

# Prevalence of Strabismus and its type in Pediatric age group 6-15 years in a tertiary eye care hospital, Karachi

## Abstract

**Objective:** To know the prevalence and types of strabismus in patients presenting at tertiary eye care hospital, Karachi.

**Material and Method:** This hospital based cross sectional study was carried out at pediatric clinic of Al-Ibrahim Eye Hospital during June to August, 2017. Non-probability purposive sampling was used. All patients diagnosed with strabismus under 6 to 15 years of age either male or female and having no previous history of surgery and also signed the consent form were included. Any Surgery and other eye complications were excluded from study. All ocular examination belongs to strabismus were performed. SPSS version 20.0 was used to analyze the data.

**Results:** Prevalence of strabismus was found to be 6.2% according to total numbers of patient whereas according to 74 patients (Numbers of Patients found during study), 5.2% of strabismus was found. Most common. 40 (46.0%) age group was 6-9 years. The vast majority of cases were of manifest strabismus and the highest frequency found alternate esotropia 14 (16.1%). The strabismus includes esotropic 40 (45.97%), exotropic 25 (28.73%), third nerve palsies 3 (3.44%), Duane retraction syndrome 1 (1.14%), nystagmus 3(3.44%), amblyopia 3 (3.44%), esophoria 2(2.29%), exophoria 3(3.44%) and psuedostrabismus 7 (8.045%).

**Conclusion:** Prevalence of strabismus was found to be high. The manifest strabismus was more common than latent strabismus. Squint has immediate (Childhood) and long-term (I.e. during adulthood) effects on the life of the children. Timely diagnosis and treatment can improve prognosis and thus quality of life. On the basis of diagnosis alternate exotropia and alternate esotropia was observed in maximum respondents.

**Keywords:** strabismus, squint, crossed eye, heterotropia, heterophoria, neurological disorder

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## Introduction

Strabismus, also called squint, tropia and heterotropia, is a common ocular disorder having 1% to 4% of prevalence.<sup>1</sup> There are two types of strabismus: concomitant and incomitant. Concomitant strabismus is a condition in which the ocular angle of deviation remains constant in each direction of gaze. It includes the most common types of strabismus, including exotropia, esotropia, hypertropia, monofixation syndrome and microstrabismus. In the incomitant strabismus, which is also called as complex or paralytic strabismus, the misalignment of eyes or the angle of deviation differs with each direction of gaze. According to different surveys the global prevalence of strabismus shows the estimated prevalence of squint in the general population is from 2 to 5%. Between 5 and 15 million individuals in the United States may have this condition, several studies of clinical populations have reported that esotropia appears to occur approximately 3 times as often as exotropia in children.<sup>2</sup> However, the National Health Survey of individual's 4-74 years of age found a higher prevalence of exotropia (2.1%) than esotropia (1.2%) in the U.S population. This difference is probably related to the fact that the overall prevalence of strabismus in persons 55-75 years of age (in whom exotropia is more common) is 6.1% substantially greater than for very young children 1-3 years of age (1.9%) or children and adults 4-54 years of age (3.3%).<sup>3</sup> The prevalence of exotropia may be underestimated, because it is most often an intermittent strabismus. For Hispanic/Latino and African American children ages 6-72 months in Los Angeles, California. The prevalence

