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ORIGINAL ARTICLE

Strabismus and its Types in Children of Age 6 to 15 Years Presenting at a Public Sector Hospital of Karachi

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ABSTRACT

Objective: To determine the frequency and types of strabismus in children aged 6-15 years presenting at tertiary eye care Hospital, Karachi.

Methods: A prospective observational study was conducted from January to April 2018 at Department of Ophthalmology, Dow University Hospital, Karachi, Pakistan. All consecutive children suspected for strabismus referred to the Orthoptic clinic having 6-15 years of age of either gender without having strabismus surgery were enrolled. The vision of children, angle of deviation, types of strabismus with its diagnosis were assessed. The cover test and Hirschberg test were performed for the evaluation of strabismus. The presence of deviation of corneal reflex from the center of the cornea on Hirschberg test while presence of misalignment of either eye on cover test was labeled as positive for strabismus.

Results: Out of 1400 children, 87 (6.21%) children were found with strabismus. Amongst these 87 strabismus patients, 46 (53%) were females and 41 (47%) were males. True strabismus was observed in 74 (85.1%) patients. Comitant Esotropia was found to be higher, i.e. 40 (58%). Most of the children had greater than 6/12 distance visual acuity of both right eye (n=48, 55.2%) and left eye (n= 57, 65.5%). Similarly, greater than N10 near visual acuity of both right eye (n= 63, 72.4%) and left eye (n=65, 74.7%) was also found higher. A significant association of types of strabismus was found with affected eye (p-value 0.022).

Conclusion: The frequency of true strabismus was found higher among children referred to the Orthoptic clinic. In particular, concomitant Esotropia was the most common type of strabismus.

Keywords: Strabismus, esotropia, exotrpia, pseudostrabismus.

INTRODUCTION

Strabismus is one of the most important subspecialty in the field of ophthalmology.[1] It may be convergent or divergent, horizontal or vertical with variable angles of deviation.[2] Prevalence of this disease ranges from 0.5% to 5%.[3] In western countries overall prevalence is 2% to 6% among children.[4] Studies have reported concomitant convergent squint in Pakistan range from 2.5% to 2.75%.[5] In European children, prevalence of strabismus reported from 2% to 5% among preschool and school-aged children.[6] It is reported in a study on young Singaporean Chinese aged 6 to 72 months that the prevalence of strabismus was 0.80% with no age effects whereas in a study intermittent Exotropia was detected in 63% children with amblyopia, 15.0% had strabismus, whereas 12.5% of children with strabismus had amblyopia.[7]

Thus, strabismus is one of the frequently encountered disease entities in the ophthalmology outpatient department. However, studies reporting the type of strabismus in our community particularly in young children are scarce. Therefore, this study was conducted with the aim to determine the most common type of strabismus in outpatient children attending a tertiary care hospital of metropolitan city, Karachi.

METHODS

This hospital-based, prospective observational study was conducted at the Ophthalmology Department of Dow University Hospital, Karachi, Pakistan from January 2018 to April 2018. Institutional approval was obtained prior to conduct of the study. Children suspected for strabismus referred to the Orthoptic clinic aged 6 to 15 years of either gender were consecutively enrolled. Whereas children having with positive history of previous squint surgery were excluded. These patients were excluded because most of the children and parents do not know the type of strabismus before surgery. Signed informed consent was also obtained from all patients parents after explaining the pros and cons of the study.

A detailed assessment regarding the vision of children, angle of deviation, type of strabismus with its particular diagnosis were performed. Strabismus was evaluated on the basis of cover test and Hirschberg test. For the evaluation of strabismus on cover test, one eye was fixed on what the person intends to look at (the fixing eye) and the other eye was looking at something else (the deviated eye). If the child misalignment was noted in any side of the eye, i.e. eyes that are not lined up to look at the same thing, strabismus was labeled as positive. These children were referred to the ophthalmologist for further detailed examination. While on Hirschberg test, strabismus was labeled as positive on the basis of the presence of deviation of corneal reflex from the center of the cornea.

Distance visual acuity of every patient was checked by the Snellen chart with glasses, without glasses, and with pinhole. The near Visual acuity was checked by N-Notation near chart.The eye adnexa were examined with torch. Orthoptic assessment included cover uncover test, Hirschberg, ocular motility, prism cover test, krimsky, prism reflex tests at 33cm for near and at 6 meters for distance.

