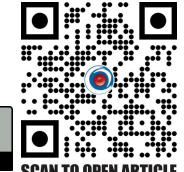


# Frequency of Strabismus in Patients with Down syndrome

Areej Ateeq<sup>1</sup>, Fatima Nadeem<sup>2</sup>  
Department of Ophthalmology, University of Lahore<sup>1-2</sup>

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Allied Vision Sciences



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## ABSTRACT

**Purpose:** To assess the frequency of deviation in eyes in Down syndrome patients and also to determine the type of deviation in each eye.

**Methodology:** After ethical approval this cross sectional study was carried out at Shadaab Special School, Lahore. All students previously diagnosed with Down syndrome were included in study while all other students were excluded. Informed consent was obtained from parents of students. Then a self-designed Performa was used to gather the data that mainly included the type of strabismus, findings of the Hirschberg test and cover uncover test. Pen torch was used to determine the findings of cover test, Hirschberg test and cover uncover test. Examination in all students was done by single examiner. Data was entered and analysed in SPSS version 26.

**Results:** A total of 60 patients took part in this research with a gender split of 36 male and 24 female, varying in age from 2-18 years. These were then categorized into 4 age groups. The patients with Down syndrome had high prevalence in age group of teens (13-18 years) i.e.51.70%. Almost forty two percent (41.70%) of deviation was in school going children (6-12 years). Three (3.3%) of Pre-school children (3.5-5 years) and toddlers (2-3 years) had misalignment. Strabismus was found in 36 (60%) males and 24 (24%) females.

**Conclusion:** This study showed that strabismus in Down syndrome patients was more prevalent in males as compared to females. Esodeviation was the commonest type.

**Key words:** Strabismus, Frequency, Down syndrome, Esotropia.

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## INTRODUCTION

Visual system comprises of cornea, lens, aqueous and vitreous humor, retina, optic nerves, optic track and visual Cortex. Visual system intakes the light signals from environment and converts it into neural signals and sends to brain for the image formation.<sup>1</sup> Internal layer is retina and is neural component of eye.<sup>2</sup> There are 9 positions of gaze and 4 basic movements of eye i.e. saccade, smooth pursuit, vergence and vestibulo-ocular movements.<sup>3,4</sup> Vestibulo-ocular developments work to stabilize the position of look by countering the

**Correspondence:** Areej Ateeq  
Department of Ophthalmology, University of Lahore.  
**Email:** areejatteque18@gmail.com

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position of look by countering the development of the head.<sup>5,6</sup>

Recti muscles are primarily responsible for movements along X-Axis and along Y-Axis i.e. superior or inferior and medial or lateral.<sup>7</sup> Agonists and antagonists are the muscles acting at the same time. Opposite muscles of other eye are equally innervated at the same time i.e. if the medial rectus of right eye is innervated in a movement than the lateral rectus of left eye is also innervated equally at the same time to make a bilateral movement of eyes.<sup>8,9</sup>

Down Syndrome (DS) may be a common chromosomal disorder. It is related with various visual signs counting keratoconus, refractive errors or strabismus. It is caused by trisomy of human chromosome 21 (HSA21). The frequency of trisomy is impacted by maternal age and contrasts between populaces (between 1 in 319 and 1 in 1000 live births are trisomic for HSA21.<sup>10,11</sup>

Ductions are monocular developments which are tried by occluding the individual eye and inquiring the understanding to take after a target in each heading of gaze.<sup>12</sup> Dextro-versions and Levo-versions bring the globe into the auxiliary position of look by revolution around either the vertical Z pivot or the horizontal X pivot of Fick.<sup>13,14</sup>

Strabismus may be a visual clutter where the eyes are misaligned and point in numerous headings. This misalignment is continually show or it may come and go. The 4 rectus muscles move the eye up, down, to the proper, and to the cleared out.<sup>15</sup> In some cases as it where one eye is influenced - turning inwards (esotropia), outward (exotropia) or descending whereas the other eye is straight ahead. Strabismus can too be portrayed by its cause.<sup>16,17</sup>

Strabismus avoids appropriate binocular vision and avoids both eyes from looking the same point. Either fringe vision or side vision may be influenced.<sup>18</sup>

## METHODOLOGY

After ethical approval this cross sectional study was carried out at Shadaab Special School, Lahore from February, 2022 to May, 2022. All students previously diagnosed with Down syndrome were

included in study while all other students were excluded. Informed consent was obtained from parents of students. Then a self-designed Performa was used to gather the data that mainly included the type of strabismus, findings of the Hirschberg test and cover uncover test. Pen torch was used to determine the findings of cover test, Hirschberg test and cover uncover test. Examination in all students was done by single examiner. Data was entered and analysed in SPSS version 26.