of strabismus was 2.4% for the former and 2.5% for the latter group. Exotropia was more common than esotropia.<sup>4</sup> Approximately 50% of all childhood esotropia are either fully or partially accommodative. An esotropia is partially accommodative when the accommodative factors of uncorrected hyperopia and/or a high accommodative convergence/accommodation (AC/A) ratio contribute to, but do not account for. The entire strabismus, non-accommodative esotropia is the second most common form of childhood esotropia, accounting for approximately 10% of all strabismus. Infantile esotropia accounts for approximately 8.1% of cases of esotropia, affecting 1 in every 100-500 persons.<sup>5</sup> Intermittent exotropia is the most common type of exotropia, affecting nearly 1% of the population. Exotropia has been reported to be more prevalent among Asian and African American populations than among Caucasians women comprise 60-70% of patients with exotropia.<sup>6</sup> The prevalence of strabismus in Nigeria was 0.14%.<sup>7</sup> In Pakistan, children under the age of 15 years account for 45% of the total population. The overall estimated prevalence of strabismus in Pakistan is 5.4%. Out of this 2.5% strabismus patients are under the age of the 5 years while 2.9% patients are over the age of 5 years. The national prevalence of squint 5.4% suggests that there are 7.02 million patients with strabismus in a population of 130 million.<sup>8</sup> The prevalence of strabismus conducted in Lady Reading Hospital, Peshawar, and The frequency of comitant convergent squint found in this study is 2.5% is almost similar to the Prevalence of squint in Pakistan which is 2.75%.<sup>9</sup> In the population of Rawalpindi, the frequency of all vertical deviations was 11.4%. Pure vertical deviation

was seen in about 2% of all strabismus cases and 60% of the patients with vertical deviation were under 10 years of age, with one third under 5 years.<sup>8</sup> The prevalence of strabismus and amblyopia varies in different parts of the world. While studies in African children showed a prevalence of between 0.5% and 4.4%, its prevalence in other parts of the world varies between 0.9% and 7.4%.<sup>10</sup> This study was design to know the frequency and types of strabismus in patients presenting at tertiary eye care hospital, Karachi.

### Methodology

This was a hospital-based cross-sectional study with non-probability, purposive sampling carried out at Pediatric ophthalmology department of Al-Ibrahim Eye Hospital (AIEH) Karachi. The duration is from June to Nov 2017. Ethical approval was taken from the institutional review board of the institution. Sample size was calculated from the online software Raosoft.com by taking 95% Confidence Interval, 5% Margin of error, Probability of 50%, Expected population of 300. The required sample size=169 (drawn from software) Inclusion criteria was age 6 to 15 years with no history of previous squint surgery. Both genders were included. Patients under the age of six years, already squint surgery done previously and those patients who did not give consent were excluded. The standard protocol for examination for all patients who were evaluated at the general outpatient clinic: The demographic data, history of prematurity, family history of squint, age of onset ,type of squint, were retrieved from the case notes, Visual acuity of every patient were check and recorded separately both for near and distance, with and without glasses, and with pin-hole. The anterior segment will examine with a slit-lamp. Orthoptic assessment included cover uncover test, Hirschberg, ocular motility, prism cover test, krimsky, prism reflex tests at 33cm for near, and at 6 meter for distance with spectacles and without spectacles. Cycloplegic refraction of all patients will do using cyclopentolate 0.5%-1% eye. All the patients were examined after obtaining a fully informed consent. Instrument used were Illuminated Snellen Chart visual acuity chart, Prism bar (for PCT), Targets (for performing near PCT), Torch, Ophthalmoscope, Profroma.

Data analysis was done on Statistical package of social sciences (SPSS) version 20.0. All continuous variables were presented as Mean±Standard Deviation. The entire categorical variables are shown as frequency and percentages. Statistical charts are present in the form of Bar chart, Frequency curve & Pie chart etc.

### Result

A total of 87 patients fulfilled the inclusion criteria for the study. Among them, 46 were female, and 41 were male. The mean age at presentation was 9.99, in which maximum age was in between 6-9 years 40 (46.0%), Initially the more patients had visual acuity was >6/12, 48 (55.2%) in right eye while in left was > 6/12, 57 (65.5%), whether in near was >= N10, 63 (72.4%) in right eye where in left eye was also >= N10, 65 (74.7 %). Out of 87 patients 74 (85.1%) patients were found with strabismus rest of patients found with pseudo strabismus (absence with strabismus) 13 (14.9%). The most affected eye was asset as left eye 37 (42.5%).when the distance and near Hirschberg taken the most frequency had seen in between >15-30 degree, during investigation procedure the most seen deviation in cover test was manifest deviation 69 (79.3%), latent were 5(5.7%) and remaining patients were found with no deviation in the eye during cover test performance 13 (14.9%), as the visual acuity had found

