

Frequency of Intermittent Distance Exotropia Among Children

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Abstract:

Objectives: To determine the frequency of Intermittent Distance Exotropia (IDXT) among age groups and gender.

Methods: A retrospective cross-sectional study was conducted on all exotropic patients aged 1–15 years without prior strabismus surgery, who visited the Pediatric Ophthalmology Department of Civil Hospital Karachi from January 2021 to December 2022. Data was collected using consecutive sampling technique through manual records in which demographic data (name, visiting age, gender, family history, age of onset) and clinical details (visual acuity, Hirschberg test results, and CT outcomes) were collected to determine the frequency of IDXT. The Chi-square test and Mann-Whitney U-test were applied to analyze the data in SPSS version 25, with $p < 0.05$ was considered statistically significant.

Results: Among 272 children with exotropia, 113 (41.5%) had IDXT. It was more prevalent in the 1–7 age group (78 cases, 69%) compared to the 8–15 years (35 cases, 31%). Females showed a higher prevalence (72 cases, 63.7%) than males (41 cases, 36.3%). Most children had VA 6/6–6/18 in both eyes: right ($n=87$, 77%) and left ($n=89$, 78.8%). IDXT was insignificantly associated with visiting age groups ($p=0.095$) but significantly associated with gender ($p=0.017$).

Conclusion:

This study concluded that IDXT was more frequent in the 1–7 years age group and in females among the pediatric patients studied. Children with IDXT tend to present at a younger age, are more often female, and generally have better visual acuity compared to non-IDXT children. *Al-Shifa Journal of Ophthalmology* 2026; 22(2): 86-92..

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Introduction:

Strabismus is the misalignment of the visual axis¹. Manifest strabismus is a medical condition characterized by a misalignment of the eye that can be observed all the time and can't be overcome by the mechanism of fusion. It includes Exotropia (outward misalignment), Esotropia (inward misalignment), Hypotropia (downward misalignment), and Hypertropia (upward misalignment)².

IDXT is a common type of exo-deviation in Asian countries³. A systematic search was conducted in various international databases to gather information on the total frequency of exotropia, which was found to be 1.23%⁴. If cases are not treated in the early stages, they can progress into permanent exotropia, and with each stage

of disease progression, fusional capacity deteriorates, which disturbs BSV, and may eventually lead to amblyopia^{5,6}. To diagnose IDXT, a full orthoptic assessment should be completed at both fixations, i.e., distance and near, and in all directions of gaze⁷.

IDXT is further classified as True IDXT and simulated IDXT⁸. Intermittent distance exotropia (IDXT) affects approximately 1% of the global population. Often, delayed recognition by parents contributes to the progression from a mild, hidden condition (phoria) to a more noticeable and persistent misalignment (tropia)⁹. A retrospective study was conducted to define the frequent types of exotropia in which 235 exotropic patients under the age of 19 from a rural Appalachian region were studied, and 112 (47.7%) had IXT¹⁰.

A retrospective longitudinal study discovered that intermittent exotropia accounts for 86% of exotropia cases and usually begins with a stage of exophoria¹¹. A longitudinal study of 5831 preschool kids elderly 3 to 6 years was conducted in China, which reported the overall frequency of intermittent exotropia at about 3.24 %. In a previous study, the mean corrected visual acuity was found to be 0.86 ± 0.14 for the good eye¹². A Study found that approximately 25 % of participants had exotropia, in which the most common type was intermittent distance exotropia¹³. In the American Academy of Ophthalmology Journal, both eyes' visual acuity was equal in patients with intermittent exotropia¹⁴.

A hospital-based observational study of exotropia of aged less than 16 years was conducted in North India, which revealed that 72% of the cases were IXT¹⁵. In a study conducted at the Chinese University, it was suggested that in IDXT patients, the near Hirschberg test revealed that the corneal reflex was centered¹⁶.

