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Frequency of Refractive Error in Patients with Squint

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Author`s Contribution

[1]Substantial contributions to the conception or design of the work; or the acquisition, [4,6]Active participation in active methodology, [2]analysis, or interpretation of data for the work, [3,5]Drafting the work or revising it critically for important intellectual content

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ABSTRACT

Objective: To determine the frequency of refractive errors in patients with squint at a tertiary care Hospital.

Methodology: A cross-sectional study was conducted at the Department of Ophthalmology, Liaquat University Eye Hospital in Hyderabad from May 2020 to October 2020. A total of 128 patients either exotropia or esotropia were included in this study. Auto refraction and Hirschberg reflex test was done. A refractive error of ≥+2 was taken as hypermetropia and ≤ -2 was taken as Myopia. This information was entered in the proforma and analyzed using SPSS version 20.

Results: The average age of the patients was 6.26±3.09 years. There were 73(5.03%) male and 55(42.97%) female. Hypermetropia was observed in 47.66% (61/128) cases while myopia in 11.72% (15/128) cases. Furthermore, the frequency of hypermetropia was found statistically insignificant according to age, gender, types of squint and Hirschberg reflex p-value (>0.05). Frequency of Myopia was found statistically insignificant across age groups, gender-wise and across different angles of the Hirschberg reflex-value (>0.05), while it was statically significant according to types of squint, (p-0.033).

Conclusion: Study revealed that the hypermetropia emerges as the most prevalent refractive error among the children assessed. It underscores the necessity for all these children to undergo cycloplegic refraction, with glasses being identified as the primary treatment approach. Mass screening initiatives are essential aimed at facilitating early identification and treatment of refractive errors.

Key words: Squint, Refractive errors, Hypermetropia, Myopia.

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Introduction

Strabismus, also known as squint, refers to a condition where the eyes fail to align correctly with each other. This condition arises due to a lack of coordination in the muscle movements of the two eyes. Refractive errors represent the predominant cause of visual impairment globally.[1] Their prevalence differs across different populations, posing a significant public health concern.[1] According to the World Health Organization (WHO), approximately 19 million children under the age of 15 were reported to have visual impairments.[2] Among these, uncorrected refractive error was identified as the primary cause affecting 12 million children with visual impairment.[2,3] Refractive error encompasses conditions such as myopia, hyperopia, and astigmatism in children.[2,4] In Pakistan, overall prevalence of squint is 5.4% out of which 2.5% patient are under 5 years age and 2.9% patients are over 5 years age, this indicates that there are approximately 7.02 million individuals with squint in 130 million population.[5] Squint is most common ophthalmic disorder among Paediatric population.[6,7] According to a study conducted in Pakistan, out of 107 children with squint, 52(48.6%) were males and 55(52.4%) were females. Mean age at presentation was 3 years and 11 months ±2 years.[6] Another study showed that commonest refractive error observed was hypermetropia, affecting 51.9% of the cases, subsequently 23.6%, astigmatism and 11.3% myopia.[1] It has been indicated that muscle imbalance, specifically exotropia (outward deviation of the eyes), was observed in 27.2% of individuals with myopia, while esotropia (inward turning of one or both eyes) was detected in 2% of myopia patients.[1] A recent study showed that esotropia was associated more with hypermetropia than exotropia.[8] The distribution of ocular diseases may differs across countries and even within regions of the same country.[9] To the best

of our knowledge, no hospital- or population-based study has been conducted on refractive errors in the Hyderabad Sindh region. However, this study aimed to determine the prevalence of refractive errors among patients with squint.[10] This research could be beneficial in understanding the extent of refractive errors in squint patients, enabling the implementation of appropriate interventions to correct these errors. This, in turn, could lead to improved vision, cosmetic appearance, and reduced morbidity.

Methodology

A cross-sectional study was conducted at the Department of Ophthalmology, Liaquat University Eye Hospital in Hyderabad from May 2020 to October 2020. A non-probability convenience sampling technique was utilized. All patients aged between 3 to 14 years old, presenting with Esotropia/Exotropia and Refractive Error of either gender, were included. Patients with congenital cataracts, a history of past ocular trauma, ocular tumors, and those with cranial Nerve Palsies were excluded. Written informed consent was acquired from every participant following a thorough explanation of the study objectives. All of the study participants were recruited based on specific sample selection criteria from the outpatient department by a skilled Senior Medical Officer or the Registrar. Selected cases underwent further thorough evaluation at the Squint Clinic by the Principal Investigator and, ultimately, by a consultant Ophthalmologist having minimum experience of 5 years or more. Details of the assessment were recorded via self-made study proforma. Written informed consent was obtained from each participant. Each participant's ophthalmic examination would include: autorefraction (MR- 3100, HUVITZ, Korea) and Hirschberg reflex test was done by a torchlight is shone on the patient's eye, a reflection was seen on the surface of the pupil: the reflexis taken as 15 degrees if at margin of pupil, 30 degrees if between pupil and edge of cornea and 45 degrees if outside cornea. A refractive error of ≥+2 was taken as hypermetropia and ≤-2 was taken as Myopia. This information was entered inthe proforma was attached as annexure. Data was analyzed by SPSS Software version 26.

