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The Correlation between the Refractive Error of Patient and the Degree of Squint

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Keywords

Children, esotropia, exotropia, hypermetropia, squint.

Abstract

The aim of this paper is to study the relation between (the esotropia and hypermetropia) and the relation between the (exotropia and myopia) for children in different ages. In this study 54 cases were diagnosed with squint of different ages. This work has been carried out by the directory of IbnAl-Haytham Hospital in Baghdad/Iraq for years (15/02/2015) measuring the degree of squint of each eye for children with esotropia who have a hypermetropia and treated with positive lenses. Also dealing with children with exotropia who have myopia and can be treated with negative lenses. This study to investigate the relation between the squint and refractive error for children because it has great importance for treatment way. It is founded that for the esotropic cases need not an over correction, but for exotropic need an over correction.

Article History

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1. Introduction

Strabismus is a common childhood ocular disorder with population-based prevalence estimates ranging from. 12% to 5%. In Chinese children (Yanoff & Duker, 2008; Khurana et al., 2014). The manifest misalignment of the eyes often results in deficient binocular depth perception and even amblyopia. Besides these functional effects, there are psychological distresses because of strabismus, such as depression and anxiety, impaired self-esteem and self-confidence, unsatisfied interpersonal relationships and social prejudice (Pott et al., 1999; von Noorden, 1988; Nordlöw. 1953; Raab, 1982; Rutstein, 2011). Surgical or optical therapy is necessary in many patients with strabismus.

The cause of strabismus has not yet been clearly understood and many factors may contribute. Children who were hyperopia in infancy have been found to be more likely to become strabismus (Kushner, 1988). Refractive accommodative esotropia has been identified to be the consequence of childhood hyperopia (Freeman & Isenberg, 1989; Burian & Spivey, 1964). However, how hyperopia influences other strabismus and how other types of ametropia influence strabismus are not known very well.

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Population-based research is significant in exploring the effect of refractive error on the development of various types of childhood strabismus. Confirming the relationship is very helpful to guide eye care providers to manage childhood refractive error and to influence public health policy-making. The present study aimed to analyze associations between refractive error and different types of strabismus in preschool children aged 3 to 6 years enrolled in the population-based Nanjing Pediatric Vision Project (NPVP).

2. Intermittent Exotropia

This is the most common form of exotropia. It affects twice as many females as males. Intermittent exotropia causes the eye to sometimes move outward, often when you're tired, sick, daydreaming, or looking in the distance. Other times, the eye stays straight. This symptom may occur infrequently, or it can happen so often it eventually becomes constant (Kushner, 1988).

3. Treatment and Management of Exotropia

When eye misalignment occurs early in life and the drifting is infrequent, your doctor may recommended to just watch and wait. Treatment may be advised if the drifting starts to worsen or doesn't improve, especially in a young child whose vision and eye muscles are still developing.

The goal of treatment is to get the eyes to align as much as possible and improve vision. Treatment include:

- Glasses: -Glasses that help correct near- or farsightedness will help keep the eyes aligned.
- Patching: -People with exotropia tend to favor the aligned eye, so vision in the eye turned outward can weaken, resulting in amblyopia (lazy eye). To improve strength and vision in the misaligned eye, some doctors will recommend patching the "good" eye for up to several hours a day to encourage to use the weaker eye.
- Exercises:-your doctor may suggest a variety of eye exercises to improve focus.

In some cases, your doctor may also recommend surgery to readjust eye muscles. The surgery is done under general anesthesia for a child and with a local numbing agent for an adult. Sometimes the surgery has to be repeated.

In adult, the surgery doesn't usually improve eyesight. Instead, an adult may choose to have the surgery to make their eyes appear straight (Freeman & Isenberg, 1989).

4. Methods of Diagnosis

A diagnosis is usually made based on family history and vision testing.

An ophthalmology or optometrist-doctor who specializes in eye issues-are best equipped to diagnose this disorder. They'll ask you about symptoms, family history, and other health condition to help than make a diagnosis.

Your doctor will also conduct a number of vision tests. These can include:

- Reading letters from an eye charts if your child is old enough to read.
- Placing a series of lenses in front of the eyes to see how they refract light.
- Tests that look at how the eyes focus.

Using dilating eye drops to help widen the pupils of the eyes and allow a doctor to examine their internal structure (Burian & Spivey, 1964).