Data analysis were performed on Statistical package of social sciences (SPSS) version 20.0. The comparison of strabismus and its types were compared with the baseline characteristics like age, gender and affected eye. Chi-square test was applied. P-value <0.05 was taken as significant. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

RESULTS

Out of 1400 children attended ophthalmology department, the frequency of strabismus was found in 87 (6.21%) children. These 87 children were referred to the Orthoptic clinic; the mean age of these children was 9.99 ±2.67 years. There were 41 (47.1%) males and 46 (52.9%) females. The majority of the children had distance visual acuity of both right and left eye greater than 6/12, i.e. 48 (55.2%) and 57 (65.5%) respectively. Moreover, majority of the children had near visual acuity of both right and left eye greater than N10, i.e. 63 (72.4%) and 65 (74.7%) respectively. (Figure 1)

Frequency of true strabismus was observed in 74 (85.1%) children whereas 13 (14.9%) children had Pseudostrabismus. Out of these 74 true strabismus children, concomitant strabismus was observed in 70 (94.6%) and incomitant strabismus was observed in 4 (5.4%) children.

Hirschberg distance test showed that central was found in 17 (19.5%) children, 5 to 15 degree in 29 (33.3%), 15 to 30 degree in 30 (34.5%), 30 to 45 degree in 9 (10.3%) and more than 45 degree in 2 (2.3%) children. While Hirschberg near test showed that central was found in 17 (19.5%), 5 to 15 degree in 30 (34.5%), 15 to 30 degree in 31 (35.6%), 30 to 45 degree in 7 (8%), and more than 45 degree in 2 (2.3%) children.

The cover test findings showed that 69 (79.3%)

children had manifest, 5 (5.7%) had latent whereas 13 (14.9%) children had Orthophoria. Out of 69 children with manifest, esotropia was found in 40 (58%) and Exotropia in 25 (36.2%) children whereas 4 (5.8%) had miscellaneous types (Figure 2). Out of 5 children with latent, Esophoria was found in 2 (40%) and exophoria was found in 3 (60%) children. The comparison of types of strabismus was found to be insignificantly associated with age (p-value 0.122) and gender (p-value 0.201). Types of strabismus with its subtypes is presented in table 1.

As far as types of strabismus are concerned, significant association of types of strabismus was found with affected eye (p-value 0.022). (Figure 3)

Table 1: Comparison of types of strabismus with its subtypes (n=87)

	Esotropia (n= 40)	Exotropia (n=25)	Pseudo strabismus (n=13)	Others (n=9)
Accommodative	3	-	-	-
Constant	8	2	-	-
With hypertropia	5	2	-	-
Alternate	14	13	-	-
with DVD and amblyopia	1	0	-	-
with Amblyopia	8	2	-	-
Convergence excess	1	-	-	-
Intermittent distance	-	6	-	-
Pseudostrabismus	-	-	13	-
Esophoria	-	-	-	2
Exophoria	-	-	-	3
III nerve palsy	-	-	-	3
Duane's syndrome	-	-	-	1

