

Occurrence of different types of Manifest Strabismus in Children

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Abstract: Manifest strabismus is a visual defect that can be either constant or intermittent. It may involve only one or both eyes simultaneously. It is basically the misalignment of the eyes, as a result, the retinal image is not in corresponding areas of both eyes, which may result in diplopia in adult patients and can lead to amblyopia in childhood. The objective of this study was to observe the frequency of different types of manifest strabismus in children attending ophthalmology out-patient department at Al-Shifa Trust Eye Hospital Rawalpindi. The study design was descriptive Cross-sectional study. It was conducted at Department of pediatric ophthalmology and strabismus, Al-Shifa Trust Eye Hospital Rawalpindi. The study duration was Six months (from 1st July 2016 to 31st Dec 2016). The data of the Patients was collected by the application of Consecutive Sampling technique and a total of 711 strabismus patients were examined attending the OPD. Data was recorded on a prescribed Performa. Detailed strabismus evaluation was performed by orthoptists. All these tests were performed both at near and distance when possible. Cycloplegic refraction was performed with 1% cyclopentolate eye drops. Ophthalmic examination was carried out by pediatric ophthalmologist. The results of the study show that there were total 711 patients with mean age (in years) \pm SD as 5 ± 3.27 . The minimum age was 3 months and maximum age was 12 years. The results revealed that majority of the patients had constant ET (30.1%), followed by constant XT (20.4%), congenital ET (14.2%), intermittent XT (12%), accommodative ET (11.8%), pseudo squint (7.7%), vertical deviation (1.3%), Duane syndrome (0.7%), MED (0.7%), CFEOM (0.6%), nystagmus (0.3%), 6th nerve palsy (0.1%) and bilateral Duane syndrome (0.1%). The congenital ET, constant ET, constant XT, intermittent XT and MED was found more common among males compared to females. Most of the patients having strabismus were less than three years of age. The study concluded that comitant strabismus is more occurring than incomitant type. Most occurring types of strabismus in children are constant ET, constant XT, congenital ET, intermittent XT, and accommodative ET.

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INTRODUCTION

Strabismus, which is also known as heterotropia, squint, and tropia, is a common ocular disorder having a prevalence of 1% to 4% (1, 2). The types of strabismus include both incomitant and comitant strabismus. In the comitant strabismus the angle of deviation of the eye remains same in different directions of gaze. The types of comitant strabismus include exotropia, esotropia, hypertropia, hypotropia and microstrabismus. In the incomitant strabismus, which is also known as complex or paralytic strabismus, the angle of deviation or misalignment varies with the direction of gaze. The prevalence of congenital cranial disinnervation disorders is approximately 5% which comprises of congenital fibrosis of the extraocular muscles (CFEOM),

various forms of Duane retraction syndrome (DRS), and horizontal gaze palsy (3). The horizontal strabismus is the most prevalent form of comitant strabismus(4). In strabismus, when a child fixates on an object, one eye is either intermittently or constantly not aligned to the fixating point with the other eye. Consequently, the fovea of deviated eye fails to form the image of the object being fixated. Exotropia is the outward misalignment of the eye and the esotropia is an inward deviation or misalignment of the eye. Similarly, an upward deviation of eye is called hypertropia and the downward deviation is called hypotropia. The top inward wheel-like deviation of eye is called incyclotorsion and the top outward wheel-like deviation of eye is called excyclotorsion (5).

This study was conducted to find out the frequency of different types of manifest strabismus in children attending the department of pediatric ophthalmology and strabismus at Al-Shifa Trust Eye Hospital Rawalpindi.

PATIENTS AND METHODS

It was a Descriptive Cross-Sectional study, which was six months duration, started on 1st July 2016 and continued till 31st December 2016. The Consecutive sampling technique was used to collect the sample. Total of 711 strabismus patients were enrolled for study who were examined attending the OPD of department of pediatric ophthalmology and strabismus at Al-Shifa Trust Eye Hospital Rawalpindi. After proper slit-lamp examination, patients were referred to the orthoptist clinic from OPD to rule-out any anterior or posterior segment pathology. After taking complete history of the patients, their visual acuity was recorded for each eye separately by using an age appropriate visual acuity assessment tests. It was assessed by using, teller acuity card, cardiff cards, lea symbols, Allen pictures and the Snellen chart in older children. Orthoptists performed the detailed orthoptic examination of all children. The Bruckner reflex and Hirschberg reflex was observed by direct ophthalmoscope for the qualitative assessment of the deviation. The cover tests was performed to differentiate between heterotropia and well compensated heterophoria. For quantitative measurement of the angle of division, prisms were used for performing Krimsky test and Prism cover test. For infants and in children with poor fixation, evaluation was relied upon qualitative assessment. All these tests were performed at near (40cm) and distance (6m) and without and with glasses (in patients having previous prescription). The EOM motility was assessed in 9 positions of gaze to see whether there is normal or abnormal muscle action. Presence or absence of diplopia was assessed and stereopsis was checked with Titmus Fly test

