

Study to Ascertain the Profile of Refractive Error in Children Attending an Ophthalmology Outpatient Clinic at A Tertiary Care Hospital

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Abstract

Aim: The aim of this study to determine the profile of refractive error among children attending ophthalmology OPD at a tertiary care Hospital in Bihar region. **Methods:** The Cross-sectional study was conducted in the Department of Ophthalmology, Nalanda Medical College and Hospital, Patna, Bihar, India from January 2017 to December 2017. after taking the approval of the protocol review committee and institutional ethics committee. Children of age between 5-15 years, Signature of the informed consent by parents or legal guardians and no history of systemic diseases. Colour vision by Ishihara's chart and squint evaluation was done wherever needed. Dry retinoscopy and automated refractometer examination were done in co-operative patients. **Results:** A total of 100 children between 5 to 15 years of age group were included, where majority (50%) were between 9-12 years with mean age as 9.5 years. Astigmatism was the most common refractive error of about 56% followed by myopia 34% and hypermetropia 9%. Astigmatism was common in both males and females of about 22% and 34% followed by myopia which is 23% in females and 11% in males and hypermetropia which were almost 9% among both sexes. The common type of astigmatism was compound myopic astigmatism (46.43%) followed by simple myopic astigmatism (41.07%). Of the 100 children with refractive errors in the study 10 were non correctable. Of the 10 non correctable refractive error 5 belonged to age group 9-12 years. Out of 100 children examined, 14 were found to be amblyopes and the common refractive error among amblyopes was found to be compound myopic astigmatism followed by simple myopic astigmatism. **Conclusion:** The refractive errors with or without amblyopia is a common and significant cause of visual impairment in the children.

Keywords: Astigmatism, Amblyopia, Refractive Errors.

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Introduction

Refractive error is defined as a state in which the optical system of a non-accommodating eye fails to bring the parallel rays of light to focus on the retina[1]. It is of three types - myopia, hypermetropia and astigmatism[2]. Refractive error, as a cause of blindness, is a significant problem both in the developing as well as the developed countries[3]. Hence, refractive errors are one of the priority areas for Vision 2020, a global initiative for the elimination of avoidable blindness introduced by W.H.O.(World Health organization)[4]. It is estimated that 253 million people are visually impaired worldwide, with 36 million people blind while 217 million have low vision[5]. Uncorrected refractive error (URE) is the leading cause of visual impairment (VI) globally (43%), followed by cataract (33%)[6]. URE is responsible for 18% of cases of blindness worldwide, second to cataract (39%). Nineteen million children are estimated to be visually impaired globally, and 12 million of these children have URE[6]. In other words, URE is responsible for almost two thirds of cases of visual impairment in children across the world. Refractive errors include myopia, hypermetropia and astigmatism. They cause defocussing of images formed on the retina of a relaxed eye resulting in poor vision and/or asthenopia (eye strain). Uncorrected refractive errors in children can result in amblyopia, limited or slow academic progress, poor social functioning and impaired quality of life[7-9]. Refractive errors can be easily diagnosed, measured and corrected. In fact, spectacle correction of refractive errors is considered to be one of the most cost effective interventions in eye care[3]. However, refractive errors often remain uncorrected due to various reasons such as lack of awareness, failure to recognize symptoms in children by parents and teachers, non-availability or inability to afford refractive services and negative attitude to the use of spectacle in children[10]. The impact of refractive

errors on the individual and on the community cannot be ignored. Hence there is a need to plan future strategies and implement appropriate measures for early diagnosis and treatment of refractive errors.

Material and methods

The Cross sectional study was conducted in the Department of Ophthalmology, Nalanda Medical College and Hospital, Patna, Bihar, India from January 2017 to December 2017. after taking the approval of the protocol review committee and institutional ethics committee.

Methodology

Children of age between 5-15 years, Signature of the informed consent by parents or legal guardians and no history of systemic diseases. Children below 5 years and above 15 years, Children who had a history of untreated closed- angle glaucoma or untreated anatomically narrow angles - information obtained from anterior segment examination and medical history and Children who have a history of juvenile diabetes.

