Research article

Assessment of pattern of refractive errors in infantile esotropia- A single-center cross-sectional study

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DOI: 10.38106/LMRJ.2021.3.04-04
Received: 20.09.2021
Accepted: 21. 12.2021
Published: 30. 12.2021

ABSTRACT

This was a cross-sectional study conducted to explore the patterns of refractive errors found in infantile esotropia patients from newborns to the age of 15 years, attending the Pediatric clinic of Al-Ibrahim Eye Hospital, Karachi, Sindh, Pakistan. Data was collected on a pre-designed proforma. A total of 79 patients (total of 158 eyes) including 44 males (55%) and 36 females (45%) were recruited. All these patients had infantile esotropia. The study showed out of 79 patients (158 eyes), 89 eyes had hyperopia, 15 eyes had myopic astigmatism, 44 eyes had hyperopic astigmatism, while 4 eyes had mixed astigmatism, and 6 eyes had myopia. The hypermatropia was found to be the most commonly occurring refractive error in infantile esotropia resulting in inward eye deviation.

Key Words: Infantile, Esotropia, Refractive Error

INTRODUCTION

Any deviation of binocular alignment is called *Strabismus*. Squint or the lazy eye is a common term used for strabismus, if remains untreated it can potentially result in consequences including permanent loss of best-corrected visual acuity (ie amblyopia) in otherwise anatomically normal eye (1). Strabismus also badly affects the quality of life due to cosmetic disfigurement which in turn result in poor self-confidence and social dissociation (2). This can also badly affect career progression. Esotropia is a type of strabismus which presents with an inward turning of one or both eyes (3). Congenital esotropia patients tend to have compromised sensory function in a way that the focused object is seen by the fovea of one eye and the nasal retina of the second eye. It is reported that around 40% cases present within six months of age while other 60% by the age of 48 months (4). Infantile estropia is most frequently seen comitant esotropia with a reported incidence between 0.2 to 0.6% in the United Kingdom, and the United States of America (5,6).

Globally reported rate of visual impairment in children over the age of 5 years is 153 million due to untreated refractive errors, out of which 8 million are reported to end-up in blindness. According to World Health Organization approximately 12.8 million children between 5 to 15 years' age group are reportedly visually impaired mainly due to untreated refractive errors resulting in a worldwide prevalence of 0.96%, where the highest rate has been reported in urban regions in south-east Asia and China (7).

Refractive errors are correctable in a great majority of cases accounting for more than 50% of correctable cases where visual impairment can be successfully avoided. Refractive errors in children have a higher chance of remaining undetected, potentially causing behavioral complications and nega-

tively impacting social interaction and poor performance (academic or extra-curricular both activities) at school. There is evidence available suggesting an association of even slight reduction in vision can increased risk of poor performance regardless of age. While in children it has shown inverse relationship with the performance at school/ educational institution causing mental health issues in children (8). Nevertheless, up to 75% of all visual impairments reported from urban and high income regions are due to un-corrected or partially corrected refractive errors (8).

There is limited literature available suggesting types of refractive errors found in infants and younger children in the Pakistani population. Thus this study was designed to assess the types of errors found in our population that will help in the early diagnosis of refractive error and also the development of preventive strategies in infantile refractive errors.

METHODOLOGY

This descriptive cross-sectional study was conducted at the Pediatric Ophthalmology Department of Al-Ibrahim Eye Hospital, Isra School of Optometry, Karachi, Pakistan. The patients of infantile esotropia having eye deviation by birth or developed within the first six months of age and presented in the hospital by the age of 15 years were identified and recruited. Data was collected between August 2019 and October 2019. Patients were identified by using non-probability convenient sampling.

Initially patients had to register at the Pediatric department and their visual acuity was checked and then they were referred to the orthoptic department for case assessment. All patients underwent the assessment of cycloplegic refraction as well as fundoscopy for anterior and posterior segment examination. Data was collected and recorded on a pre-designed proforma.

Data was analyzed by using Statistical Package for Social Sciences (version 20.0). All continuous variables were presented as mean and ± Standard Deviation (SD). All categorical variables were presented as frequency distribution and percentages.

RESULTS

A total of 79 patients were recruited and 158 eyes were examined (ie 79 right eyes and 79 left eyes). There were 43 males and 36 females. The highest number of patients were presented in the age group 0-5 years, age distribution is given in Figure 1. The low refractive error was reported in 47.5%, moderate refractive error in 35.0%, and severe refractive error was reported in 16.3%. Females patients showed refractive errors in 36 (45%) patients while in males 43 (55%) had errors in refraction. A summary of the distribution of refractive errors according to age is presented in Table 1.