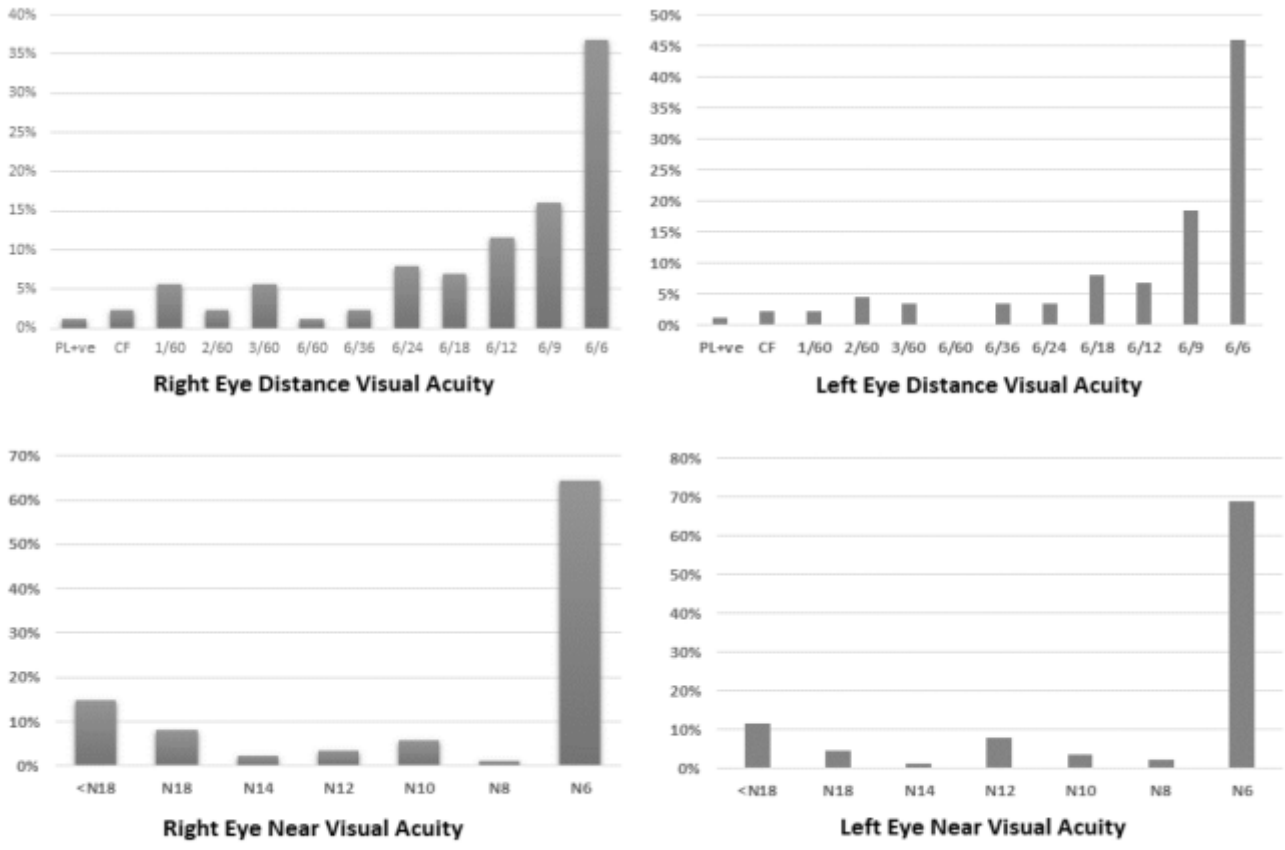

Figure 1: Distance and near visual acuity of both eyes

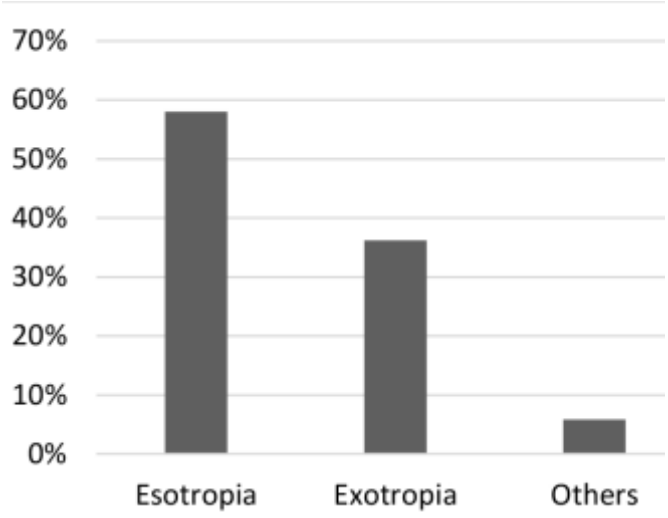

Figure 2: Frequency of manifest strabismus (n=69)

