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Original Research Paper

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PREVALENCE OF REFRACTIVE ERRORS IN PRE-SCHOOL CHILDREN (3-5 YEARS) IN AN URBAN POPULATION.

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ABSTRACT

BACKGROUND AND OBJECTIVE: Refractive errors remain a very important cause of treatable blindness especially in children and when diagnosed early can help improve their overall development. The purpose of this study was to evaluate the prevalence of refractive errors in preschool children enrolled in kindergartens of Jammu. **MATERIALS AND METHODS:** This study included 357 preschool children in the age group of 3-5 years old of both the sexes. 3 Kindergartens were randomly selected and all the children enrolled were screened for refractive errors. The children with suspected refractive errors were called in Eye OPD of our hospital for retinoscopy under cycloplegia to assess the amount of refractive errors which was taken as hyperopia of >4D in 3-4 years old and >3D in 4-5 years old, Astigmatism of >1.5D in 3-5 years old and myopia of >-3D in 3-5 years old. Emmetropia was below these levels. **RESULTS:** A total of 13.44% (n-48) were diagnosed with refractive errors. Hyperopia was diagnosed in 8.96% (n-32) while astigmatism was found in 3.08% (n-11). Myopia was present in 1.40% (n-5) of children. Rest 86.55% (n-309) were emmetropes.**CONCLUSION:** Most common refractive error in preschool children was found to be hypermetropia followed by astigmatism. Myopia was found more in children above 4years of age. So, early screening and treatment is very important to prevent lifelong visual impairment and different strategies are required to improve current vision screening methods in preschoolers.

KEYWORDS : Hypermetropia, Astigmatism, Myopia, Cycloplegia, Retinoscopy, Emmetropia.

INTRODUCTION

Uncorrected refractive errors remain the leading cause of visual impairment worldwide, especially in developing countries including India. [1],[2] Uncorrected refractive errors have profound consequences on the overall development of children, most importantly on their education and psychosocial development.

Children often do not complain of defective vision and may not be even aware of their problems. They adjust to poor vision in different ways like moving objects closer or tend to avoid task requiring more visual concentration. There is disparity in the availability of eye care services at different regions in a country like ours and thus school based vision screening programmes are useful and cost effective in detecting treatable causes of decreased vision among children.

Uncorrected refractive errors are an avoidable cause of visual impairment affecting majority of children in India. The main cause of visual impairment is refractive error in India contributing 87.1% visual impairment in urban children and 61% in rural children.[3],[4]Region specific prevalence estimates of refractive errors in children are necessary for policy decisions and evidence based allocation of resources. Global estimates show that around 1.42 million and 17.52 million children are suffering from blindness and moderate to severe visual impairment respectively. [3] There are very few population-based surveys on childhood blindness and visual impairment. 0.8/1000 is known to be the current prevalence of blindness in paediatric age group in India [5], but its fortunate that majority of the causes of blindness are avoidable. More population based surveys are needed to know the actual distribution of refractive errors in children and in planning cost effective programmes for reducing the burden of blindness and visual impairment in children.

Its recommended to screen children for early detection and intervention to provide them with best opportunities to develop. [6] Underserved communities where there is lack of knowledge and scarcity of available resources, refraction of children and provision of spectacles to prevent blindness should be undertaken by government and non-government organizations. The main aim of this study is to estimate prevalence of refractive errors among children of 3-5 years' age group, which will be helpful in early detection and correction of these errors and in preventing the development of related ocular morbidities like amblyopia, squint etc. and judicious allocation of future resources tailored according to the need of the community. Preschool vision screening programmes should be adopted to ensure timely assessment and interventions as and when required.

MATERIALS AND METHODS

The present study is a descriptive cross sectional study. Ethical clearance was obtained from the Institutional ethics committee before conducting the study. This study included 357 preschool children of 3-5 years' age group of both the sexes residing in Jammu. We randomly selected 3 kindergartens from a list of schools located within the municipality limits of Jammu region and all the children attending these kindergartens were invited to participate from November 2019 to February 2019. A written permission from the respective principals was obtained after explaining the purpose of the study. The purpose and procedure of the study was also explained to their parents by their respective class teachers before obtaining a written informed consent and only those who agreed were included in the study. Verbal consent was also taken from each child before commencing the ocular examination.

The children with other ocular co-morbidities like corneal opacities, cataract, squint and glaucoma were excluded from the study. Also if any child had history of ocular trauma or head injury following which vision was decreased were also excluded from the study. All the children first underwent preliminary ocular examination in the school with the aid of

Snellen's chart, picture charts and trial frame. One optometrist performed refraction of all the children and one ophthalmologist conducted ocular examination. Those who were not achieving best corrected visual acuity following subjective refraction were advised to attend Eye OPD of our institute along with their teachers for further evaluation and to assess the presence of refractive errors. Cooperation and participation of children was aided by the presence of their school teachers along with them in the OPD.

We provided Atropine eye ointment to the teachers for selected children and explained them about the possible side effects that can occur in children. Those children who were willing to undergo eye examination along with their parent's consent after being explained about the potential side effects of atropine by their teachers were advised to come in the Eye OPD. Cycloplegia was achieved with 1% atropine eye ointment three times a day for 3 days which was explained to the teachers before the hospital visit. On the day of OPD visit they were examined by retinoscopy under full cycloplegia and fundus examination was also done. A single ophthalmologist along with one optometrist performed the eye examination in all the children to reduce subjective error. Significant levels of refractive error for which treatment was prescribed was Hyperopia of >+4D in age group 3-4 yrs and >+3D in more than 4years old, Astigmatism >1.5 D in 3-5 years old and Myopia of >-3D in 3-5 yrs old. Emmetropia was below these levels.