Numerical variables were computed as Means and SD. Frequencies and percentages were computed for categorical variables. Stratification was employed to control for effect modifiers, and the Chi-square test was utilized to assess their impact on outcome variable, with significance level of ≤0.05.

Results

A total of 128 patients A total of 128 patients either exotropia or esotropia were included in this study. The averageage of the patients was 6.26±3.09 years. Out of 128 cases, 73(5.03%) were male and 55(42.97%) were female. Regarding the type of squint, 90(70.31%) patients had esotropia and 38(29.69%) patients had exotropia as shownin figure 7. Majority of patients (82, 64.06%) had mild 15 degrees squint on Hirschberg reflex, while 36(28.13%) had moderate 30 degrees and only 10 had large squint of 45 degrees (Table I).

Table I: Clinical characteristics of the patients. (n=128)

Variables		Frequency (%)
Gender	Male	73(57.03%)
	Female	55(42.97%)
Types of squint	Esotropia	90(70.31%)
	Exotropia	38(29.69%)
HIRSCHBERG REFLEX	15	82(64.66%)
	30	36(28.23%)
	45	10(7.81%)
Hypermetropia	Yes	61(47.66%)
	No	67(52.34%)
Myopia	Yes	15(11.72%)
	No	113(88.28%)

Analysis of refractive errors across different demographic and clinical categories among a total of 128 patients was done. Hypermetropia was higher among patients aged less than 5 years (23.4%), followed by (14.8%) in the 5-10 years age group, and (9.4%) in patients older than 10 years.

Table II: Refractive Error (Hypermetropia) according to age, gender, types of squint and Hirschberg reflex. (n=128)

Variables		Refractive Error (Hypermetropia)		p-value
		Yes	No	
Age groups	<5 years	30(23.4%)	34(26.6%)	0.766
	5-10 years	19(14.8%)	23(18.0%)	
	>10 years	12(9.4%)	10(7.8%)	
Gender	Male	36(28.1%)	37(28.9%)	0.665
	Female	25(19.5%)	30(23.4%)	
Types of squint	Esotropia	45(35.2%)	45(35.2%)	0.414
	Exotropia	16(12.5%)	22(17.2%)	
HIRSCHBERG REFLEX	15	40(31.3%)	42(32.8%)	0.557
	30	15(11.7%)	21(16.4%)	
	45	6(4.7%)	4(3.1%)	

Table III: Refractive Error (myopia) according to age, gender, types of squint and Hirschberg reflex. (n=128)

Variables		Refractive Error (myopia)		p-value
		Yes	No	
Age groups	<5 years	10(7.8%)	54(42.2%)	0.37
	5-10 years	3(2.3%)	39(30.5%)	
	>10 years	2(1.6%)	20(15.6%)	
Gender	Male	9(7.0%)	64(50.0%)	0.805
	Female	6(4.7%)	49(38.3%)	
Types of squint	Esotropia	7(5.5%)	83(64.8%)	0.033
	Exotropia	8(6.3%)	30(23.4%)	
HIRSCHBERG REFLEX	15	12(9.4%)	71(55.5%)	0.334
	30	3(2.3%)	33(25.8%)	
	45	--	9(7.0%)	

However, the p-value (0.766) indicates insignificant difference. In terms of gender, hypermetropia was slightly higher among male patients (28.1%) compared to females (19.5%), p-value (0.665). Furthermore, the frequency of hypermetropia was also found statistically insignificant according to types of squint and Hirschberg reflex p-value (>0.05) (Table II).