good in most of patients the technique of measurement of deviation performed according to patients visual acuity therefore, PCT had shown the highest frequency 67 (77.0%) during data collection procedure. Measurement of deviation results shows distance > 30 – 60prsim diopters in right and left eye 22 (25.3%) and 21 (24.1%), similarly in near the greatest measurement was in between > 30-60 prism diopters in right eye and left eye 18 (20.7%) and 22 (25.3%), the diagnosis of all the strabismus patients showed the frequency of concomitant was 76 (87.4%) and incomitant was 4 (4.6%) where in concomitant the most frequent diagnosis acquisition was alternate esotropia 14 (16.1%)and alternate exotropia 13 (14.9%)and the least common was esotropia with DVD with amblyopia 1(1.1%), convergence excess esotropia 1 (1.1%), where in incomitancy there was only few case presented during study duration and that is Duane retraction syndrome 1 (1.1%) and III nerve palsy 3 (3.4%).

In 6-9 age group the highest cases were found with alternate esotropia 6while intermittent distance exotropia was 5 cases, alternate exotropia and constant esotropia was 4 cases and no case were found of hypertropia and hypotropia (Figure 1-4), (Table 1-3).

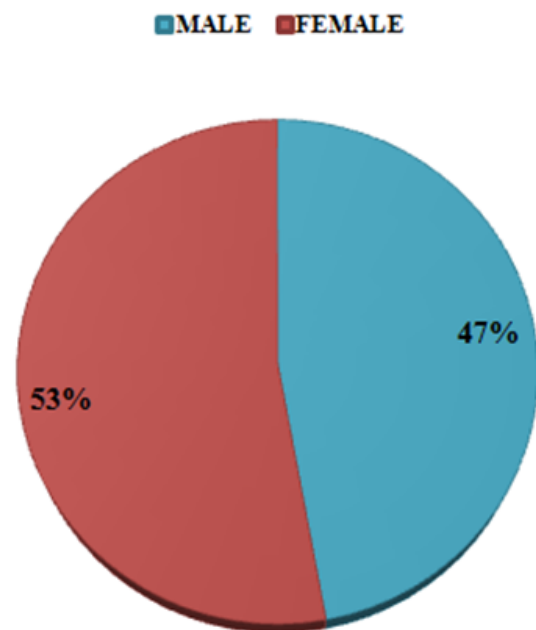


Figure 1 Frequency of gender.

