

# A Study of Prevalence of Refractive Error in Squinted Children (6-12 Years) Attending Shahed Dr. Aso-Eye Hospital

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## Abstract

To determine the prevalence of refractive error (RE) as a cause in squinted children in this aged (6-12 years) in Sulaimania city. The prevalence rate study among patient attending Shahed Dr. Aso eye hospital for the period from 1st October 2008 - 1st June 2009. A total of 116 children (6-12 years) attending squint department for about 8 months. The study included both sexes, were boys 55 and girls 61. Under went full ocular examination. We found that (72) patients (62.02%) had refractive error, include: 33 patients (45.9 %) = Hypermetropia (H); 22 patients (29.16%) = Myopia [M]; 18 patients (24.3%) Astigmatism (Ast.); 4 mixed; 6 H-Ast. and 8 M-Ast. In conclusions, the most prevalent cause of childhood squint at this aged (6-12 years) is refractive error while the other causes as a whole constitute only 1/3 of the causes, and most common refractive error is hypermetropia.

**Keywords:** Refractive Error; Myopia; Hypermetropia; Astigmatism

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## Introduction

Refractive Error (RE) is inability of eye to parallel light to focus on the retina i.e Second principal focus of eye does not fall on the retina (where the eye is at rest or accommodation).

## Types

1. Myopia (short sight) second principal focus lies in front of the retina: a. Axial myopia - abnormally long eye. b. Index myopia - (Refractive) e.g., keratoconus and nucleosclerosis.
2. Hypermetropia (long sight) the second principal focus lies behind retina: a. Axial hypermetropia. b. Refractive hypermetropia e.g., aphakia.
3. Astigmatism - refractive power of the astigmatic eye varies in different meridians: a. Regular astigmatism - principal meridian are at 90 to each other. b. Oblique astigmatism - principal meridian at 90 to each other, but not lies at or near 90 and 180. C. Irregular astigmatism - principal meridian are not at 90 to each other.
4. Anisometropia: refraction of the two eyes is different. Large degree of anisometropia is significant cause of amblyopia. Anisometropia of more than 1D in hypermetropia is enough to cause amblyopia because accommodation is binocular functions. Myopic with anisometropia is unlikely to develop amblyopia because both eyes

have clear near vision [1].

Squint is a misalignment of the two eyes so that both eyes are not looking in the same direction. The two different images reaching the brain lead to confusion and may have either of the two effects [2].

1. A brain ignores the image from deviating eye and thus sees only one image, and loses the depth perception. This brain suppression of image result in poor development of vision in this eye which is known as amblyopia.
2. Adult cannot ignore the image from either eye and has double vision.
3. Squint can be classified as: Constant squint present in all time. Intermittent squint (comes and go) according to weakness, inattention, ill health and so on [3].

Comitant squint the deviation is, within physiological limit and for a given fixation distance, the same in all direction of gaze. The term comitant originally had the form concomitant, derived from the late Latin concomitor meaning I attend, I accompany, which implies that in spite of the deviation, one eye accompanies the other in all its excursions [3].

Comitant strabismus can be esotropia and classified into:

1. Accommodative which sub classified into: refractive (fully



accommodative or partially accommodative and non-refractive with convergence excess or accommodative weakness) [2].

2. Non-accommodative such as (essential infantile, microtropia, basic, convergence excess, divergence insufficiency, divergence paralysis, Sensory) [2].

Comitant exotropia: Constant (early onset) exotropia with normal refraction.

Intermittent exotropia is often present with exophoria which break down to exotropia under condition of visual inattention, bright light, fatigue or ill health [2]. Sensory exotropia: which result of monocular or binocular visual impairment by acquired lesion such as cataract or opacified media [2]. Incomitant squint (paralytic squint). Causes of squint are:

**Congenital squints:** Means that the child is born with squint or it develop within six months of age. In most cases, the cause is not known. The ocular muscles are not balanced but the reason for this is not known congenital squint can be esotropic (e.g. infantile esotropia), or exotropic which is less common [2,3].

Squint related to refractive error these conditions that are due to poor focusing of light through the lens in the eyes. Other causes most children with squint have one of the above types of squint and are otherwise healthy. In some cases, squint is one feature of a more generalized genetic or brain condition. For example, a squint may develop in some children with cerebral palsy, hydrocephalus, brain injury, and secondary sequelae like (retinoblastoma) [2,3].