Myopia frequency was found statistically insignificant across age groups, gender-wise and across different angles of the Hirschberg reflex-value (>0.05). However, the prevalence of myopia differs significantly between types of squint, with Esotropia showing a higher prevalence (5.5%) compared to Exotropia (6.3%), with a significant p-value of 0.033. (Table III)

Discussion

Strabismus can influence the daily activities and diminish overall well-being. It affects the mental and social health as well as the quality of life in both children and adults, and I assess the difficulties faced by parents of children with strabismus.[10] In developing nations including Pakistan, there is a shortage of basic eye care services, insufficient trained personnel, and a deficiency of specialized units for treating strabismus. These challenges are exacerbated by community ignorance regarding squint and its potential treatments.[11] Although this study conducted to evaluate the refractive errors rates among patients with squint at a tertiary care Hospital possess an overall average age of 6.26±3.09 years and out of 128 cases, 73(57.03%) were male, while 55(42.97%) were females. In aligns to this study Singh A et al[12] found that the average age of the participants in their study was 11.20 ± 5.49 years and among the participants, males were in majority 97(55.5%) and females were 81 (45.5%). In another study, the average age upon presentation was 3 years and 11 months, with a variation of ±2 years.[6] These findings confirm that strabismus predominantly occurs in children. Conversely, Junejo AY et al,[14] reported a mean age of patients with strabismus as 9.99 ± 2.67 years, with females slightly more prevalent at 52.9% compared to males at 47.1%. Similarly, in another study conducted at the eye unit of Lady Reading Hospital in Peshawar, it was found that 56% of the patients were male, while 44% were female.[7] However, Abbas M et al[5] indicated a higher average age of patients at 12 years with a range from 2 to 45 years, which surpasses the findings of this study. This variation may because of differences in the criteria used for selecting the age range of patients in the studies. In the study conducted by Sethi et al, it was observed that 63% of the patients, totaling 313 individuals, were male, whereas 37%, totaling 187 individuals, were female. This gender disparity may be attributed to the male-dominated nature of our society.[8]

Regarding the type of squint, 90(70.31%) patients had esotropia and 38(29.69%) patients had exotropia in this study. In aligns to this study Qanat AS et al[15] conducted study on strabismus patients aged less than 18 years old and they found most frequent strabismus types were esotropia (63.0%) and exotropia 34.2%) followed by 3.6% hypertropia and 1.4% dissociated vertical deviation. Comparatively Yetkin AA et al[16] demonstrated that Amblyopia was in 26.09% patients out of 207 cases of esotropia and in 15.70% out of 172 cases of exotropia. Their findings suggested that esotropia is more closely associated with amblyopia compared to exotropia.[16] Hypermetropia was observed in 47.66% (61/128) cases while myopia in 11.72% (15/128) cases in present study. Similar result was also reported in another study showed that the prevalent refractive error observed was hypermetropia, occurring in 51.9% of cases, followed by astigmatism at 23.6%, and myopia at 11.3%[5] According to another previous study showed that esotropia was associated more with hypermetropia than exotropia.[8] In the study by Zaidi SR et al[17] stated that the among the patients, 43% of the patients had emmetropia, myopia was only 2%, and 9% cases had hyperopia. However, according to Bataineh HA et al[18], 25.32% of students had refractive

errors and inconsistently they found that myopia was the most prevalent refractive error in 63.5% of cases, followed by hypermetropia in 11.2%, and astigmatism in 20.4% of patients, while like this study they reported that the males were 53% and females were 47%.

In this study rate of hypermetropia and myopia was also not significant among different age groups, between gender and in Hirschberg Reflex. According to a study done conducted among schoolchildren in Dezfal, Iran, demonstrated that the prevalence of myopia among students aged 15 and younger was 3.4%, while hyperopia was observed in 16.6% of the participants, and astigmatism in 18.7% of them.[19] Comparatively in the study by Olusanya BA et al[19] reported that the majority of cases 57.4% had myopia, with 36.1% being hypermetropia and the rest of them 5.3% representing astigmatism. In aligns to this study Hassan S et al[21] reported that refractive errors indicated that myopia was most common among individuals aged 13–14 years, with 16 cases identified, while hypermetropia was predominant in the 14–15 age group, with 10 cases reported and additionally, astigmatism was observed in 5 cases within the same 14–15 age range.[21] This study noted certain discrepancies in its findings compared to recent research, potentially attributed to limitations such as a relatively small sample size and the retrospective nature of some data thesis work based. However, it is suggested that more extensive investigations should be conducted at the local level to gain a precise understanding of the current scenario regarding such health-affecting conditions. Similar to Qanat AS et al[15], we also advocate for the implementation of a mandatory nationwide pediatric ophthalmic screening program for children at ages one, three, and five years. This initiative would facilitate the early detection of strabismus and other refractive errors, ensuring timely intervention and management.

Conclusion

As per the study conclusion hypermetropia observed the most common refractive error among the examined children. This emphasizes the critical need for all these children to undergo cycloplegic refraction, with corrective glasses identified as the primary treatment modality. Based on these findings, mass screening programs become imperative to facilitate early detection and appropriate management of refractive errors, ensuring that affected children receive timely interventions to optimize their visual health and overall quality of life.

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