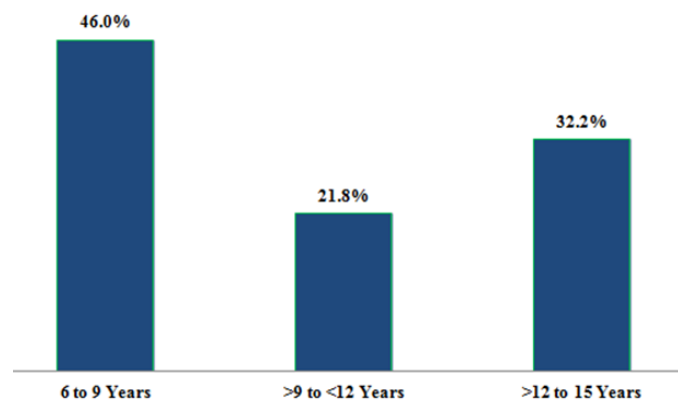


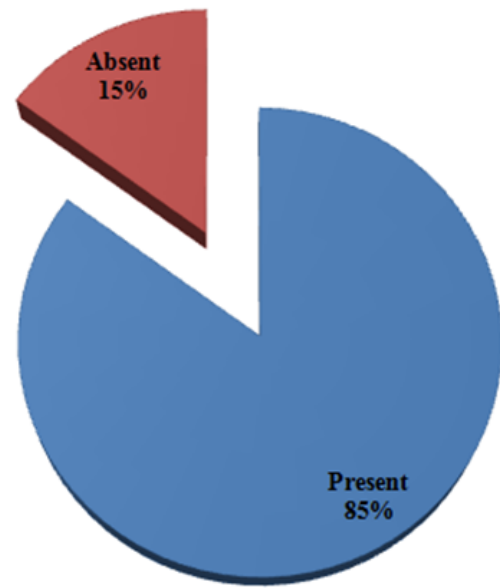
Figure 2 Frequency of age.

**Table 1** Indicates Cover Test, Its Results & types of Strabismus

Frequency of cover test		
Strabismus	Frequency	Percentage
Manifest	69	79.3
Latent	5	5.7
Orthophoria	13	14.9
Total	87	100
Manifest results of cover test		
Cover test	Frequency	Percentage
Esotropia	40	57.97
Exotropia	29	42.3
Total	69	100
Latent results of cover test		
Cover test	Frequency	Percentage
Esophoria	2	40
Exophoria	3	60
Total	5	100
Frequency of concomitant and inconcomitant strabismus		
Strabismus	Frequency	Percentage
Concomitant	76	95
Inconcomitant	4	5
Total	80	100

**Table 2** Different types of Diagnosis in Strabismus in relation with Gender

Diagnosis	Gender		Total
	Male	Female	
Accommodative esotropia	2	1	3
Constant esotropia	4	4	8
Esotropia $\bar{e}$ hypertropia	4	1	5
Alternate esotropia	6	8	14
Esotropia $\bar{e}$ amblyopia	6	2	8
Esotropia $\bar{e}$ dvd $\bar{e}$ amblyopia	0	1	1
Convergence excess esotropia	0	1	1
Constant exotropia	1	1	2
Idxt	1	5	6
Exotropia $\bar{e}$ hypertropia	0	2	22
Alternate exotropia	9	4	13
Exotropia $\bar{e}$ amblyopia	1	1	2
III Nerve Palsy	1	2	3
Duane's Syndrome	0	1	1
Esophoria	2	0	2
Exophoria	0	3	3
Pseudostrabismus	4	9	13
Total	41	46	87



**Figure 3** Strabismus.

**Table 3** Different types of Diagnosis in Strabismus in relation with Age (years)

Diagnosis	Age			Total
	6 to 9 year	>9 to <12 year	>12 to 15 year	
Accommodative esotropia	3	0	0	3
Constant esotropia	4	1	3	8
Esotropia $\bar{e}$ Hypertropia	1	2	2	5
Alternate esotropia	6	3	5	14
Esotropia $\bar{e}$ amblyopia	4	3	1	8
Esotropia $\bar{e}$ DVD $\bar{e}$ amblyopia	0	0	1	1
Convergence excess esotropia	1	0	0	1
Constant exotropia	0	1	1	2
Idxt	5	0	1	6
Exotropia $\bar{e}$ hypertropia	0	1	1	2
Alternate exotropia	4	2	7	13
Exotropia $\bar{e}$ amblyopia	1	0	1	2
III Nerve Palsy	0	1	2	3
Duane's syndrome	1	0	0	1
Esophoria	1	0	1	2
Exophoria	1	1	1	3
Pseudostrabismus	7	4	1	13
Total	40	19	28	87

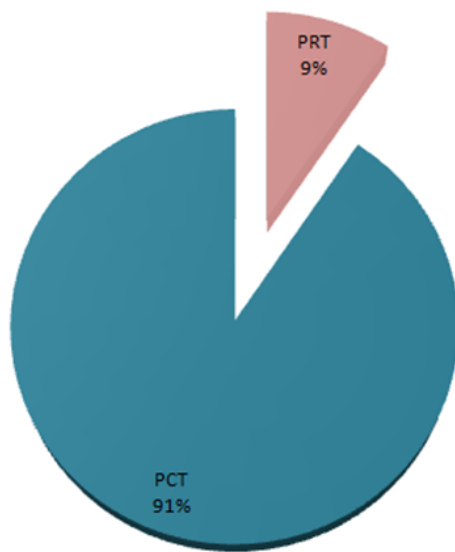


Figure 4 Method of measurement.