Screening was undertaken with the help and co-operation of the technical staff of the OPD and with the guardian of the child. Each child's guardian was explained about the importance of vision and overall development of the child. They were also informed about the importance of dilatation of the eye for the examination of both external and internal aspects of eye and the same was conducted after obtaining the consent.

After obtaining a detailed history, ocular examination was undertaken which included visual acuity assessment for distance with Snellen's chart at room illumination and for near vision with near vision test types. Colour vision by Ishihara's chart and squint evaluation was done wherever needed. Dry retinoscopy and automated refractometer examination were done in co-operative patients. Ocular movements and anterior segment

evaluation with slit lamp, cycloplegic refraction and fundoscopy were performed on each child. Post mydriatic refraction was performed after 3 days and the required spectacle correction was prescribed. In children with amblyopia, glass prescription with insistence on regular and constant wear was advised and was reviewed after 1 month with visual acuity testing and refraction. If a patient was found to have less vision in one eye compared to other, in spite of regular use of spectacles, occlusion therapy was initiated (duration of occlusion depended on age and visual deficit).

Results

A total of 100 children between 5 to 15 years of age group were included; where majority (50%) was between 9-12 years with mean age as 9.5 years. Astigmatism was the most common refractive error of about 56% followed by myopia 34% and hypermetropia 9%. Astigmatism was common in both males and females of about 22% and 34% followed by myopia which is 23% in females and 11% in males and hypermetropia which were almost 9% among both sexes. Astigmatism was common in age group 9-12 years (30 children) followed by 13-15 years (18 children). Myopia was found to have equal distribution between 9-12 and 13-15 years whereas hypermetropia was common in age group between 9-12 years showing that refractive errors are most common in age

group 9-12 years (Table 2). The common type of astigmatism was compound myopic astigmatism (46.43%) followed by simple myopic astigmatism (41.07%) (Table 3). Of the 100 children with refractive errors in the study 10 were non correctable. Of the 10 non correctable refractive error 5 belonged to age group 9-12 years. The most common complaints presented among the children was diminution of vision (42 children) especially between 13-15 years followed by headache (36 children) in children between 9-12 years with not much sex variation 10 children were found to have uncorrectable refractive error among 48 children who had positive family history suggesting strong influence of family history with uncorrectable refractive error. Out of 100 children examined, 14 were found to be amblyopes and the common refractive error among amblyopes was found to be compound myopic astigmatism followed by simple myopic astigmatism. Of the 100 children with refractive error, in 1 month follow up, 10 (10%) of children did not have improvement of vision and the reason for non-improvement of vision could be amblyopia in older children more than the 8 years of age. Other ocular findings such as allergic conjunctivitis, bitot spots were also found in 18 children. Ocular defects such as congenital ptosis, corneal opacity, squint, spring catarrh were also found in about 6 children and contributed for uncorrectable refractive errors.

Table 1: Demographic details of the children in the present study

Age	Male	Female	Total
Below 8 years	5	10	15(15%)
9-12 years	16	34	50(50%)
13-15 years	18	17	35(35%)
Total	39	61	100(100%)

Table 2: Distribution by types of refractive errors with respect to age and sex

Refractive errors	5-8 years		9-12 years		13-15 years	
	Male	Female	Male	Female	Male	Female
Astigmatism 56	2	6	8	22	12	6
Myopia 35	2	4	6	9	4	10
Hypermetropia 9	1	0	2	3	2	1
Total	5	10	16	34	18	17

Table 3: Distribution by types of astigmatism

Types	No. of children found with error	Percentage
Simple myopic astigmatism	23	41.07
compound myopic astigmatism	26	46.43
Simple hypermetropic astigmatism	4	7.14
compound hypermetropic astigmatism	2	3.57
Mixed astigmatism	1	1.79
Total	56	100

Discussion

In our study out of 100 children between 5 to 15 years of age group were included, where majority (50%) were between 9-12 years with mean age as 9.5 years.

