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Research Article

REFRACTIVE ERRORS IN HORIZONTAL CONCOMITANT STRABISMUS

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ABSTRACT

The aim of this study is to find out if there is any relation between the presence of refractive errors and presence of strabismus. **Materials And Methods**-In this retrospective study, all patients attending squint clinic affected by horizontal comitant squint were included and a chart review was done of all patients with horizontal strabismus to find out type of refractive errors. **Results**-100 patients were examined, of which 46 had exodeviation and 54 had esodeviations. Amongst 92 eyes with exodeviations, 12(13.04%) had myopia, 39(42.39%) had hypermetropia, 38(41.3%) had astigmatism and 3(3.2%) were emmetropes. Of 108 eyes with esodeviations 8(7.4%) had myopia, 68(53.7%) had hypermetropia and 42(38.88%) had astigmatism. Chi square test showed significant relation between refractive error and strabismus. **Conclusion**-This study shows significant relation between refractive error and strabismus.

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INTRODUCTION

Strabismus, a misalignment of both eyes, is a common ocular disorder in pediatric as well as adult populations. Population-based prevalence estimates ranging from 2% to 4%^(1,2). In India, the prevalence in children is around 2%⁽³⁾.

The consequences of strabismus can be devastating. First, it would lead to loss of binocularity and depth perception. It is also the most common cause of amblyopia, and as such contributes importantly to childhood visual impairment^(4,5). In addition to these functional effects, it also has significant psychosocial consequences in terms of self-image⁽⁵⁾ negative social prejudice^(6,7) and lower chance to get employed⁽⁸⁾. Hence, it becomes important to find any possible causes and associations of strabismus the correction of which would reduce psychosocial impact of strabismus⁽⁹⁾.

The pathogenesis of different types of concomitant strabismus has not been well established. Many researchers have studied the association between accommodative esotropia and hyperopia⁽¹⁰⁾. On the other hand, the observed higher prevalence of concomitant exotropia in Asian than Caucasians has been postulated to be related to the high prevalence of myopia⁽¹⁰⁾, but this relationship has not been well substantiated. (Ingram, 1977), suggested that an environmental factor such as blurred vision caused by an uncorrected refractive error may be a more important factor causing squint and/or amblyopia⁽¹¹⁾. Thus, attention could be directed towards the search for refractive errors of sufficient magnitude.

The association between other types of refractive errors (such as astigmatism and anisometropia) and different types of concomitant strabismus is not clear. Indeed, confirming these relationships is important, because it can provide insights into the pathophysiology of concomitant strabismus; as well as providing guideline on the managements of refractive error in the aspect of preventing strabismus development⁽¹⁰⁾.

Thus, the purpose of this study is to find out if there is any relation between the presence of refractive errors and presence of strabismus.

Aims and Objectives

To find out the distribution of refractive errors in patients with horizontal concomitant strabismus. To find out if there is any relation between the presence of refractive errors and the presence of horizontal concomitant strabismus.

MATERIALS AND METHODS

In this retrospective study, a chart review was done of 100 patients with horizontal concomitant strabismus, to find out type of refractive errors. The study was conducted in a Medical College and Tertiary care hospital in Central Maharashtra. Patients of all age groups affected by horizontal concomitant squint were included in this study.

The study included patients attending squint clinic from January 2016 to December 2016. Data obtained was collected and compiled using Ms excel and was analyzed to find out association.

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Patients with concomitant esotropia or exotropia presenting to MGM hospital, Aurangabad squint clinic were evaluated as per a specially designed proforma, which included –

Detailed history of strabismus, including the age of onset of strabismus. Visual acuity was checked on Snellen’s charts or picture charts. Detailed anterior segment examination on slit lamp was performed.

Cycloplegic refraction with age appropriate cycloplegia (atropine 1% eye ointment in children with esotropia and age less than six years; homatropine 2% eyedrops in children between six to 12 years of age and children less than six years with exotropia and tropicamide 1% and phenylephrine 5% combination in children more than 12 years of age and adults) was done. Fundus was examined with indirect ophthalmoscope.