## Discussion

Our study estimated the prevalence of strabismus in children 6-15 years in pediatric unit of tertiary eye care hospital. Prevalence of strabismus was found to be 6.2% according to total numbers of patient whereas according to 74 patients (Numbers of Patients found during study), 5.2% of strabismus was found. The frequency of concomitant strabismus was 76 (87.4%) while incomitant showed least than concomitant that is 4 (4.6%) the frequency of manifest strabismus was 69 (79.3%) and latent was 5 (5.7%) respectively, the most affected eye were found to be left 13 (14.9%). In comparison with the study published in china showed prevalence of amblyopia in our population-based sample of 36 to 72 month-old preschool children from Yuhua District of Nanjing was 1.20%.<sup>11</sup> The prevalence of amblyopia in Iran was 0.19%-3.9%.<sup>12</sup>

The prevalence of amblyopia was found to be 1.1% in young Singaporean-Chinese children.<sup>8</sup> A total of 200 students of a school in Lahore, Pakistan, were examined for visual impairments and 3% of them were found to be amblyopic.<sup>13</sup> From different studies it can be observed that prevalence of amblyopia is around 1.09% to 3% of population of any area. In literature, the most common type of amblyopia is anisometropic.

Results from this study clearly depicted that the type of amblyopia was independent of gender. It can affect anyone regardless of gender during their early years of childhood. Moreover, anisometropic amblyopia was found to be the most common type of amblyopia in both genders. The findings of this study are similar to previous studies,<sup>14,15</sup> and in contrast with the study in which the most common type is strabismic. The results are also opposed to a study which concluded that amblyopia is more common in males than females.<sup>16</sup>

In this study the prevalence of strabismus was found more common in 6-9 age group 40 (46.0%) and  $\geq 12$  to 15 years of age group, most frequent condition was alternate esotropia and alternate exotropia in these groups. The vast majority of cases were of manifest strabismus and the highest frequency found alternate esotropia 14 (16.1%). The strabismus includes esotropic 40 (45.97%), exotropic 25 (28.73%), third nerve palsies 3 (3.44%), Duane retraction syndrome 1 (1.14%),

nystagmus 3(3.44%), amblyopia 3 (3.44%), esophoria 2(2.29%), exophoria 3(3.44%) and psuedostrabismus 7 (8.045%). Comparison with earlier studies that had been performed by Awan et al.,<sup>13</sup> at Lahore, Pakistan, revealed that meridional amblyopia is the most common type of amblyopia being 1.5% ametropic, while anisometropic and strabismic types of amblyopia were 0.5%. In our study, anisometropia was 69.23%, strabismic was 21.54%, while meridional and sensory deprivation types of amblyopia were 9.23%. This similarity co-relates with the study performed in Iran, which concluded that the prevalence of amblyopia was 2.1% and anisometropia was the most common cause (54.2%) while the prevalence of strabismus was 1.5%.<sup>17</sup>

## Conclusion

Prevalence of strabismus was found to be high as compare to other countries. The manifest strabismus was more common than latent strabismus. Squint has immediate (Childhood) and long-term (I.e. during adulthood) effects on the life of the children. Timely diagnosis and treatment can improve prognosis and thus quality of life too.

## Ethical approval

Ethical approval was taken from the institutional review board of the institution where the samples were drawn.

## Informed consent

An informed consent was taken from the parents of the child before taking sample.

## Fund status

There were no funding involved in this study. Patients were selected from Out-patient department.

## Authors' conflict of interest

The authors declared that there was no conflict between the authors of this study.

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