## RESULTS

A total of 60 patients took part in this research, with a gender split of 36 males and 24 females, ranging in age from 2 to 18 years. Twenty-one esotropia 2 exodeviation and 2 verticalal deviation were found. The mean age of onset was 54 months. This study concluded that majority of Down syndrome children had Esotropia. As, compared to our study which signifies 67.57% of esotropia in right eye and 60.86% in left eye.<sup>11</sup>

**Table -1: Gender Distribution**

	FREQUENCY	PERCENT
Males	36	60%
Females	24	40%
Total	60	100%

**Table -2: Frequency of Strabismus in Each Eye**

EYE	FREQUENCY	PERCENT
Right Eye	37	61.70%
Left Eye	23	38.30%
Total	60	100%

**Table -3: Frequency of Strabismus in Right Eye**

STRABISMUS	FREQUENCY	PERCENT
Exotropia	9	24.32 %
Esotropia	25	67.57 %
Alternating deviation	3	8.11 %
Total	37	100.0 %

**Table -4: Frequency of Strabismus in Left Eye**

STRABISMUS	FREQUENCY	PERCENT
Exotropia	7	30.43 %
Esotropia	14	60.86 %
Alternating deviation	2	8.69 %
Total	23	100.0 %

## DISCUSSION

Down syndrome is known to be caused by trisomy human chromosome 21 (HAS21). It is observed that patients with Down syndrome are mentally retarded and they seem to have gradual loss of memory, judgement and ability to function. This ponder pointed to decide the recurrence of strabismus in down syndrome patients.<sup>19</sup>

Our study concluded that there are 67.57% esotropic patients and 24.32% exotropic patient of right eye, while 60.86% esotropia and 30.43% exotropia was found in left eye of patients. It shows that percentage of strabismus in esotropia is more than the exotropia in Down syndrome.<sup>16,20</sup>

A report of 261 Korean patients with Down syndrome showed esotropia more common than exotropia. However, the prevalence of exotropia was 10% among 29% of the strabismus patients in Korean school age. According to their study basic exotropia was the common type of squint, 1 infantile esotropia patient.<sup>21</sup> As compared to a study which signifies that esotropia is the commonest among exotropia in Down syndrome patients.<sup>18</sup>

A study was conducted to assess the deviation after the surgery of strabismus in Down syndrome patients. Fifteen sequential cases of children having down disorder aging up to 18 years and selected for strabismus surgery were included. Mean pre-operative angle of deviation was  $\Delta 37.6$  in 15 children and 14 of them underwent surgery. Twelve of 14 children (85.7%) had surgical success (within  $10\Delta$  of orthophoria) and 2 children (14.3%) has residual esotropia.<sup>15</sup>

In a research, 170 children and young adults having Down syndrome of age 1-34 years were assessed for ocular findings. Forty five of 170 children (26.5%) had strabismus and esodeviation was most prevalent in them. Nine (20%) had exodeviation whereas 4(8.9%) had vertical deviation. Twenty seven of 32 esotropia patients were found to have acquired esodeviation. In (5%) high grade hyperopia group, frequency of strabismus was lowest. In this study the predominance of strabismus cannot be ascribed to nearness of hyperopia.<sup>17</sup> But according to our study, type of strabismus esotropia is more common. Hence, this

implies a significant relation between Down syndrome and strabismus. Our study conducted by the students of university of Lahore shows high prevalence of esotropia in Down syndrome patients. Routine ocular check-ups are recommended for the patients of Down syndrome.

Down syndrome patients need evaluation and treatment regularly. These patients should be kept under consideration for better consultation with extra patient care. Data was collected from a single centre and included a specific age group, which constitute major limitations of the study.

**Conflict of Interest:** None to declare

**Ethical Approval:** The study was approved by the Institutional Review Board / Ethical Review Board No. REC UOL 195.01.2024

**Author Contributions:** Areej Ateeq: Concept, Design, Data Collection, Drafting

Fatima Nadeem: Data Collection And Analysis, Critical Review

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