Statistical Analysis

The data collected was entered into a master chart on Microsoft excel spread sheet and analysed. Data was grouped, tabulated and represented in the form of number and percentages and stratified on the basis of age and gender.

RESULTS

357 preschool children were included in the study out of which 55.46% (n-198) were females and 44.53% (n-159) were males and is shown in Table 1. The mean age was 4.12 years with the range of 3-5 years. A total of 13.44% (n-48) were diagnosed with refractive errors. Hyperopia was diagnosed in 8.96% (n-32) while the astigmatism was found in 3.08% (n-11). Myopia was present in 1.40% (n-5) of children. 86.55% were emmetropes as given in the Figure 1.

Table 1: Showing Gender and Age wise distribution of children included in our study.

Age (years)	Male (no.)	Female(no.)
3 to <4	59	53
4 to<5	53	77
5 to <6	47	68
Total	**159(44.54%)**	**198(55.46%)**

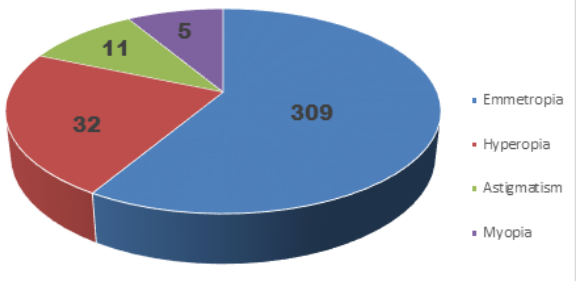

Figure 1- Showing distribution of different refractive errors among screened children.

DISCUSSION

Refractive errors among children are a very common problem and needs to be assessed regularly for early detection and timely interventions. In our study, we screened 357 children of 3-5 years' age group out of which 48(13%) were diagnosed with refractive errors in which hypermetropia was diagnosed in 29(60.41%), astigmatism in 11(22.91%), myopia in 8(16.6%) children. In a study by RB schimiti *et al.* [7] in 2001; included 614 children, 284(46.25%) had hyperopia, 206(33.55%) had myopia and 124(20.19%) showed mixed astigmatism. ASI Pai *et al.* [8] in 2012 concluded in their study that refractive errors particularly hyperopia and astigmatism were the major amblyogenic factors in preschool population. A study by DSP Fan *et al.* [9] in 2004 found high prevalence of astigmatism in Chinese preschool children, predisposing them to progressive myopia.

Visual disorders like amblyopia, refractive errors and strabismus are found in relatively high frequency in school going children. S Resnikoff *et al.* [10] in 2008 estimated the prevalence of visual impairment caused by uncorrected refractive errors in 5-year old children and found that uncorrected refractive errors can hamper performance at school, reduce employability and productivity and impaired quality of life. Jamali *et al.* [11] in 2009 sampled 6years old children and observed relatively high rates of hyperopia and astigmatism in this population.

Another study by JR Polling *et al.* [12] in 2012 observed that refractive errors are more common in Caucasian children and prevalence of amblyopia was 3times more in unscreened population. Study by W Lan *et al.* [13] in 2013 suggested that children up to age of 5-6 years developed little myopia and hyperopia mean spherical equivalent over +1 D. In our study we also found the similar results i.e. high rate of hyperopia and astigmatism in preschool children. In a review article by Sheeladevi *et al.* [14] in 2018, they observed that overall prevalence of myopia, hyperopia and astigmatism was 5.3, 4.0 and 5.4% respectively. A retrospective data collection on causes of childhood vision impairment in Eritrea was done and they concluded that cataract, corneal opacities/scarring, refractive errors and amblyopia and lobe damage post trauma were the leading causes of visual impairment among children attending a tertiary eye care hospital in Eritrea. [15]

A study conducted in Shanghai [16] on prevalence of refractive errors in Chinese preschool children showed maximum prevalence of astigmatism followed by myopia and hypermetropia which is different from our study, quiet possibly because of more prevalence of myopia in Chinese children. [17] In a study on prevalence of amblyopia among preschool children in central south china by Yun-Ping *et al.* [18] they observed that anisometropia and refractive errors were the most common causes of unilateral and bilateral amblyopia respectively. A study conducted in a rural paediatric population in southern India by Kemmanu V et al. [19] observed that most common ocular morbidity was bitot spots followed by refractive errors, both being avoidable causes of childhood blindness, when diagnosed early can be beneficial for the children. A prospective study to compare the results of cycloplegic and non-cycloplegic refractive error measurement in Chinese children showed that non-cycloplegic refraction is not suitable and found to be inaccurate for studying refractive errors in children. In children, if hyperopia remains uncorrected then it has a negative impact on distance visual acuity with growing age. [20] Therefore, correction of refractive errors is very important.

Parents are also concerned about their child's development and their concerns about overall development are also associated with the presence of refractive errors in their children especially in urban pre-school children. [21] With improving health care facilities, trend is changing for the cause of childhood blindness and visual impairment. Still efforts are required for timely paediatric eye care services and

proper refractive strategies. [22] These studies indicate the importance of early screening of refractive errors to prevent vision threatening complications. So, early screening and treatment is very important to prevent lifelong visual impairment and different strategies are required to improve current vision screening methods in pre-schoolers. Quality of life and academic achievements can be enhanced by treating children early.

CONCLUSION

Most common refractive error in preschool children was found to be hypermetropia followed by astigmatism. Myopia was found more in children above 4years of age. Refractive error in children remains a major health problem and needs collaborative efforts from various stakeholders including education providers, health care providers and parents to manage this issue effectively and reduce the potential loss to national economy especially in developing countries including India. There is need for public awareness regarding ocular health in our country.

LIMITATION: Due to present COVID conditions, schools were shut down, therefore more number of students could not be assessed.

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