Amblyopia is the unilateral or (rarely) bilateral, decrease of best-corrected visual acuity caused by form vision deprivation and / or abnormal binocular interaction, for which there is no pathology of the eye or visual pathways [2]. Classification includes:

1. Strabismic, result from abnormal binocular interaction where there is continued monocular suppression of the deviating eye.
2. Anisometropic, caused by difference in refractive error between the eye and may result from difference of as little as 1D sphere.
3. Stimulus deprivation e.g. cataracted or ptosis.
4. Bilateral ametropia, result from high symmetrical RE usually hypermetropic.
5. Meridional, result from image blur in one meridian [3-7].

## Methods

### Setting of the study

The study was carried out in Sulaimania governorate in Shahed Dr. Aso eye hospital. Approval paper had been taken from the manager of hospital which gives the researcher the authorization.

### Design of the study

It is a cross-sectional study.

#### Instrument

1. History taken from parent or relative of children.
2. Torch used to see corneal reflex in order to detect type of deviation and degree of squint.
3. Prism bar to measure the degree of deviation. Also, use of cover and uncover test, in order to exclude pseudo strabismus.

4. Snellen chart, by which we can determine the visual acuity (VA) of children.

5. Atropine drop, given to parent of child with refractive error, and taught them how to use it (one drop twice daily for three days, and also told parents about any undesired side effect that may occur). And resurgent about effect of cycloplegic, and perform auto refraction and retinoscopy - only if pupil diameter was fully dilated.

6. Auto-refractometer, done after cycloplegic drop.

7. Retinoscope.

8. Slit lamp examination in which the anterior segment of the eye examined. Also use convex lens (78D, 90D) to examine posterior segment of the eye.

9. Ophthalmoscope (Direct) for further examination of the eye especially in un-cooperating child.

10. After full examination, we told parents to go home and wait for 2 weeks so as cycloplegic effect of atropine will be out. After that we can do final vision test with correction by glasses in order to detect best corrected visual acuity.

### Sample of the study

The total number of the patient were involved in this study was 116.

#### Inclusion criteria

1. Patients with squint.
2. Patients in aged of 6-12 years.

### Limitations of the study

1. The research is relatively a new subject in Sulaimania governorate.
2. Deficient information gained from the parents.

### Statistical Analysis

1. Questionnaires were collected, tabulated, and presented in a descriptive form, and the collected data was put down on A3 paper first, and then transferred to computer on SPSS manager system No. (13).
2. Counts and percentage were used in the calculation and description of the sample.
3. Statistical analysis was done by using SPSS 13 pack for windows and Chi-square test (X-test) used for comparing groups.

## Results

The total number of the patients was, 116 consist of 61 girls and 55 boys. Prevalence of Refractive Error (RE) was 72 patients (62.06%) of 116 squinted children (Figure 1).

The most common refractive error was hypermetropia (H). RE result classified as follow (Table 1).

Hypermetropia (H) present in 33 patients (45.83%) include 19 females and 14 males. Myopia (M) present in 21 patients (29.16%) composed of 11 females and 10 males. Astigmatism (Ast.) present in 18 patients distributed equally in both sexes.

Total children with convergent squint (CS) or esotropia were 90 patients (77.5%) distributed into 50 females (55.5%) and 40 males.

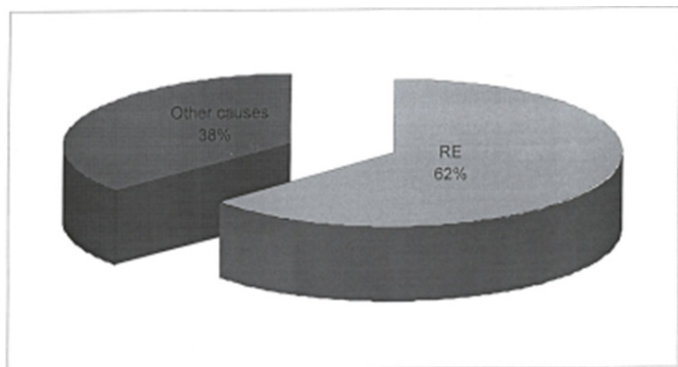


Figure 1: Prevalence of Refractive error.

Table 1: Types of Refractive error.

