]confining students to the online mode of education, reduced outdoor activities and increased screen time.

The data from our country on the prevalence and pattern of refractive error among school children is highly inadequate due to of shortage of resources and insufficient facilities. In previous conducted studies in different states of Indiaprevalence of refractive error was observed were 7.03% byPavithra MB et al.[7]GVS Murthy et al in New Delhi (6.4%.)[8] and Kumar et al in Lucknow (7.4%)[9] while in our study, the total number of students were 2000 out of which 226 (11.3%) students had refractive error similar finding were observed by Sheeladevi S et al. [10] (10.8%) , 12.8% in Shunyi district in China by Zhao J et al. [11] But less compared to the prevalence observed by Seema S et al in Haryana (13.65%)[12], 15.8% in Chile by Maul E et al [13].The pattern of ocular diseases varies in different part of the world and is influenced by racial, geographic, socioeconomic and cultural factors and the availability of primary health care and eye care service

Our study shows that the prevalence of refractive error was found more (12.5%) in the 13- 15 year age group compared to 4.1% of 5-8 years age group which was similar to the results of a study conducted by Pavithra MB et al (7.5%in the 13- 15 year vs. 6.6% of 7-9 years). Sethi S in Ahmedabad city observed prevalence of refractive errors (40% in 17 years vs 6.7% in 11 year old). S Mattaet al[14] stated that refractive error increased with increasing age especially in the age group of 10- 14 years.

There was no significant difference in the prevalence of Refractive errors between females and males in our study similar results were observed in study conducted by Hansraj R et al [15]

In this study we observed that association of type of refractive errors with socio- demographic variable - Age was present ,as the age increases the prevalence of myopia and astigmatism increased. Whereas the prevalence of hypermetropia was found to be significantly higher in the younger age group of 5- 8 years, Similarobservations were observed by Pavithra MB et al, GVS Murthy et al.

In our study non vegetarian diet children's were having higher proportion of refractive error as compared to vegetarian diet children the reason behind ,a) may be adequate intake of green leafy vegetables by vegetarian children as compared to non vegetarian diets .b) the influence of different Ethnic groups and regional dietary pattern   . Crawford & Hammer[17] also found that the racial and ethnic difference, affects the prevalence of refractive errors. Proportion of RE was more in Hindus and in Nuclear families, similar findings were seen by Kumar P et al. [18] but was not significant, may be due to more number of Hindus in study. Contradictorily, Basu M et al. [19] found more RE in Muslims.

In our study proportion of less RE was associated with higher maternal education the reason behind it may be theincreased awareness of refractive error and close contact of children to their mothers, while in our study higher proportion of RE was associated with increasing fathereducation, the reason elicited by various authors is the association of genetic , and pressure for better academics and the refractive error in the parents .

In a study done by Dandonaet al[20] in 2002, myopia was associated with increasing levels of education of the father. Saw et al observed similar finding of significant association between higher prevalence of RE and higher the father's and mother's education [21]

Significant association was found between RE and type of family where proportion of RE was more in nuclear family becauseeducation pressure and time outdoors are at play , in joint family outdoor activities are higher due to possible presence of peer children for outdoor activity. Similar finding were observed by Xiyan Zhang et al[22] to a limited extend in their study

LIMITATIONS

In our study there were Limitations as,Cycloplegic refraction wasdone for hypermetropiabut not in all cases for refraction and this may be reason for underestimation of refractiveerrors. A proportion of children who do not attend schools regularly and dropout students were not represented by this study ; hence a complete assessment of visual impairment in children could not be assessed merely by school eye screening. Population based studies is recommended for correct estimation of burden as every children of specified age group will be covered

CONCLUSION

Refractive error, especially myopia, is growing common among Indian school-going children and with the increase in literacy rate this may even grow at rapid rate This study supports that regular visual assessment of school going children would be very useful in early detection of poor vision, especially refractive errors,and in preventing intermediate and long term visual complications. Public awareness, health education and school screening programs with monitored periodic evaluation will be able to identify and manage refractive error. Educating school teachers; children and their parents about the knowledge of refractive errors and measures to correct it.

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