Strabismus evaluation included-Hirschberg’s test Cover and uncover tests to assess visual axis. Prism cover test (PCT) for distance and near, with and without glasses to measure deviation in prism diopters. Modified Krimsky test (in case of young uncooperative children and in patients with poor vision). Extra ocular movements were checked for both versions and ductions.

Inclusion Criteria

All patients with horizontal concomitant strabismus, attending Ophthalmology OPD in MGM Hospital, Aurangabad from January 2016 to December 2016.

Exclusion Criteria

Patients with in comitant and vertical strabismus.

Data Analysis

The results obtained were analyzed based on- Gender and age of presentation Presence of refractive errors Association of refractive errors in strabismus patients. Chi square test was used in each case to find out significant correlation where a P value of <0.005 was considered significant.

OBSERVATIONS AND RESULTS

- This study included a total of 100 patients (200eyes) of which, 54 patients had esodeviations while 46 patients had exodeviations. (Table 1)(Figure 1).
- Of the 46 patients in this study with exotropia, 22(47.82%) were male and 24(52.17%) were females and .of the 54 patients with esotropia, 21(38.88%) were male and 33 (61.11%) were females.
- On applying chi square test, however showed a P value of 0.386 which showed no significance association of gender with strabismus.(table 2)
- Cycloplegic retinoscopy of each eye of each patient determined the type of refractive error they had. i.e myopia, hypermetropia, myopic astigmatism, hypermetropia astigmatism and emmetropia. Of the 92 eyes (of 46 patients) with exotropia, 12 eyes(13.04%) had myopia, 39 eyes(42.40%) had hypermetropia, 18 eyes(19.57%) had myopic astigmatism , 20eyes(21.73%) had hypermetropic astigmatism and 3 eyes(3.26%) were emmetropic. Of the 108 eyes (of 54 patients) with

esotropia, 8eyes (7.40%) had myopia, 58(53.70%) had hypermetropia. 4(3.70%) had myopic astigmatism and 38(35.18%) had hypermetropicastigmatism.(Table 3). Application of chi square test showed a p value of <0.0001 which showed a significant association between refractive errors and strabismus.

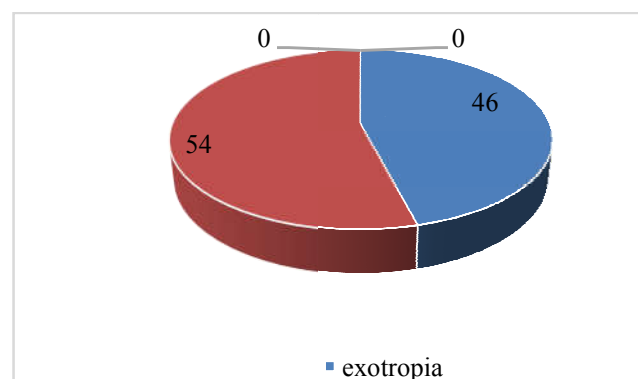


Figure 1

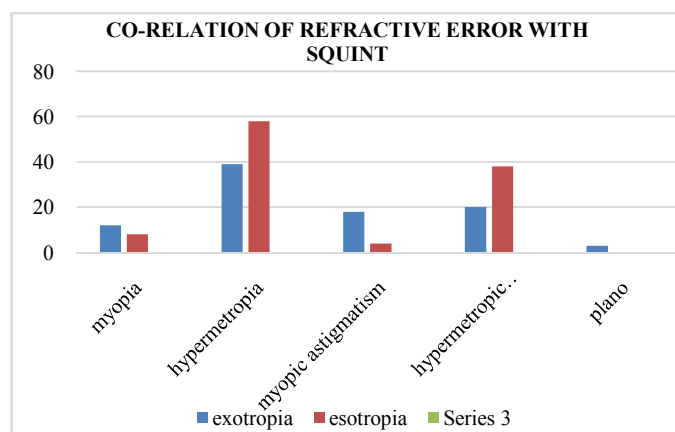


Figure 1

DISCUSSION

In this study, a total of 100 patients of concomitant horizontal strabismus were examined, i.e 200 eyes were examined. {Of the 100 patients, 46 patients had exotropia whereas 54 patients had esotropia.

