

Original Research Article

Prevalence of refractive errors and their association with socio demographic characteristics in pediatric patients attending tertiary eye care centre

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ABSTRACT

Background: Uncorrected refractive errors are one of the major culprits of visual impairment among children in our country. Children included in school going age groups i.e., 6-16 years, represent 25% of population in developing countries. They fall in the category of preventable age group for correction of refractive errors. This paper describes the salient features and results of the cross-sectional study conducted to determine the prevalence of refractive errors and their association with socio demographic characteristics in pediatric population objective were to study the prevalence of refractive errors and their association with socio demographic characteristics in pediatric patients attending tertiary eye care centre.

Methods: The cross-sectional study was conducted for a period of one year among children in 0-16 years age group and a total of 444 patients were included. All children were examined by ophthalmologists and refraction was done by optometrists. Data was analysed using web-based software open epi version 3.01.

Results: Prevalence of refractive errors was found to be 29.5%. Amongst the socio demographic factors, there was a significant association of age and literacy with refractive errors whereas gender and residence were not found to be significant.

Conclusions: Refractive errors are an important preventable cause of childhood ocular morbidity. Schools are an excellent platform to educate children and their parents regarding eye care and signs of ocular morbidity due to refractive errors. Health education activities in schools need to be intensified.

Keywords: Refractive error, Myopia, Hypermetropia, Astigmatism

INTRODUCTION

Childhood ocular morbidity, of which refractive errors form a significant fraction, is defined as a condition in the study subject, recognized or suspected, ocular or vision abnormality, which requires treatment or surveillance.¹ A fact quoted by world health organization (WHO) that "Every minute a child goes blind", reflects the ever-increasing global burden of childhood blindness. Even though the proportion of infants and school aged children with visual impairment is less than 5% worldwide, yet they are included in bunch of 20% of individuals with

visual impairment after adjusting disability adjusted life years (DALYs).²

The available data is suggestive of the fact that the difference in prevalence of childhood blindness between the wealthiest and the poorest countries of the world may be fifteen-fold, ranging from as low as around 0.3 per 1000 children aged 0-5 years in high economic nations to 1.5/1000 children in developing countries. If this very correlation is used to estimate the prevalence of blindness in children, the number of blind children in the world is estimated to be 1.4 million. According to W.H.O.

statistics, approximately three-quarters of the world's blind children reside in the poorest regions of Africa and Asia, where the prevalence is high.³ Even though India had launched the national program for prevention of blindness in 1976, yet the prevalence of childhood blindness is 0.80/100 children.⁴

The major culprit are the uncorrected refractive errors, forming one of the most common causes of visual impairment during childhood in our country. Children included in the school going age groups i.e., 6-16 years, represent 25% of population in developing countries.⁵ They fall in category of preventable age group for correction of refractive errors.

The prevalence and distribution of refractive errors is variable with age. At birth, practically all the eyes are hypermetropic to the extent of 2.5 to 3.0 diopters. With time, as the child's body growth proceeds, the antero-posterior axis of eyeball lengthens, resulting in a decrease in hypermetropia. During preschool period and early school years, majority of children become emmetropic or may remain slightly hypermetropic. So, by the time adolescence is passed, each eye should theoretically be emmetropic. But as a matter of fact, it is found that 50% of population, never becomes emmetropic, either some degree of hypermetropia persists or if antero-posterior length of eyeball overshoots the normal mark, eye tends to become myopic. Result is that proportion of myopes in population of 18 years old may reach 25% or even more.

In the competitive world of today, good physical and mental health is indispensable and a good visual acuity is essential to get employment in certain fields like navy, military, railways and aviation. Unfortunately, for children with visual impairment, schooling and other day-to-day activities become extremely difficult. Their way of adjustment to poor eyesight includes sitting near the blackboard, holding books closer to eyes, squeezing their eyes, frequent rubbing of eyes or even avoiding work requiring visual concentration. The child's learning ability, performance and adjustments in school is therefore affected, leading to hampering of the overall development of the child.

Pattern of ocular diseases is variable. It is dependent upon a no. of geographical, seasonal, racial, socio-economic and socio-cultural factors. Children living in rural areas with poor socio-economic condition and lack of medical facilities have an increased rate of infection and complications. This, study describes salient features and results of cross-sectional study conducted to determine prevalence of refractive errors and their association with socio-demographic characteristics in pediatric patients.

METHODS

The present study was conducted in the Upgraded department of ophthalmology, government medical college, Jammu (J and K) over a period of one year from

November 2018-October 2019 after taking permission from Institutional Ethics Committee.

It was a cross sectional study in which children in age group of 0-16 years attending OPD and Emergency were taken to find the prevalence of refractive errors in different pediatric age groups. A total of 444 patients were included in the study. Verbal consent taken from all patients/guardians after briefing them about study.

Questionnaire was filled by asking the patients/guardians for the required information. The first part of questionnaire dealt with child's preliminary data such as name, age, sex, residence, educational status of patients, their parent's occupation and family's average monthly income. Second part of questionnaire included detailed examination of eyes for diagnosing refractive errors.

All children in the study were examined by ophthalmologists and refraction was done by single optometrist. Visual acuity was measured, first of right eye, followed by the left, by using Snellen's visual acuity charts for distant vision and Jaeger's visual acuity charts for near vision. Visual acuity was recorded as the smallest line read on Snellen's chart with one or no error, at a distance of 6 meters. All children with Visual acuity <6/6 were taken for further examination. External ocular and anterior segment examination was done by torch light in all children. Anterior segment was examined using slit lamp while posterior segment was examined using slit lamp bio-microscopy which included direct and indirect ophthalmoscopy.