RE	No.	%
Hypermetropia	33	45.83
Myopia (M)	21	29.16
Astigmatism (Ast.)	18	25
Total	72	100

On other hand divergent squint present in 26 patient (22.5%) present. Divergent squint present in 15 boys and 11 girls (Figure 2).

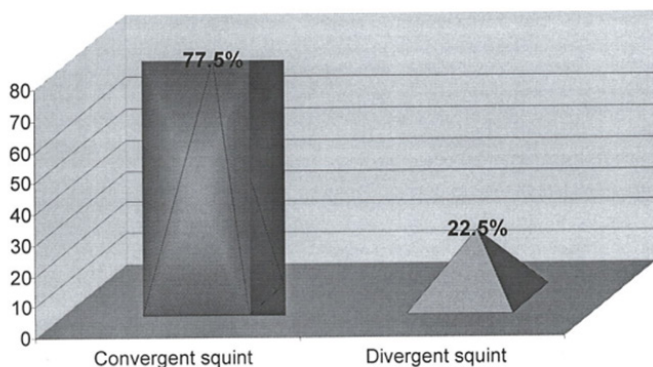


Figure 2: Types of squint.

Age distribution in this study as follow (6years) was 48 patients (41.3%) and (7-8 years) was 35 patients (31%), so most of squinted childhood in this study concentrated in age of (6-8 years) (71.4%) (Figure 3).

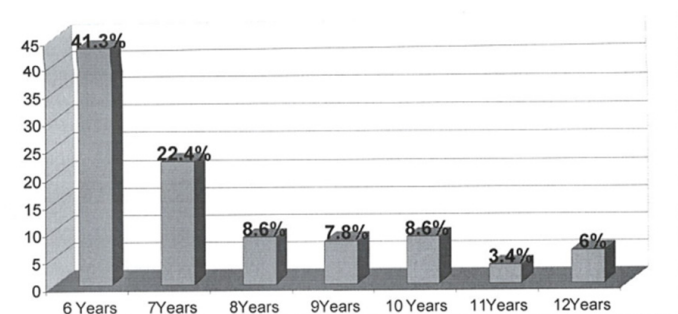


Figure 3: Age distribution.

Less than 6 months in 53 patient (45.68%) and distributed equally between both sexes. In this age group we can divide causes of squint into congenital which present in 32 patient (60.03%), refractive causes

present in 11 patient (20.7%), and other causes in 10 patients = (18.8%) (Table 2).

Table 2: Age of onset of squint.

Cause	Age of onset			
	Birth-6month		6month> month	
	No.	%	No.	%
Congenital	32	60.5	0	0
RE	11	20.7	61	96.8
Others	10	18.8	2	3.2
Total	53	100	63	100

$\chi^2=35.63$ ,  $df=2$ ,  $p$  value=  $<0.001$ (significant)

More than 6 months in 63 patients (54.3%), there is no congenital causes among them, while refractive error as cause present in 61 patients and other causes only 2 patients. Table 3 Causes of squint as already mention refractive error (62.06%), other causes of squint present in following manner (Table 3).

Table 3: Causes of squint.

Cause	No.	%
Congenital strabismus	15	12.93
Congenital retinal anomalies	6	5.17
Syndromes	7	6.03
Trauma	2	1.72
Refractive Error	72	62.06
Strabismus and sensory	14	12.06
Total	116	100

Amblyopia which can consider it as cause of squint and also as result or consequence. Amblyopia (Amb.) present in 46 patient (39.6%) of total 116 patients, the refractive amblyopia present in 32 patient (44.4%) of total refractive error, and can be classified into, Anisometropic amblyopia (Anis. -Amb.) present in 21 patient (65.6%) of refractive amblyopia, ametropic amblyopia (Amm. -Amb.) present in 10 patient, and miridional amblyopia in only one patient.

Strabismus amblyopia (St.-Amb.) present in 13 patient (28.26%). And only one patient had sensory amblyopia (Figure 4). Congenital squint present in 15 patient (12.9%) of total causes of squint, congenital retinal abnormalities and infections present in 6 patient (5.1%) other syndromes constitute 7 patient (6%) and trauma in 2 patients.