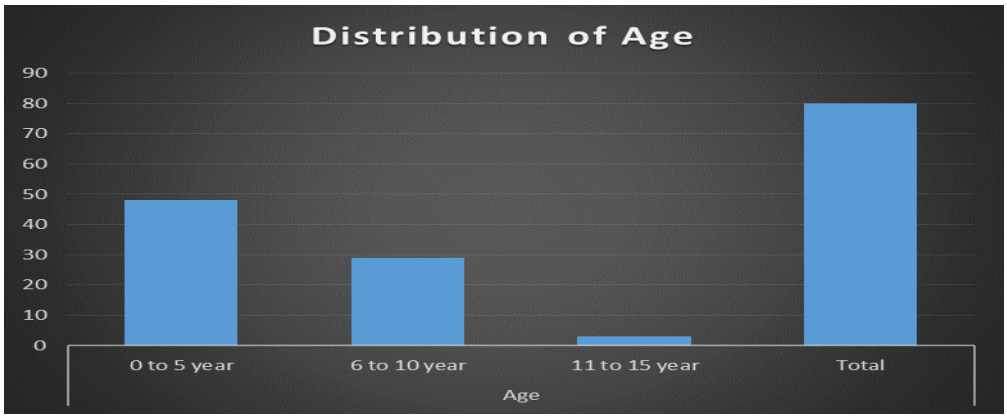

Figure 1. Age distribution of patients presenting with refractive error

Table 1: Comparison between Refractive error and age group

Type of Refractive Error of Total Eyes						
Age	**Myopia (%)**	**Hyperopia (%)**	**Myopic Astigmatism (%)**	**Hyperopic Astigmatism (%)**	**Mixed Astigmatism (%)**	**Total No of Eyes (%)**
0 to 5 year	**4 (2.5%)**	**58 (36.7%)**	**11 (6.9%)**	**20 (12.6%)**	**2 (1.2%)**	**95 (60.1%)**
6 to 10 year	**2 (1.2%)**	**27 (17.0%)**	**4 (2.5%)**	**22 (13.9%)**	**2 (1.2%)**	**57 (36.0%)**
11 to 15 year	**0 (0.0%)**	**4 (2.5%)**	**0 (0.0%)**	**2 (1.2%)**	**0 (0.0%)**	**6 (3.7%)**
Total	**6 (3.7%)**	**89 (56.3%)**	**15 (9.4%)**	**44 (27.8%)**	**4 (2.5%)**	**158 (100.0%)**

DISCUSSION

This study shows that out of 79 patients, right eyes were 79 (50%) and left eyes were 79 (50%), the frequency was found higher in the male 43(55%) as compared to females 36(45%) from 79 esotropic (infantile) patients. Similar results were previously reported in a study conducted by Retina Foundation of the Southwest, USA, where all recruited patients were followed up for a minimum of 5 years for infantile esotropia (8).

In this study frequency was found higher 48(60%) were falling in the age group between newborn to 5 years, 29(36.3%)were in the age group of 5 to 10 years, and 3(3.7%)were in the age group of 10 to 15 years. However, in study on longitudinal refractive changes in infantile esotropia from United States of America (8), 13 (ie 9%) participants had correction of their vision before their first birthday with or without use of spectacle. While those who presented late n=130 (ie 91%) participants had to undergo surgery. The mean age of patients who underwent surgery was 9.9±5.6 months (8).

In contrast in our study out of 79 patients (ie 158 eyes), 15 eyes had myopic astigmatism, 44 eyes were found hyperopic astigmatism, while 4 eyes were found to have mixed astigmatism, 89 eyes were found to have hyperopic and 6 eyes were myopic, and none of them had correction within one year. One such study focusing on "Longitudinal Changes in Refractive Error of Children with Infantile Esotropia" reported that 55% of low to moderate hypermetropic refractive errors had a spherical equivalent with (<+3.00 DS), while 27% had a spherical equivalent of +3.00 to +4.99 DS, and only 19 (13%) had a spherical equivalent ≥+5 .00 DS, Eight (6%) had a myopic of infantile esotropia patients (5).

In another study from Asian population focusing on comitant horizontal strabismus reported that less to moderate hyperopes refractive errors were found in children (3). There was Myopia (i.e., spherical equivalent ⩽ −0.5 D) present in 5%, while 58% of children had moderate hyperopes (with spherical equivalent ⩾2 D). However, in our study there were no difference observed in the type of refractive error, this might be because of difference in sample size.

Similar studies have been reported from other regions of the world but limited literature has been presented from Sindh therefore this study is first of its kind. Another important factor observed beyond the scope of the study that people had lack of awareness to get their eye conditions checked or check their children at early age to exclude any visual impairment.

CONCLUSION

In the study, hypermetropia found to be the most frequently occurring type of refractive error in infantile esotropia causing inward eye deviation. Individuals with congenital esotropia fail to demonstrate typical patterns of emmetropisation. Therefore, correction of refractive errors should be encouraged in children with esodeviation; so that visual impairment can be timely corrected.

Ethical Consideration: Approval of the study was taken from the research ethical committee of Isra postgraduate institute of ophthalmology Informed consent was taken from all the patients, the codes were used for data collection. Names of the patients or any kind of identity was not mentioned in questionnaire or any other form of data.

Conflict of Interest: Authors declare no conflict of interest.
Funding: No funds required for the study.

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