Retinoscopy was done and best acceptable refraction was prescribed. Fogging was done for relaxing accommodation in cases of hypermetropia. Objective and subjective refraction performed till best corrected visual acuity was achieved, and glasses were then prescribed. Visual acuity of <6/9 and improving with pinhole were considered as refractive error.

Children having pre-existing eye diseases, eye diseases due to other causes/ ocular injuries excluded from study.

Statistical analysis

Data was compiled and entered into MS excel. Data was tabulated and represented as mean \pm SD for quantitative variables and proportions and percentages for qualitative variables. Chi square test was applied to analyze the association of ocular morbidities with socio demographic characteristics. $P < 0.005$ was considered as statistically significant. Data was analysed using web-based software open epi version 3.01.

RESULTS

Refractive error was present in 131 pediatric patients out of a total of 444 patients. The prevalence of refractive error was 29.5% in our study.

Table 1: Prevalence of refractive errors.

Refractive error	N	Percentage (%)
Present	131	29.5
Absent	313	70.5
Total	444	100

Males had slightly higher odds of getting diagnosed with refractive error as compared to females but the difference was not statistically significant, as shown in Table 2.

As evident from Table 3, odds of being diagnosed with refractive error were less in age group of 0-8 years as compared to older children and this association was found to be statistically significant.

On analyzing literacy status of parents with refractive error it was found that being illiterate parents decreases the odds of children being diagnosed with refractive error. This association was found to be statistically significant.

Table 2: Association of sex with refractive error.

Sex	Refractive error				Total		Crude odd's ratio (95% CI)
	Present		Absent		N	%	
	N	%	N	%	N	%	
Male	73	55.7	166	53	239	53.8	1.11 (0.73-1.68)
Female	58	44.3	147	47	205	46.2	
Total	131	100	313	100	444	100	

$\chi^2=0.26$, $p=0.6$, non-significant.

Table 3: Association of age with refractive errors.

Age (years)	Refractive error				Total		Crude odd's ratio (95% CI)
	Present		Absent		N	%	
	N	%	N	%	N	%	
0-8	31	23	134	43.4	165	37.2	0.3 (0.2-0.6)
8-16	104	77	175	56.6	279	62.8	
Total	135	100	309	100	444	100	

$\chi^2=16.75$, $p=0.00004$, highly significant

Table 4: Association of literacy with refractive error.

Status	Refractive error				Total		Crude odd's ratio (95% CI)
	Present		Absent		N	%	
	N	%	N	%	N	%	
Illiterate	34	26	127	40.5	161	36.2	0.51 (0.3-0.8)
Literate	97	74	186	59.5	283	63.8	
Total	131	100	313	100	444	100	

$\chi^2=5.54$, $p=0.003$, highly significant

Table 5: Association of place of residence with refractive error.

Place of residence	Refractive error				Total		Crude odd's ratio (95% CI)
	Present		Absent		N	%	
	N	%	N	%	N	%	
Rural	69	52.6	140	44.7	209	47	1.37 (0.9-2.0)
Urban	62	47.4	173	55.3	235	53	
Total	131	100	313	100	444	100	

$\chi^2=2.33$, $p=0.12$, not significant

When analyzed according to place of residence it was observed that children residing in rural area had 1.37 times more chances of getting diagnosed with refractive error as compared to children of urban area but the difference was the statistically insignificant as shown in the Table 5.

DISCUSSION

The child of today is the adult of tomorrow and leader of the community and country as a whole in different spheres of life. Let no child miss the beauty, pleasure and opportunities that this world has for them.

Prevalence of refractive errors

In the present study, the prevalence of refractive errors in pediatric population was found to be 29.5% which is almost similar to the study conducted by Patil et al where it was found to be 27.8%.⁶

Association of socio demographic characteristics with refractive errors

Association with age

In our study, it was found that refractive errors were present in majority (44.2%) of patients in 8-12 years age group followed by 32.1% in 12-16 years age group. The associate of age was found to be highly significant ($p=0.00004$) with Refractive error. Odds of being diagnosed with Refractive error were less in age group of 0-8 years as compared to older children.

Similar association with age was also found in study conducted by Parmar et al who found the majority of refractive errors in 12-13-year-olds followed by 14-16-year-olds. In their study, difference in prevalence of refractive errors according to age significant ($p<0.05$).⁷

Higher prevalence in older children could be due to better articulation and detection of visual problems by older children, suggesting a lack of detection by parents and teachers at younger ages.

Association with literacy of parents

In our study, there was a highly significant association of literacy of parents with refractive error in child. Illiterate parents decreased the odds of children being diagnosed with refractive error ($p=0.003$). Similar findings were reported in study done by Mittal et al. In their study, higher education of parents was associated with presence of refractive error in child and this was statistically significant ($p<0.05$).⁸

Association with gender and residence

In our study, the association between sex of child and place of residence was found to be not significant with refractive error.

CONCLUSION

Refractive errors are an important preventable cause of childhood ocular morbidity. Schools are an excellent platform to educate children and their parents regarding eye care and signs of ocular morbidity due to refractive errors. Health education activities in schools need to be intensified. Importance of ocular hygiene needs to be

taught to students, parents and teachers so that ocular and early treatment of refractive errors is ensured. Thus, a large number of childhood visual impairment and blindness can be avoided and socio-economic health of nation can be improved.

There is a need to educate people collectively through health facilities, media, government and non-government organizations emphasizing the importance of ocular health. More extensive efforts in this direction will help us achieve the goals of vision 2020.

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