

# Study to Evaluate the Association Between Strabismus (Squint) and Anxiety in Children and Adolescents Using the Hamilton Anxiety Scale



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## Aim

To evaluate psychosocial difficulties due to strabismus in children and adolescents, to create awareness regarding this neglected aspect of strabismus, and to emphasise the need for early correction with appropriate referrals for better psychosocial development.

**Keywords:** Ophthalmology; Strabismus; Eyes; Cranial Nerves; Amblyopia

## Introduction

In normal subjects, eye movements are controlled by six muscles, the four Recti and the two Obliques, that work together and point both eyes in the same direction. Out of a total of 12 Cranial nerves, three cranial nerves, primarily the 3<sup>rd</sup>, 4<sup>th</sup> and 6<sup>th</sup> are involved in the control of ocular movements. In squint or strabismus, eyes point in different directions and are not aligned properly, due to improper control of eye movements that do not maintain normal ocular alignment causing abnormalities in binocular vision due to malfunction of neuromuscular control of ocular motility. It can lead to changes in physical appearance, can disrupt visual development and function, harm overall physical and mental health, and has a high potential to cause psychological distress. Patients of Strabismus often experience embarrassment at the hand of peers and suffer from low self-esteem. They have a hard time doing activities requiring fine motor skills and a good degree of stereopsis like driving, certain sporting disciplines, employment in the armed forces and other jobs requiring precision motor skills. Squint affects 2% to 4% of the population and can result in lazy eye (amblyopia), which is often not diagnosed in time to start an effective treatment. Squint increases the chances of social phobia, anxiety, low self-image and negativity with depressive symptoms. It puts the patient at a cosmetic disadvantage and leads to abnormal binocular visual development including lack of depth perception or stereopsis, and poor vision in one or both eyes of the patients.

The Hamilton Anxiety Rating Scale (HAM-A) is a rating scale used to measure the severity of anxiety by evaluating a series of symptoms in 14 items. It measures agitation, distress, and psychic anxiety [1]. Anxiety causes irritation, headaches, stomach pain, anger and disturbed sleep patterns in children so early management and appropriate referrals are needed not only for cosmetic and visual correction but also for the mental wellness and long-term mental health of children and adolescents. Removing anxiety from children's lives by initiating early intervention and correction will improve their long-term mental and physical well-being.

## Material and Methods

Our study was done from April 2019 to September 2021 in the district hospital, in Amritsar, Punjab, India after taking permission from the ethical committee of the Civil hospital, Amritsar, Punjab, India. Squint patients with manifest deviation with no associated problems especially neurological like cerebral palsy, mental retardation and syndromic phenotype and no associated ocular pathologies, visiting the Department of Ophthalmology in our secondary level district Hospital were taken and evaluated further. History of strabismus in the family and among siblings, age of presentation, prematurity and low birth weight and method of delivery, type of deviation, in or out and other, involvement of one or both the eyes, presence of double vision and whether the

deviation was constant or intermittent was recorded. Parents were asked if the deviation became more pronounced when the patient was inattentive or tired or ill. In clinical history, patients were asked about difficulty experienced in hand-eye and body coordination while performing activities like riding a bicycle or playing with a ball and carrying out fine motor activities like colouring and painting. Best corrected visual acuity was recorded using Snellen visual acuity chart and E charts. The presence of abnormal head position, facial asymmetry and Diplopia was recorded. Cycloplegic refraction was done in each case along with dilated fundus examination with indirect ophthalmoscopy and evaluation of ocular movements in all nine positions of gaze using a torch light. The presence of amblyopia or lazy eye was noted, and appropriate treatment was initiated. Spectacles were prescribed in cases detected with refractive errors. A detailed squint

examination was carried out in each case. Assessment of Binocular single vision and stereopsis was done by using the Worth Four Dot test and Lang Pencil Test. For motor evaluation of squint, Hirschberg's test, cover and uncover test were done and an Alternate Prism Bar cover test was performed to measure the exact deviation. In cases with Diplopia, diplopia charting was done by using a finger or pencil in all the nine positions of gaze. We selected 106 strabismus patients from our routine OPDs and referrals from the paediatrics department of the district hospital and government medical college, Amritsar. The range of age varied from 10 to 19 years and the average was  $14 \pm 4.23$ . Among the types of strabismus esotropia (65%) was most common, then exotropia (29%), hypertropia (4%), and dissociated vertical deviation (2%). Controls were selected from other children and teens without squint, with no major chronic illness coming for other problems or siblings coming along after age, sex, and profile matching. Anxiety level was measured by using the rating scale of Hamilton Anxiety Score (HAM-A Score) in all participants including squint and non-squint children and teens. The HAM-A rating scale has 14 scoring parameters on a 5-point scale, with count starting from 0=nil to 4=severe, with a total outcome count ranging from 0-56, where <17 suggest mild severity, 17-24 moderate and 25-30 shows moderate to severe anxiety and distress.