A study concluded that the median age of onset of IDXT was 30 months (range: 0-

180). In an observational study, 18 (9%) children had a positive family history¹⁵. A minor female predominance in the study, with a total population of 5385 subjects, 51.9% were women and 48.1% were men¹⁷. In a previous study conducted in North India with a total of 286 children, 116 (56%) were females, while 90 (44%) were males. The median age of onset of IDXT was 30 months (range: 0-180). In the same study, 18 (9%) children had a positive family history¹⁵. Patients may complain of short-lived diplopia, diplophotophobia, asthenopia, micropsia, and exodeviation¹⁸⁻²¹.

Research conducted in Pakistan found that 5.4% is the estimated countrywide prevalence of strabismus under the age of 15 years²². In a prospective study conducted in Karachi with 87 children aged 6 to 15 years diagnosed with strabismus, the Hirschberg test was used to assess eye deviation at both distance and near fixation. At a distance, 19.5% showed a central light reflex, while the majority had deviations ranging from 5° to over 45°. Similar patterns were observed at near fixation, with most children exhibiting deviations between 5° and 30°. Only a small number showed severe deviation (>45°) in both tests. In a study, the visual acuity of each patient was found to be >6/12 in both right and left eyes, with 48 (55.2%) and 57 (65.5%) children, respectively²³. Although there are many international studies demonstrating the predominance of gender in types of IDXT and the age of onset of IDXT, there appears to be a gap in the literature in Pakistan. To address these gaps in knowledge, this study will provide information on the frequency of intermittent distance exotropia in children aged 1 to 15 years, as well as the gender predominance in IDXT.

Methodology:

A retrospective cross-sectional study was conducted at the Pediatric Ophthalmology Department of Civil Hospital Karachi,

covering the period from January 2021 to December 2022. Data was collected through a consecutive sampling technique through manual records from the ophthalmology department after approval, IRB-3420/DUHS/Approval/2024/314.

Overall, 272 children with exotropia aged 1-15 years were included in the study. Patients who were diagnosed with exotropia and patients between the ages of 1 and 15 years were included in the study. Patients with a history of other types of strabismus and patients who have had strabismus surgery were excluded. The patients with incomplete records were excluded. The Study variables are IDXT, visiting age groups, gender, family history, visual acuity of both eyes, Hirschberg distance, and near tests.

The software used for analysis was IBM SPSS 25. Categorical and quantitative data were denoted in the form of frequency and percentages, and Median Interquartile range (IQR), respectively. To estimate the differences in study variables, Chi-square test and Mann-Whitney U-test were used to analyze data. A p-value less than 0.05 was considered statistically significant.

Results:

Out of the total sample, 113 children (41.5%) had IDXT, while 159 (58.5%) did not. The median age at presentation differed significantly between the groups, with children with IDXT presenting at a median of 5 years (interquartile range 3–8 years) compared to 6 years (interquartile range 3–10 years) in the non-IDXT group ($p = 0.03$). Gender showed a significant association with IDXT ($p = 0.02$).

Females accounted for 55.1% of the overall cohort, with 63.7% of them having IDXT compared to 49.1% without the condition.

Visual acuity demonstrated strong associations with the presence of IDXT. In the right eye, 67.6% of all children had visual acuity between 6/6 and 6/18, but this

was more frequent among IDXT patients (77.0%) compared to non-IDXT children (61.0%), with $p < 0.001$.

Moderate impairment (6/24–6/60) was distributed similarly between the two groups, whereas severe impairment ($<6/60$) was seen exclusively in non-IDXT children (13.8%) and not in those with IDXT. The left eye findings mirrored this pattern ($p = 0.001$). Most participants (68.8%) had acuity between 6/6 and 6/18, with IDXT patients showing better outcomes (78.8%) compared to non-IDXT cases (61.6%). Severe impairment ($<6/60$) was again absent in the IDXT group but present in 15.7% of non-IDXT children.