Exotropia is common and treatable, especially when diagnosed and corrected at a young age. By about 4 months of age, the eyes should be aligned and able to focus. If you notice misalignment after this point, have it checked out by eye doctor. Exotropia note that untreated exotropia tends to get worse over time and will rarely spontaneously improve (Saunders, 2009).

5. Patients and Methods

54 cases of children patients were examined and diagnosed during a period of months from November 2017 to March 2018. Identified of 54 cases of esotropia and exotropia for children of 8 month to 6 years of age for the years 2013, 2014, 2015 in auditory IBN ALHAYTHAM hospital. The degree of vision was measured for each eye as well as an examination under atropine. By giving them drops of atropine 0.5% for children less than one year old, and 1% for children over than one year old for three days to dilate the pupils for examined for both eyes. Handing all esotropia children by described a glasses that appropriate any balance in refractive power between the eyes, as the child is less than school age can bear difference in refractive power between the eyes up to four diopter. Convex lenses are used to treat about internal and refractive error and sometimes lenses fail in the treatment of positive internal squint so succumb to the process. Concave lenses are used to treat about external and refractive error and sometimes lenses fail in the treatment of positive external squint. In the following table (3-1) write the number of patients cases (54 cases), ages of patients (8 month to 6 years), gender (male or female), the deviation of squint (corneal reflex and deviation average), type of squint (esotropia or exotropia) and (in right or left eye or alternate squint) , the refractive error in the right.

6. Results

Traditional screening with VA chart and refraction under atropine using to examined the children. In the following figure (1) distribution of squint related to age of child. The figure (2) and (3) distribution of esotropia and exotropia related to degree of refractive error, So the patients with (+ 4.00 D.S) be high rate in esotropia, patients with. (-1.00D.S) be high rate in exotropia.

Table (1) prevalence of by corneal reflex (degree of deviation) it is high rate of patients (35.19%) in corneal reflex N+ (10-15)

Figure 1. Distribution of squint related to age of child

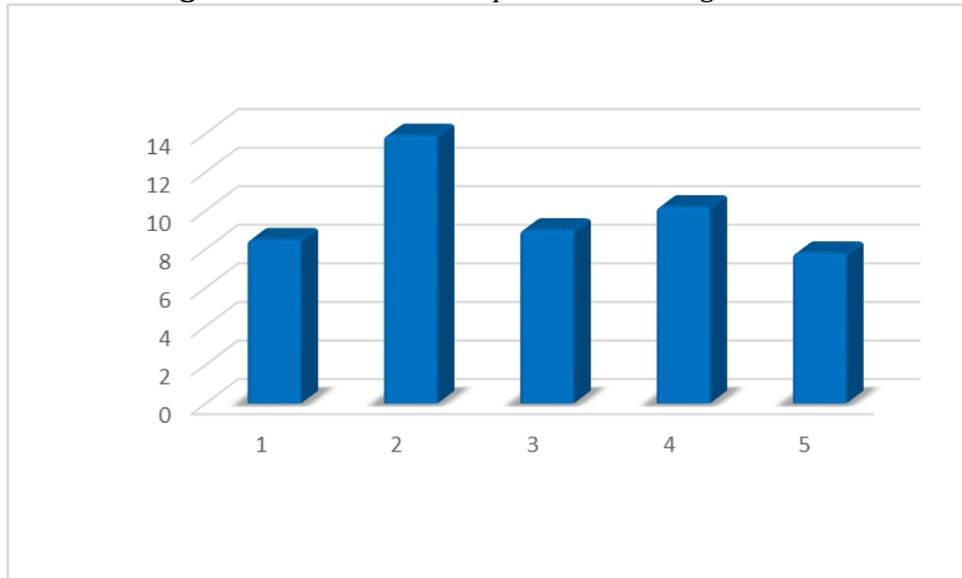


Figure 2. Distribution of esotropia related to degree of refractive error (+)