### Results

Data from both groups, patients with strabismus and without strabismus (the control group) was collected and tabulated and analysed. The outcome showed that patients with strabismus had a high anxiety score as compared to the controls. 35% of Adolescents had anxiety with 19% mild, 9% moderate and 7% severe, while controls showed 23% positivity for anxiety with a mild score of 14%, moderate 6% and severe 3%. In squint-positive children, 26% had anxiety, with mild 17%, 6% moderate and 3% severe. Children's control group had 13% positive for anxiety with 8% mild, 4% moderate and 1% severe. In all subjects having diplopia and an abnormal head position, distress, anxiety (significant  $p=0.001$ ) and related symptoms like

irritation, anger, headaches, and sleep disturbances were more. During the interview, many children and teens talked about their parents being depressed and parents' concerns were more in subjects with lazy eyes (amblyopia), manifest squint and those with abnormal head positions. Many children expressed their worries regarding driving, licence exams, marriage and finding a partner especially when they have a poor self-image. Subjects having ocular discomfort with headaches or 'pulling sensation' etc. were more worried and depressed. Some patients admitted to experiencing confusion when they are looked at or scrutinised by someone and avoiding eye contact when interacting with others. Treatments such as eye patching and cycloplegic drops worsened the distress for some. Many children complained of teasing by peers in school and which often resulted in them being shy or introverted according to the parents. They often had reading problems and difficulty in seeing the blackboard and were in fear of getting reprimanded by the teachers with many of them underperforming in academics in comparison to their peers. Most of them complained about the difficulty in playing sports and not being preferred as partners in group sports. Once they started the interview for filling Hamilton anxiety scale, many of them gradually opened up about their emotional trauma and started discussing multiple problems and inferiority complexes. We, as health professionals took this opportunity to give to them suggestions regarding having a balanced diet, good sleep, exercise routine, building social connections by video or phone calls, playing indoor games, and not putting pressure on themselves for academic success.

### Discussion

In a study by Satterfield and colleagues, an assessment of the psychosocial impact on growing children with a noticeable squint was done and it was found that patients had difficulty with self-image, studies, employment, interpersonal issues, and day-to-day activities including sports. These difficulties got aggravated in their adolescent and adult years. Subjects demonstrated generalized higher levels of distress on the Hopkins Symptom Checklist than age- and sex-matched controls ( $P < .01$ ) [2]. Timely identification of these symptoms of distress and psychological disorders in squint-positive subjects may improve overall management [3]. A cross-sectional study by Lee and colleagues established an association between squint and depression, anxiety, bipolar disorder, and schizophrenia [4]. Menon and colleagues found that 80% of subjects (85% males and 75% females) had psychosocial issues. The surgery improved appearance and patients had better self-body images [5]. In a study by Hatt SR et al, subjects were asked many questions and interviewed for many issues regarding distress, negativity, and anxiety. In squint patients with diplopia, the most common issue was Non-specific negativity, followed by General Disability and Driving etc. In subjects without diplopia, the most common problem was the appearance of others [6]. Adults and children

found strabismus in the right eye more disturbing as compared to the left eye. Children rated esotropia as more disturbing than exotropia [7]. For a young person with a visible squint, it is hard to get employment as compared to normal. Surgery makes the external appearance normal and removes hurdles in a job [8]. The presence of visible squint strabismus harms many aspects like finding a partner, employment, and peer interaction and causes anxiety, distress, and negative feelings. Corrective surgery has a positive effect on the self-body image and considerably improves mental health [9]. Li D and colleagues searched observational and interventional studies from 9 electronic databases and found associations of sight impairment, disorders of eye movement, or both with distress, anxiety, or negativity in children. Vision-impaired paediatric subjects were having significant depression (standard mean difference [SMD], 0.57; 95% confidence interval [CI], 0.26-0.89; 11 studies) and anxiety (SMD, 0.62; 95% CI, 0.40-0.83; 14 studies) than normal children without any visual impairment. There was a significant improvement in depression (SMD, 0.59; 95% CI, 0.12-1.06; 3 studies) and anxiety (SMD, 0.69; 95% CI, 0.25-1.14; 4 studies) in children after strabismus surgery [10]. Mohney and colleagues in a study found psychosocial issues including depression, and anxiety in 168 (41.3%) of the 407 (mean age of 17.4 years), patients with a history of childhood squint, in comparison to 125 control subjects (30.7%). Exotropia children were 3.1 times more likely to develop a mental health problem as compared to control when monitored to a mean age of 20.3 years and not with age-matched paediatric patients with esotropia [11].

## Conclusions

As established from our study, an association between squint and anxiety was found. This made us understand that the management of strabismus should include psycho-social assessment as an integral part. Timely referral and management

will reduce stress, and anxiety and will improve the self-body image and long-term mental health.

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