Of the 46 patients with exotropia, 22 were male and 24 were females. Of the 54 patients with esotropia, 21 were male and 33 were females.} Of the 54 patients of esotropia, i.e 108 eyes, the distribution of refractive errors showed, 8(7.40%) eyes had myopia, 58(53.70%) eyes had hypermetropia, 4(3.70%) had myopic astigmatism, 38(35.16%) had hypermetropic astigmatism.

Of the 46 patients of exotropia, i.e 92 eyes, distribution of refractive errors showed, 12(13.04%) eyes had myopia, 39(42.40%) had hypermetropia, 18(19.57%) had myopic astigmatism, 20(21.73%) had hypermetropic astigmatism, whereas 3(3.26%) eyes were emmetropic.

Chi square test applied to study the correlation of refractive errors with strabismus, showed a P value of 0.00 i.e was highly significant.

In the Sydney Myopia Study (SMS) (Australia) by Robaei (2006), 1740 6-year-old school children examined between

2003-4; 26(1.5%) with esotropia, 14 (0.8%) with exotropia. Myopia, hyperopia (≥ 3 D), astigmatism (≥ 1 D) and anisometropia (≥ 1 D) were associated with strabismus ingeneral ($p < 0.05$). A separate analysis of esotropia and exotropia were not reported⁽¹²⁾.

In, The Multi Ethnic Pediatric Eye Disease and Baltimore Pediatric Eye Disease Studies (MEPEDS & BPEDS) (USA) by Cotter (2011), Hyperopia was found to be a strong predictor of esotropia⁽¹⁰⁾. In the case of exotropia, astigmatism showed a stronger association than did Spherical equivalent refractive error. Exotropia was associated with astigmatism 1.50 D in the less astigmatic eye⁽¹⁰⁾.

Our study also shows a higher prevalence of hypermetropia and hypermetropic astigmatism in patients with esotropia of, though not statistically significant ($p = 0.111$).

In this study, based on our observations we see that the prevalence of hypermetropia and hypermetropic astigmatism is much more in esotropia patients i.e 53.70% and 35.16% respectively.

Astigmatism has previously been noted to be associated with strabismus in general, separate analysis of esotropia and exotropia were not reported.⁽¹³⁾

In the Strabismus, Amblyopia, and Refractive Error in Young Singaporean Children (STARS) Study (Singapore) by Chia(2013), 2992 Chinese children aged 6–72months; 3 (0.1%) with esotropia and 20 (0.7%) with exotropia; Astigmatism ≥ 1 D compared to <1 D: OddsRatio 4.02 (95% CI 1.79–9.03); Anisometropia ≥ 1 D compared to <1 D: OR 7.16 (95% CI 2.08–24.67). A separate analysis of esotropia and exotropia were not reported⁽¹⁴⁾.

In a study by Hui Zhu in china, it was concluded that, childhood strabismus found a strong link between refractive error and strabismus⁽¹⁵⁾.

In this study we conclude that, there is significant association ($p < 0.0001$) between presence of horizontal squint and refractive error. As refractive errors are correctable, early identification and appropriate treatment by screening of preschool children can prevent development of strabismus in the future.

However, more detailed study with larger sample sizes are required for commenting on relationship of different types of strabismus and type of refractive error.

Table 1 shows the distribution of patients with horizontal concomitant strabismus into exotropia and esotropia.

Total	Exodeviations	Esodeviations
100	46	54
200eyes	92eyes	108eyes

Table 2

According to gender	Exotropia	Esotropia	Total	P-value	Significance
Male	22(47.82%)	21(38.88%)	43	0.386	Not significant
Female	24(52.17%)	33(61.11%)	57		
46(100%)	54(100%)	100			

Table 3

Refractive error	Exotropia(eye)	Esotropia (no. eyes)	Total	p-value	Significance
Myopia	12(13.04%)	8(7.40%)	20(10%)	< 0.0001	Highly Significant
Hypermetropia	39(42.40%)	58(53.70%)	97(48.5%)		
Myopic Astigmatism	18(19.57%)	4(3.70%)	22(11%)		
Hypermetropic Astigmatism	20(21.73%)	38(35.18%)	58(29%)		
Plano	3(3.26%)	0	3(1.5%)		
Total	92	108	200		

Co-Relation of Refractive Error with Squint

Table 3 shows the correlation of refractive errors with squint.

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