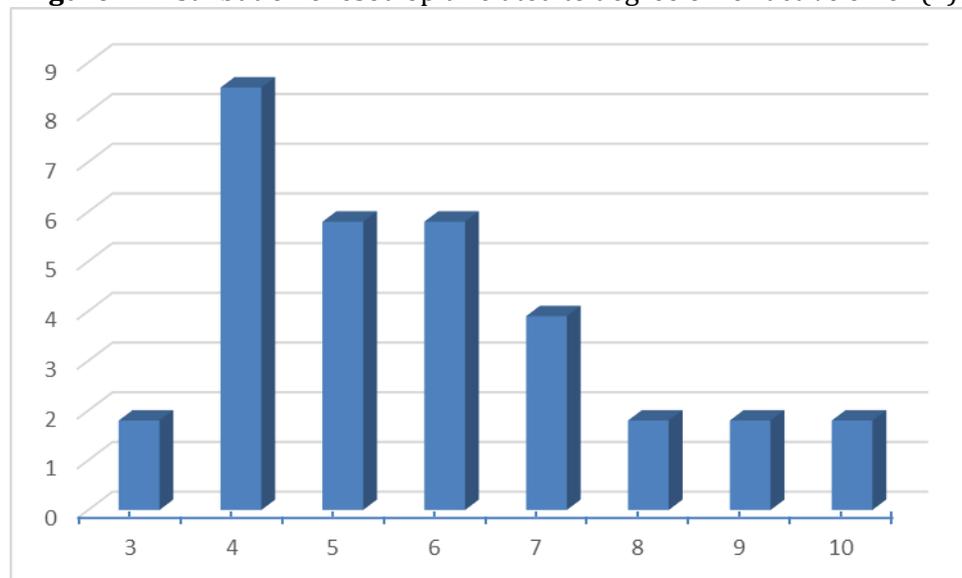
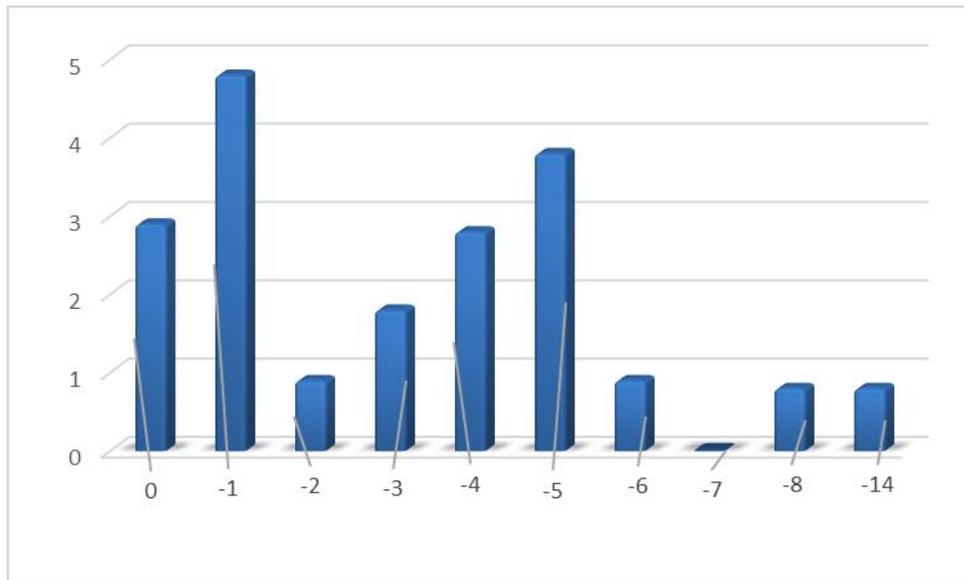


Table 1. Degree of deviation

By corneal reflex	Number of patient/54	Percentage 100%
N+(10-15)	19	35.19 %
N+(15-20)	16	29.63%
N+(20-25)	16	29.63%
N+(25-30)	1	1.85%
N+(30-35)	2	3.70%

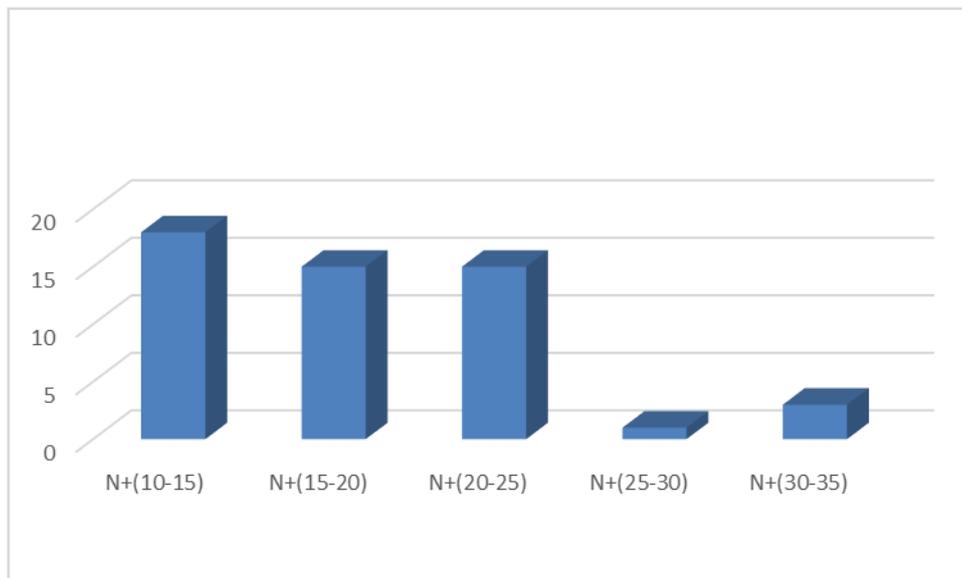
The distribution of by corneal reflex (degree of deviation) as shown in the following figure (4).