when possible. The worth-4-Dot test was used to assess sensory anomalies. Cycloplegic refraction was performed on all children by instilling 1% cyclopentolate eye drops, 3 times in each eye, 10 minutes apart and then retinoscopy was performed Any available previous prescription was determined by the Lensmeter. Final refraction was prescribed as full cycloplegic refraction in accommodative (hyperopic) esotropes and in myopic exotropes. Management plan also included the visual rehabilitation followed by strabismus surgery if required. The clinical eye examination was performed by the pediatric ophthalmologists which included the anterior and posterior segment examination.

Data was entered and analyzed using SPSS 22. The continuous variable was analyzed as Mean \pm SD and Median, and categorical variables as Frequency.

RESULTS

There were total 711 patients with mean age (in years) \pm SD as 5 ± 3.27 . The minimum age was 3 months and maximum age was 12 years. The results revealed that majority of the children had constant ET (30.1%), followed by constant XT (20.4%), congenital ET (14.2%), intermittent XT (12%), accommodative ET (11.8%), pseudo squint (7.7%), vertical deviation (1.3%), Duane syndrome (0.7%), MED (0.7%), CFEOM (0.6%), nystagmus (0.3%), 6th nerve palsy (0.1%) and bilateral Duane syndrome (0.1%). The frequency of constant ET, congenital ET, constant XT, and intermittent XT was higher in males while accommodative ET and pseudo squint was more frequent in females. The frequency of different types of strabismus in both genders is shown in Graph no: 1. The frequency of types of squint in different age group is given in Table1. Table 2 shows the descriptive statistics of age with respect to different types of strabismus.