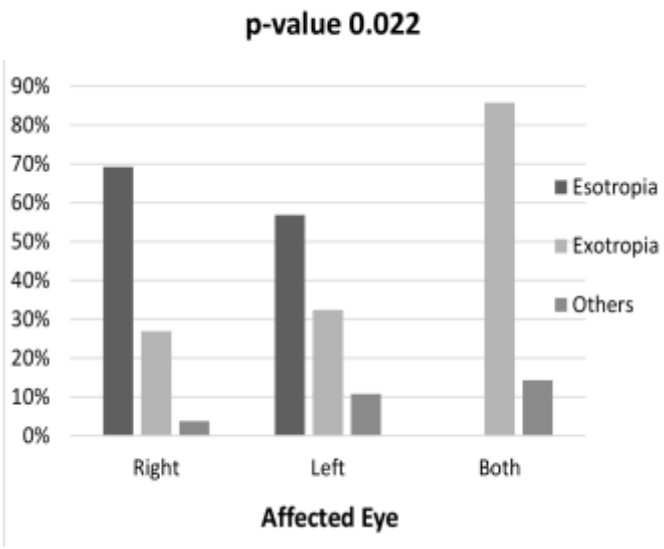

Figure 3: Comparison of strabismus types with affected eye (n=70)
***13 patients had pseudostrabismus**

DISCUSSION

The findings of our study reported that frequency of strabismus founds higher. Moreover, females were more affected than males. Similar findings were reported in previous studies.[8-10] However, according to school-based study from china has revealed an insignificant association of gender with the prevalence of strabismus. Furthermore, this study also illustrate that Exotropia has higher ratio than esotropia in school going children.[11] In our study it is reported that in children having infancy and early age of childhood, effect of unilateral eye may lead to Esotropia and children with bilateral strabismus had higher ratio of Exotropia both latent and manifest.

In addition, our study also reported no strong association of decreased vision due to strabismus because most of the patients had good visual acuity. In contrast to our study finding, a study by Robaei D et al has reported infantile strabismus is at high risk of reduced visual acuity and non-developed binocular function, consequently children with risk of strabismus must be detected earlier to prevent binocular problems[12.] If strabismus left untreated it decreased binocularity and increase risk of Amblyopia. It is also reported that strabismus patient also suffering from psychosocial problems like self-confidence, depression, and decreased relationships with others.[13.]

According to our study, prevalence of strabismus is likely same as global, mean age was less than ten years of age, comitant Esotropia is higher than other type of strabismus. Pseud-ostrabismus is also considerable condition which has higher ratio than incomitant strabismus. Patients diagnosed with Pseudostrabismus might be considered "at risk". With Pseudostrabismus, management should reflect this increased risk of true strabismus.[14]

In our study, in manifest strabismus, alternate Esotropia was the most frequent condition than other types of Esotropia in age group of 6-15 years. Garvey et al has reported racial difference in their study and strabismus in children was at the low end as compared to the prevalence reported in studies of European based white and African American black populations.[15] Another study conducted in Jordon reported that frequency of strabismus was less than one percentage.[16] A study was done in school going children in the district of Baluchistan, frequency of strabismus likely same as above was less than one percentange.[17] According to private sector study unilateral Esotropia was the most type of strabismus and males were mostly affected.[18] According to study of china and United Kingdom, strabismus frequency was same as global but

Exotropia was most common type.[19-20] As such the difference in the strabismus frequency rates was unlikely to be due to genetic factors and may be primarily environmental in nature. This could attribute to better socioeconomic conditions in the form of lower educational levels, less vigorous age.

The strength of the study is that this study included a very important binocular problem regarding children. Strabismus not only create visual problem but also effect the psychological and social stress which is not only faced by the children but their guardians as well.[21]

The limitation of this study is that the association of refractive error with risk factors of the strabismus like low gestational age, low birth weight, postnatal retinopathy of prematurity occurrence, artificial ventilation and intraventricular bleeding were not reported. Previous study has reported significance association of these risk factors with strabismis.[22] Further studies are recommended to investigate determinants of strabismus, demographic changes on types of strabismus and exact etiology of strabismus in our country.

CONCLUSION

The assessment of strabismus is important in all children age 6 years or above presenting to outpatient specially those children who are suspected or noticed for squint by any family member. In our study, most of the children had true strabismus. Moreover, concomitant Esotropia was the most common type of strabismus in outpatient. Visual acuity of the patients distance and near is almost good in both eyes. Early diagnosis and correction of the refractive error may prevent the high ratio of strabismus and also prevent the leading cause of visual loss in children due to lazy eye.

AUTHORS' CONTRIBUTION: MH substantially contributed to the conception and design of the study. AYJ worked in the acquisition, analysis, and interpretation of data and also drafted the manuscript, MH revised it critically for important intellectual content gave the final approval of the manuscript.

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