Figure 3. Distribution of exotropia of right eye



After examination we note that the patient with exotropia are at a high rate at (-1.00D.S) by 23.81 %, we did not found any Case has (-7.00D.S) in the exotropia.

Figure 4. Distribution of by corneal reflex



7. Discussion

The value of the slope of esotropia larger than exotropia there are over correction in degree of myopia, so the slope is decrease. (Over correction in **x - axis** of exotropia) (Longer than real) **slope = y/x** equation of line where $y = mx + c$ where m is the slope and c is constant so $m = \frac{y_1 - c_1}{x_1}$ in exotropia, $m = \frac{y_2 - c_2}{x_2}$ in exotropia.

In esotropia the slope is larger than m of exotropia, because the values of c in esotropia is negative and $y - c = y - (-c) = y + c$, so m is large, in exotropia is positive and $y - c$ small, so m is smaller than m of esotropia.

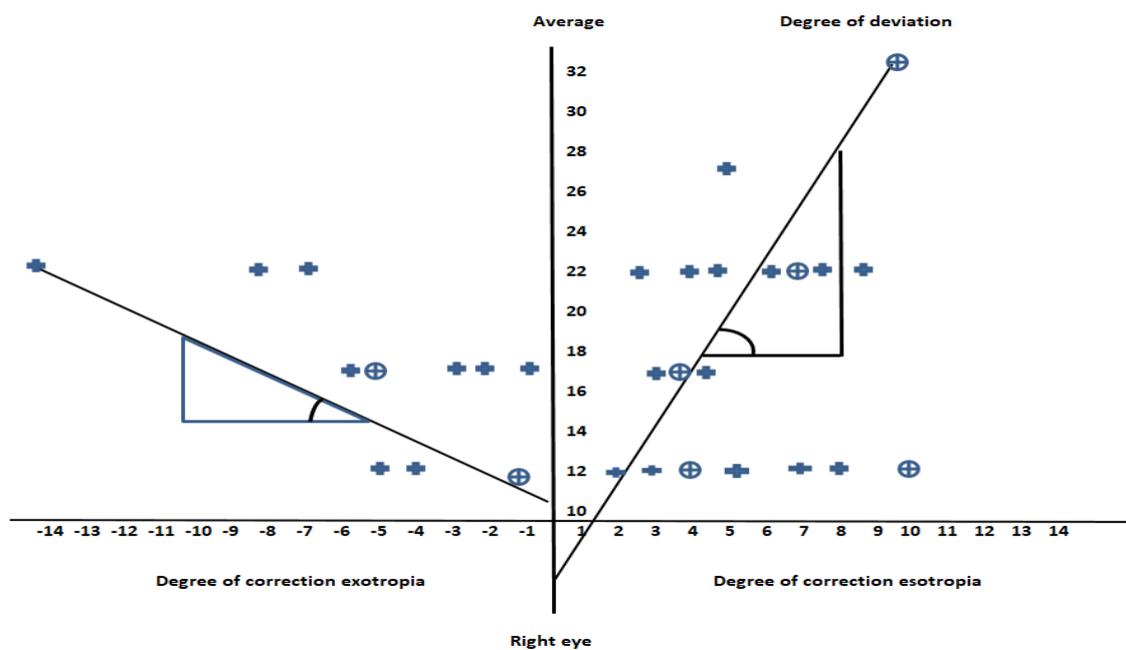
The deviation in exotropia is decrease, a cause the over correction and the correction of deviation more rapid and positive in exotropia.

The deviation in exotropia is decrease, a cause the over correction and the correction of deviation more rapid and positive in exotropia.