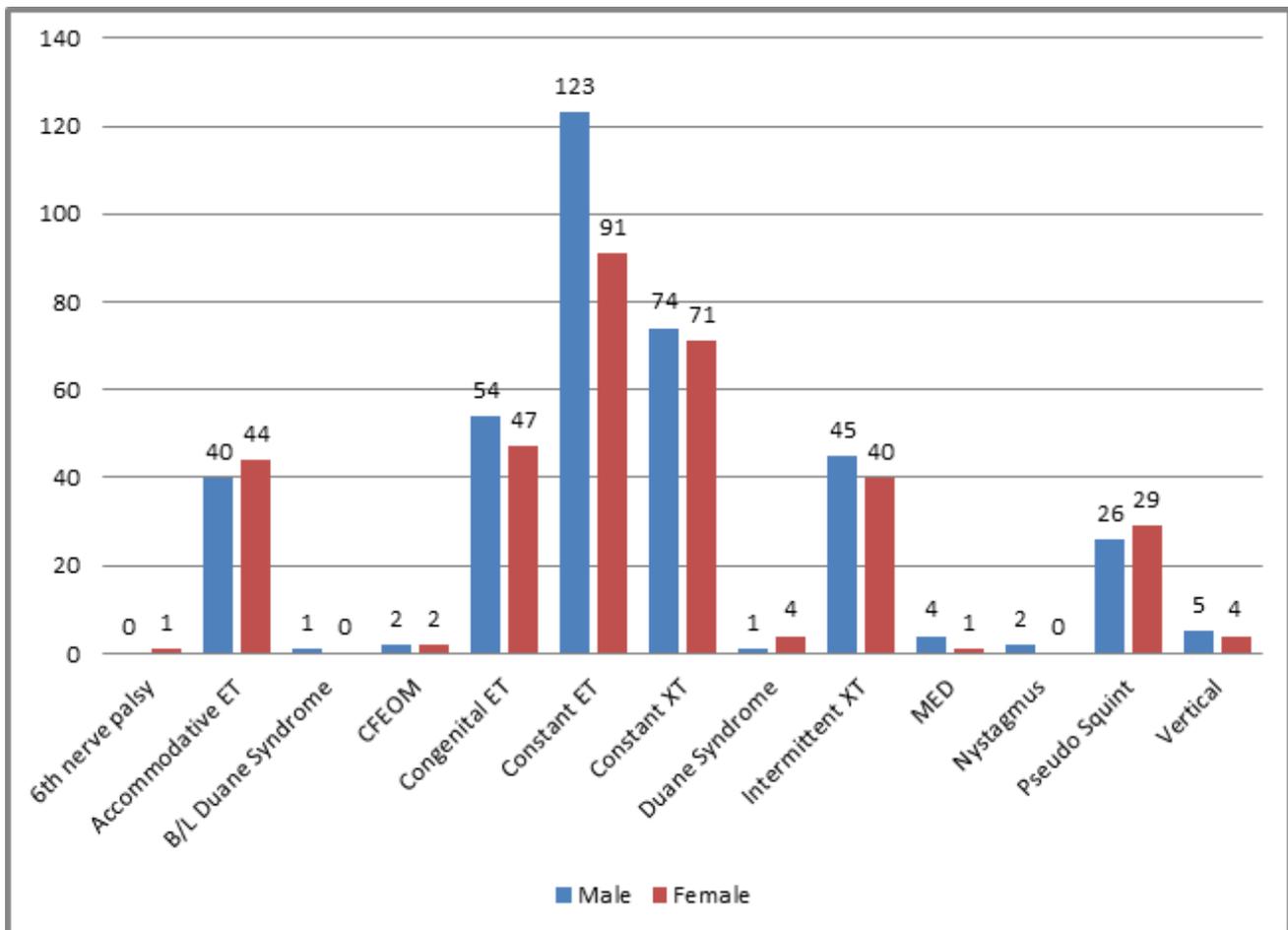


Table 1: Frequency of different types of Strabismus in different Age Groups

Diagnosis	3 month to 3 Years	4 – 6 Years	7 – 9 Years	10 – 13 Years
	N (%)	N (%)	N (%)	N (%)
6th nerve palsy	0	0	0	1 (0.9)
Accommodative ET	22 (7.6)	34 (15.9)	13 (12.9)	15 (14.2)
B/L Duane Syndrome	0	0	1 (1)	0
CFEOM	1 (0.3)	1 (0.5)	1 (1)	1 (0.9)
Congenital ET	101 (34.8)	0	0	0
Constant ET	43 (14.8)	96 (44.9)	35 (34.7)	40 (37.7)
Constant XT	58 (20)	40 (18.7)	21 (20.8)	26 (24.5)
Duane Syndrome	0	1 (0.5)	3 (3)	1 (0.9)
Intermittent XT	27 (9.3)	24 (11.2)	19 (18.8)	15 (14.2)
MED	2 (0.7)	2 (0.9)	0	1 (0.9)
Nystagmus	1 (0.3)	1 (0.5)	0	0
Pseudo Squint	35 (12.1)	11 (5.1)	7 (6.9)	2 (1.9)
Vertical	0	4 (1.9)	1 (1)	4 (3.8)
Total	290 (100)	214 (100)	101 (100)	106 (100)

Table 2: Descriptive Statistics of Age in different types of Strabismus

Diagnosis	N	Minimum Age (in years)	Maximum Age (in years)	Range of Age (in years)	Mean Age (in years)	SD	Median Age (in years)
6th nerve palsy	1	12	12	0	12.00	--	12
Accommodative ET	84	2	12	10	5.93	2.95	5
Bilateral Duane Syndrome	1	7	7	0	7.00	--	7
CFEOM	4	1	10	9	6.00	3.92	6 ½
Congenital ET	101	½	3	2 ½	1.48	0.59	1
Constant ET	214	1	12	11	6.00	2.91	5
Constant XT	145	½	12	11 ½	5.24	3.34	4
Duane Syndrome	5	5	12	7	7.80	2.59	7
Intermittent XT	85	1	12	11	5.65	3.18	5
MED	5	1	12	11	5.00	4.53	5
Nystagmus	2	1	6	5	3.50	3.54	3 ½
Pseudo Squint	55	3 months	12	11.7	3.56	2.83	3
Vertical	9	4	12	8	8.00	3.35	8
Total	711	3 months	12	11.7	4.99	3.27	4

DISCUSSION

Strabismus is a common pediatric eye problem with visual and cosmetic consequences. It is a common cause of amblyopia, because most deviations occur in the critical period of visual development (period of plasticity), so if it is not diagnosed and remain untreated, it can cause irreversible amblyopia. Strabismus also results in confusion or diplopia in adults, because of the brain's inability to suppress one image. It leads to loss of binocularity and depth perception (stereopsis) (6).