Astigmatism was the most common refractive error of about 56% followed by myopia 34% and hypermetropia 9%. Out of total 56% of astigmatic patients, simple myopic astigmatism was present in 41.07% patients; compound myopic astigmatism 46.43% patients; simple hypermetropic astigmatism in 7.14% patients; compound hypermetropic astigmatism in 3.57% patients and mixed astigmatism in 1.79 % patients. These findings were consistent with other refractive error studies in children[11].

These findings can be explained on the natural process of emmetropism of the development of immature human eye. In most new-borns, the growth of the eye increases initially and then declines over the first year of life. Babies with mild hypermetropia often become emmetropic or even myopic when they become older. In a study conducted in China it was found that myopia of -0.5 dioptre or less in either eye was essentially absent in 5 years old children but increased to 36.7% in male and 55% in females by age 15[12]. Over the same age range, hypermetropia of 2 dioptres or greater decreased from 8.8% in males and 19.6% in females to less than 2% in both. Similar results were found in refractive error study in children from La Florida, Chile[11]. 53.66% of the patients had headache as the presenting complaint and 38.05% had diminution of vision as the presenting complaint and 15% had other

complaints such as redness, watering, ocular pain, ocular injuries, frequent blinking etc. Therefore, children with complaints of headache, inattentiveness in class, frequent blinking or rubbing of eyes should be considered by the parent or school teacher as an indicator to have an ophthalmic examination to evaluate the visual status. In this study headache was the commonest symptom found in 51% of the children. This finding is in accordance with the study done by Hendricks et al, headache is the commonest habitual symptom in refractive errors, it is also seen more in females than males and common in age group 13-15[13]. In this study, prevalence of myopia was higher in school going children as compared to illiterate children. Similar findings were described by Seet et al who have raised concern that rapid rise in myopia prevalence among Singaporeans is related to higher educational attainment[14]. In a study done by Afghani et al in-school children found that myopia was three times more common (3.26%) than hypermetropia (0.99%).¹⁵ 48% of the patients had a positive family history suggesting strongly of the importance of genetic inheritance in refractive error incidence. About 4% of them had history of wearing glasses which suggests the importance of repeated visits to the ophthalmologist by a child who is already diagnosed to be suffering from refractive error. The reason for this is the constantly changing refractive correction particularly in hypermetropia and pathological myopia. 90% of the errors could be corrected which shows that though refractive error is the major cause for gradual dimness of vision,

it can be treated. Though refractive errors cannot be prevented, its effects on visual deterioration could be controlled by timely examination and correction with spectacles and occlusion therapy in the needed cases. Among the children in the study about 14% (14 children) had amblyopia.

After 1 month of follow up of children with spectacle correction 90 children showed improvement in refraction while 10 children did not show improvement. Non correctable errors (10%) are typically seen in the older age groups which suggest that delay in treating refractive error in the younger age groups have a very damaging effect on the child's vision and future as amblyopia cannot be corrected after the critical and sensitive age of 8 years. Other conditions such as strabismus, bitot spots, allergic conjunctivitis, and corneal opacity also contributed for refractive errors in children. There is higher prevalence of refractive errors and associated strabismus and amblyopia in children. Many such children are treated late or not at all. Mass school screening by governmental and non-governmental organizations followed by prompt treatment appears the only viable solution to this problem. Teachers should also be educated about the symptoms of refractive errors and the method of checking the visual acuity which helps them to refer the children with the visual complaints to the ophthalmologist at the earliest. Refractive errors in children are an important public health issue as they are the socio-economic future of the country. Screening should be initiated early in the schools and these children should be followed up regularly for compliance as amblyopia is an important preventable cause of needless blindness in children.

Conclusion

The present study concluded that the refractive errors with or without amblyopia is a common and significant cause of visual impairment in the children.

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