In esotropia note that the deviation rate (22) has the highest number of patients, but with different degree of correction. Also the deviation rate of (12) contains a number of patient but with different degree of correction, and the deviation rate of (27) patient and correct by + 5.00 D.S.

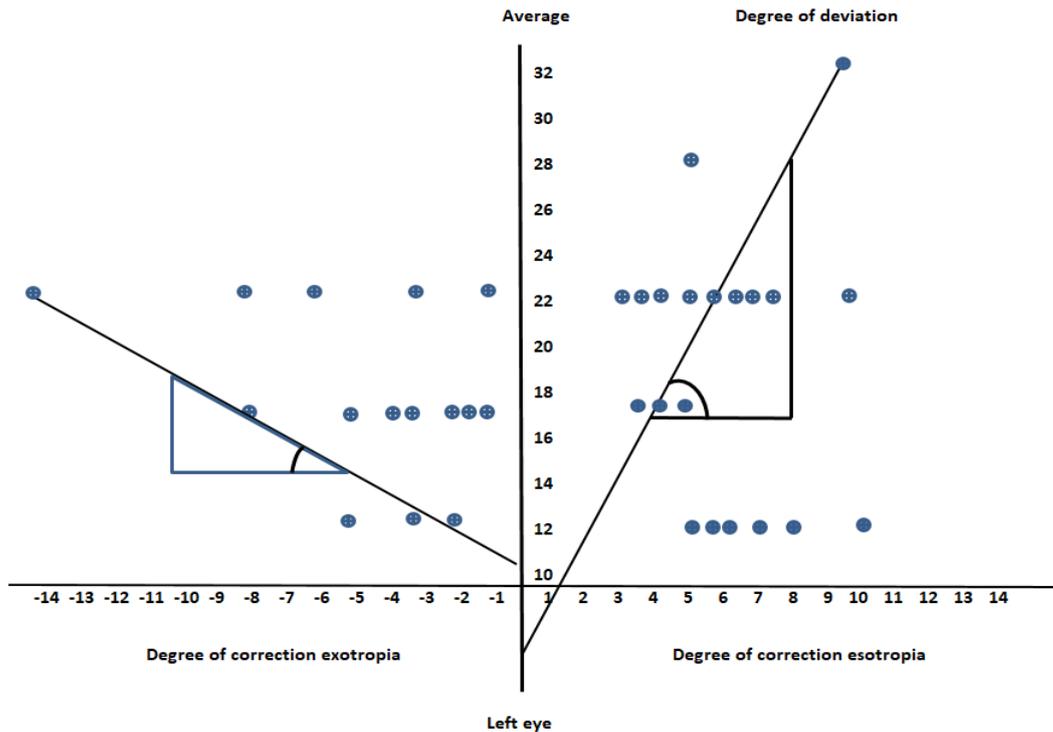
Note in esotropia the (slop) be high and correct by +9.00 D.S, and not correct by over correction because the esotropia is (convergence) do not need to over correction, it increase the deviation (squint) in patient.

Figure 5. Esotropia and exotropia of right eye.



Distribution of average (degree of deviation) and degree of correction of esotropia and exotropia of right eye.

Figure 6. Esotropia and exotropia of left eye



Distribution of average (degree of deviation) and degree of correction of esotropia and exotropia of left eye.

In exotropia not that the deviation rate of (17) has the highest number of patient but with different degree of correction, the deviation rate of (22) contains on a number of patient but with different degree of correction.

In exotropia note the (slop) be low, need to over correction because the exotropia is (divergence) need to over correction (convergence lens) like -14.00 D.S so reduced the deviation ratio (squint) in patients.

The right and left eye are symmetrical.

8. Conclusions

- The relation between the degrees, of squint is directly proportional to the refractive error of the patient.
- The cases found in females is more than in males.
- The main goal is to treat the patient by lenses according to the refractive error. The rate of deviation (squint) increases in esotropia according to the convergence so is does not need a convex lens.
- The rate of deviation (squint) increases in esotropia according to the convergence so does not need a convex lens.
- The rate of deviation (squint) decreases in exotropia according to the divergence so it does not need a convex lens.

- The uses of the correction lenses with long time by the patient done good results to correct the squint.

Recommendations

- The research is complete so it does not require further study.
- The children are typically screened for eye before the age six months old.
- Through eye examination bt an ophthalmology or optometrist is recommended when the child is between the ages of 3 and 5 years.
- Uses the corrective lenses is very important to correct the squint and refractive errors.

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