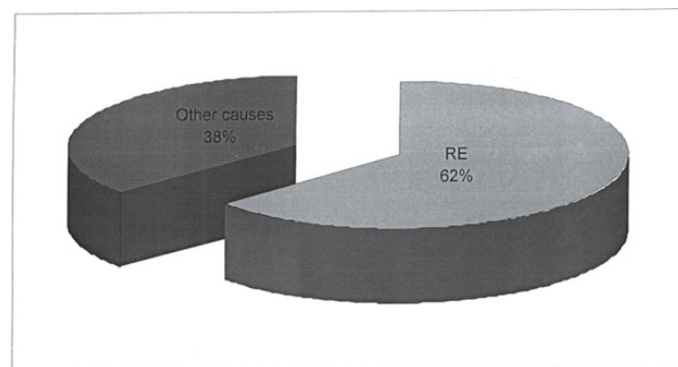


Figure 4: Showed cause of squint.

## Discussion

Based on the result obtained we found that both sexes nearly equal in this study, where boys were 55 and girls 61, so this may exclude sample bias that may make some studies imbalance in sexual distribution.



The prevalence of refractive error (RE) as cause of squint is superior to other causes, where RE result was 72 patients (62%) of 116 patients and this result suspected in respect to age of children in study and in relation with result of other studies [4]. The most type of refractive error that causing squint is hypermetropia (H), which is about (45.83%) of total RE and this may explain the high incidence of amblyopia. The girls take (57.5%) of this value which is also found in other research [4], but it is in other research more prominent and it may be explained by preference of eastern societies to male over female.

Other types of refractive error, which come next to hypermetropia as a cause of squint was myopia (M) about (29%) while astigmatism (Ast.), constitute (25%) of refractive error.

The overall female with refractive was (39) (54%), this slight difference in RE between two sexes may indicate, and in opposite to most of studies carried in eastern area [4], that in our population there is no difference in dealing or preference in relationship of parent with children on basis of sex (no preference of male over female).

Other causes of squint in this age group and as consequence of refractive error was amblyopia (Amb) 46 patient (39.6%) of total patient (116) and this ratio was high in relation to other studies (25.3%) [4] and this may indicate either careless of our society about this problem, or poor education in relation to squint and amblyopia, or it may pointed to defect in our medical performance or facilities or poor media to educate society about the disease and risk of refractive error in early age particularly if neglected without appropriate management.

Most of amblyopia was refractive (32) patient out of total amblyopic patient. Most of refractive amblyopia is anisometric amblyopia (Anis. Amb) 21 patient (45.6%), next to it is strabismus amblyopia (St. Amb) 13 patient (28.26%), and then ametropic amblyopia 10 patient (21.7%), again this indicate that refractive error dose not receive considerable interest and follow up by parent. Other causes of squint such as congenital squint (12.9%), congenital retinal abnormalities and infections were (5.1%), and other syndromes (6%), which are in the most, can be treated earlier.

For squint most type of squint was convergent squint (Con. Sq) or esotropia (77.5%) which in opposite to studies carries in India and other Asian countries [4,5], and similar to studies carried on white race [10] this because in this region the race is identical or similar to European race. There is no gender variation in convergent squint. Of this ratio of esotropia was (18.9%) alternating squint (Alt. Sq), this ratio is less than that found in other study [4]. The divergent squint (D. Sq) exotropia was (22.5%). About family history (FH) most of children have no family history of squint (88.7%) and this found in most of studies [2].

According to age of onset, study found that the onset of squint within first 6 month of life was (44.8%), and distributed equally between both sexes and it mainly caused by congenital squint (48%) and this is gone with most studies on squint at this age group which found that most of causes was congenital squint or congenital abnormalities or infection [4-9].

Cause of squint in children more than 6 month of age, refractive error (95.3%) [2,10, and 11], no congenital squint at this age group. The sexual variation in squint after 6 month was female 35 and male 29.

## Conclusions

Refractive error is the most common cause of squint followed by congenital squint, and the trauma is the less common cause. It is clear that with increase age, the refractive error become dominate.

## Recommendations

### To the researchers:

To take more period, and also to seek for squinted childhood in other place such as schools, so as to enlarge the sample and make it more representative of the community.

### To the ministry of education:

To cooperate with ministry of health and with media to publish the problem and make clearer and easier to general people and the risk of ignorance of this easily treatable condition.

### To the parents:

To give more attention to their kids and careful about any defect in vision or early eye deviation especially in neonate period.

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