The Hirschberg distance test revealed highly significant results ($p < 0.001$). The majority of children (67.3%) showed deviations of 15–30°, with this deviation being far more common among IDXT patients (80.5%) than non-IDXT children (57.9%). Larger deviations of 30–45° and greater than 45° were predominantly seen in non-IDXT cases (15.1% and 7.5%, respectively) but rarely in the IDXT group (3.5% and 0%). No cases of central alignment were recorded in the distance test.

At near fixation, however, the Hirschberg test revealed a striking difference ($p < 0.001$). All children with IDXT (100%) demonstrated central alignment, while none of the non-IDXT group did so. Among non-IDXT children, 19.5% had deviations of 5–15°, 57.9% had 15–30°, 15.1% had 30–45°, and 7.5% had more than 45° deviations (refer to Table 1).

Table 1: The demographic and clinical characteristics of children aged 1 to 15 years, comparing those diagnosed with intermittent distance exotropia (IDXT) to those without the condition

Demographic And Clinical Characteristics		Overall	IDXT (N%)		
			Yes	No	p-value
			113 (41.5%)	159 (58.5%)	
Visiting Age 1-15 years	Median (25th-75th Percentile)	5 (3-10)	5 (3-8)	6 (3-10)	0.03*
Visiting Age Groups	1-7 years	172 (63.2%)	78 (69.0%)	94 (59.1%)	0.1
	8-15 years	100 (36.8%)	35 (31.0%)	65 (40.9%)	
Gender	Female	150 (55.1%)	72 (63.7%)	78 (49.1%)	0.02
	Male	122 (44.9%)	41 (36.3%)	81 (50.9%)	
Family History	Positive	69 (25.4%)	29 (25.7%)	40 (25.2%)	0.9
	Negative	203 (74.6%)	84 (74.3%)	119 (74.8%)	
VA Right Eye	6/6-6/18	184 (67.6%)	87 (77.0%)	97 (61.0%)	<0.001
	6/24-6/60	66 (24.3%)	26 (23.0%)	40 (25.2%)	
	<6/60	22 (8.1%)	0 (0.0%)	22 (13.8%)	
VA Left Eye	6/6-6/18	187 (68.8%)	89 (78.8%)	98 (61.6%)	0.001
	6/24-6/60	60 (22.1%)	24 (21.2%)	36 (22.6%)	
	<6/60	25 (9.2%)	0 (0.0%)	25 (15.7%)	
Hirschberg Distance Test	Central	0 (0.0%)	0 (0.0%)	0 (0.0%)	<0.001
	5-15°	49 (18.0%)	18 (15.9%)	31 (19.5%)	
	15-30°	183 (67.3%)	91 (80.5%)	92 (57.9%)	
	30-45°	28 (10.3%)	4 (3.5%)	24 (15.1%)	
	> 45°	12 (4.4%)	0 (0.0%)	12 (7.5%)	
Hirschberg Near Test	Central	113 (41.5%)	113 (100%)	0 (0.0%)	<0.001
	5-15°	31 (11.4%)	0 (0.0%)	31 (19.5%)	
	15-30°	92 (33.8%)	0 (0.0%)	92 (57.9%)	
	30-45°	24 (8.8%)	0 (0.0%)	24 (15.1%)	
	> 45°	12 (4.4%)	0 (0.0%)	12 (7.5%)	
*Man-Whitney U Test Chi-Square Test					

Discussion:

The study findings show that 113 children (41.5%) had IDXT, while 159 (58.5%) did not. Children with IDXT tend to present at a younger age, are more often female, and generally have better visual acuity compared to non-IDXT children. They also demonstrate central alignment at near fixation and smaller deviations on the Hirschberg distance test.