The results of this study revealed that majority of the patients had constant ET, followed by constant XT, congenital ET, intermittent XT, accommodative ET and pseudo squint, vertical deviation, Duane syndrome, MED, CFEOM, nystagmus, 6th nerve palsy and bilateral Duane syndrome. Most of the patients having strabismus were less than three years of age.

In this study, the prevalence of esotropia was found more than exotropia. Among all the types of strabismus, esotropia accounted for 56%

of cases, whereas the exotropia accounted for 32% of cases. Similar to the findings of this study, Tekle and Bejigain conducted a study on pre-school children, they observed that the most common type of strabismus was esotropia with a prevalence of 69% followed by exotropia having a prevalence of 24% (7). The Baltimore Pediatric Eye Disease Study demonstrated that the prevalence of manifest strabismus was found as 3.3% among white children and 2.1% among African American children. Among both these groups the esotropia and exotropia comprised of nearly half of all forms of strabismus (8).

In a study which was carried out on elementary school children in Japan, Matsuo observed that the occurrence of strabismus was 1.28% among these children and the most frequent type of strabismus was exotropia (9). In this study, the constant esotropia was most common, accounted for 54% of all the esotropia cases. Another study revealed that among all the cases of esotropia the prevalence of fully accommodative esotropia was 36.4% (2). It is noteworthy that in various studies

carried out among East Asian population, the most common type of strabismus was exotropia. According to a survey conducted on Korean school children, among all the cases of strabismus there were 81.4% cases of exotropia and 18.6% cases of esotropia. Stidwill observed in his study, that the parietic strabismus accounts for 10% of all the forms of strabismus.

Prevalence of strabismus has been estimated through school & clinic based studies (8). However discrepancy in disease classification and study design could be responsible for some variation in results (10). The ratio between esotropia and exotropia in Caucasians is 60:40. Whereas, in Asians, the ratio is 33:67. This difference is thought to be due to anatomical variations between these two races (11).

After conducting a number of community-based studies, esotropia has been reported five times more frequently than exotropia in Ireland and twice as frequently in Australia (12). In the current study, the accommodative esotropia was found more common among females (52%) compared to males (48%), whereas, the congenital ET, constant ET, constant XT, intermittent XT and MED were found more common among males than females. In a similar study, with respect to gender, females comprised 60 to 70 percent of patients with exotropia (13).

In Pakistan, children under the age of 15 years account for 45% of the total population (14). The overall estimated prevalence of strabismus in Pakistan is 5.4%, in US 4%, 2.1% among African-American and 3.3% in White children. In our study, most of the children having strabismus were under the 3 years of age (40.8%), followed

by 30% of children between 4-6 years of age, 15% of children between 10-13 years and 14% of children were between 7-9 years of age. In a study conducted by Nusz et al, the highest frequency of the patients was in the age group of 7-10 years i.e. 31%, followed by 3-6 years age group i.e. 27%. 78% of the patients were children (3-14 years). Remaining 22% were adults, indicating that comitant strabismus is an anomaly of childhood. The difference in this study can probably be attributed to the different age group considered, sampling technique used, specified inclusion & exclusion criteria & the racial differences between Asian & American population.

CONCLUSION

The study concluded that comitant strabismus is more occurring than incomitant type. Most occurring types of strabismus in children are constant ET, constant XT, congenital ET, intermittent XT, and accommodative ET. The population based study should be conducted in other hospitals with larger sample size and for longer study duration so that the exact prevalence can be estimated. We should have strabismus awareness programs for the community. This will help the parents to bring their children for eye examination as soon as they notice a slight deviation of eye in their children to prevent them from visual impairment. Similarly, it is also significant to conduct strabismus awareness workshop at the primary and secondary healthcare levels to transfer the knowledge and skills for early diagnosis and timely management of strabismus.

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