In a study conducted in China by Pan et al., 2016, the overall frequency of IDXT was found to be 3.24% among 5831 preschool kids elderly 3 to 6 years¹². 72% of the cases

were IDXT in a study conducted in North India by Gore et al., 2023, which included exotropic children of age less than 16 years¹⁵. Kim et.al., 2023, found out 2628 (48.8%) out of 5385 children were of age 5 to <10 years¹⁷. Oh et.al., 2023, also reported 87 (71.4%) children of age group 8 to 17 years²⁷. The possible justification for the variations in frequencies could be due to the different age groups studied by the researchers.

Our study found that most children had good visual acuity (VA) in both eyes 77% in the right and 78.8% in the left, ranging

from 6/6 to 6/18. A significant association was observed between IDXT and good VA (right eye $p < 0.001$; left eye $p < 0.001$), as most patients maintained clear vision. In a different study by Junejo et.al., 2019, it was also found that when assessing visual acuity for distant vision, a significant portion of the children demonstrated good distance VA, with 48 (55.2%) and 57 (65.5%) having greater than 6/12 VA in both right and left eyes, respectively²³. Oatts JT 2020, reported that patients diagnosed with IDXT did not show any variation in binocular visual acuity¹⁴. 5831 preschool kids, elderly 3 to 6 years were included in a Chinese school-based cross-sectional study by Pan et. al., 2016, in which the mean VA was found to be 0.86 ± 0.14 for the good eye¹². These observations align with our study's findings of good VA in a substantial number of children.

The study reported that the Hirschberg distance test revealed that the central position was found in 17 (19.5%) children, and the majority exhibited 15 to 30° in 30 (34.5%) children²³. While our study results for the distance Hirschberg test indicated that none of the patients exhibited a light reflex in the center, 183 (67.3%) had a deviation between 15 and 30°. On the contrary, Junejo et. al. 2019 reported that the Hirschberg near test showed that the central position was found in 17 (19.5%) children, and the majority exhibited 15 to 30° in 31 (35.6%) children²³. While our study for the near test showed that 113 (41.5%) patients had a central light reflex and 92 (33.8%) had a deviation between 15 and 30°. This concurrence underscores the importance of evaluating Hirschberg's corneal reflex in IDXT. Understanding these variations is crucial for the diagnosis and management of IDXT in pediatric patients.

On examination of the extraocular muscle movements in our study, it was observed that all children with IDXT had full ocular motility. Additionally, Oatts JT in 2020 emphasized that the deviation of the eyes was constant in all gazes¹⁴.

When looking at the distribution of IDXT across the two visiting age groups, the study found that the frequency of IDXT was higher in the 1-7 years' age group (69%) than in the 8-15 years' age group (31%). Furthermore, the median of visiting age (1-15 years) was found to be 5 years (range: 3-8). North Indian hospital-based observational study by Gore 2023, the median visiting age of IDXT was 72 months (range: 7-192)¹⁵. This concurrence may indicate that IDXT is more likely to be identified in infancy because of a lack of awareness in parents, and may be due to financial issues faced by the village population in visiting a tertiary eye care facility.

The impact of gender on the occurrence of IDXT was also investigated in the study. The findings revealed an association between gender and IDXT, with females showing a higher prevalence (63.7%) than males (36.3%). The findings reported in previous studies Thuma et. al., 2023, & Khorrami-Nejad et. al., 2026, also reported female predominance^{24,25}, while a study conducted by Oh et. al., 2023, IDXT was slightly more common in males 67 (54.9%) than females 55 (45.1%) out of total 122 children aged 5-17 years²⁶. This could be due to a small sample size which is more prone to selection bias compared to larger studies.

Conclusion:

Intermittent distance exotropia is not easy to diagnose at an early age, children and parents may not be fully aware of the presence of this eye disorder. This retrospective study researched the frequency of IDXT in pediatric patients among 1-15 years age, which was found to be higher in females. However, it was more frequent in the 1-7 years' age group among the two age groups. Strategies for strabismus should aim to educate children and their parents, as well as the importance of early screening and interventions should be brought to attention. Additional research into the reason for female predominance can be done in the future.

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