



DOI: <https://doi.org/10.54692/lgujls.2023.0702256>

Research Article

LGU J. Life. Sci

Vol 7 Issue 2 April - June 2023

ISSN 2519-9404

eISSN 2521-0130

Assessment of Visual Perception in Children with Autism Spectrum Disorder

Hafiza Iqra Javaid¹, Shamsa Kanwal¹, Muhammad Ahmed², Sadia Akbar³,
Amna Rashid², Saba Yaqoob⁴, Tallat Anwar Faridi*⁵

1. Pakistan Society for Rehabilitation of Disabled.
2. Department of Rehabilitation Sciences, University of Lahore.
3. Speech-Language Pathologist, Special Education Department, Punjab.
4. Department of Rehabilitation, Riphah International University.
5. University Institute of Public health, University of Lahore

*Corresponding Author's Email: tallat.anwar@pht.uol.edu.pk

ABSTRACT: *Autism spectrum disease (ASD) is a nervous disorder. In this disease children have sensory processing dysfunction and they unable to communicate, interact, and showed repetition in behaviours. The present study was designed to determine visual impairment frequency in children with autism spectrum disorder (ASD). A descriptive study was performed in Paediatrics Department of Children's Hospital and The Institute of Child Health, Lahore. Data was collected in six months and 52 patients of both gender were considered. A total of 40 boys and 12 girls of 3-8 years old children were included. A structured Questionnaire based on visual perception was designed to determine the visual sensory processing issues in children with an autism spectrum disorder. The findings showed a strong difficulties in the visual sense particularly in differentiation among the colours and eye tracking in autism children. It was concluded that sense of sight highly affected in the patients of autism spectrum disorder.*

Keyword: *Autism Spectrum disorder, Nervous system, Sensory processing issue*

INTRODUCTION

Autism is child's disability in communication and connection with others (Baker et al., 2008; Baranek et al., 2006; Baranek et al., 1997). It is clinically defined by traits such as restricted interests, occupations,

repeated habits and behavioural deficits as a diverse neurodevelopmental disease (Web, 2015; O'Neill and Jones, 1997). In some cases cardio-respiratory and touch are also related with ASD (Ming et al., 2016; Miguel et al. 2017). The prevalence of ASD among all children

in the United States is one in 68 now (Centres for Disease Control and Prevention, 2014). There are 4:1 more boy than girls with an autism spectrum disorder (Loomes et al., 2017). The parents reports these children have high pressure regarding care of these children (Larson, 2006). According to the American Psychiatric Association, 2013, ASD is a neurodevelopmental disorder that encompasses a variety of complex developmental disabilities. These include repetitive behaviours, limited interests, ritualized behaviours, behavioural inflexibility, impaired sensory processing, and communication deficits in establishing and maintaining relationships (American Psychiatric Association, 2013).

It is reported in literature that only 6–15% of ASD cases have genetic defects due to Rett's and Fragile X syndromes and other genetic abnormalities (Schaefer, 2008; Helsmoortel et al., 2014). According to one study ASD and ID usually co-occurred with each other and with the other conditions such as seizure disorders, motor problems, and numerous other psychiatric diagnoses (Silverman et al., 2022). Autism is a problem of extreme sensory modulation that can noticed in early age (Ben-Sasson et al., 2007). In this disease the children have high sensory disorders that usually starts at very

early age and persist throughout life (Cermak and Ben-Sasson, 1997). However, various sets of causative exhibit some behavioural symptom to assess this issue (Brown et al., 2001; Autism Society, 2015). A case study was also conducted on autism child in early 2 years of age and it was found that no impairment was detected in various domains of the toddler early age (Dawson et al., 2000).

When sensory impulses are unable to be properly organized into appropriate responses, it results in sensory processing disorder (SPD), a neurological illness. Processing sensory data from their environment, such as sound, touch, and movement, is challenging for those with SPD. They may experience sensory input more strongly or less strongly than other people, according to this. Therefore, SPD may affect a person's capacity for social interaction in various settings and for carrying out routine tasks. The present study was aimed to see prevalence of Autism in the existing society.

MATERIALS AND METHODS

Study Period

The present study was designed for six months from 20th August 2017- 20th January 2018.

Study Site

This descriptive study was performed in Pediatrics Department of Children's Hospital and The Institute of Child Health, Lahore.

Inclusion and Exclusion Criteria

A 52 children of both gender were included in the study with 40 boys and 12 girls of 3-8 years While, all other children above this age were not considered.

Questionnaire

A structured questionnaire regarding visual perception was created with the help of expert advisor and a literature review served as the data collection tool for this descriptive study.

Ethical Approval

A written consent of the guardians of the patient was taken before the questionnaire was filled.

Statistical Analysis

Statistical analysis was carried out using SPSS version 21.0 to find the mean and prevalence.

RESULTS

A data of 52 patients were examined in this descriptive study at the Department of Paediatrics, Children Hospital (CH) and The Institute of Child Health (ICH) Lahore. Each patient had to fill questionnaire prepared for them based on their medical history and clinical observations. SPSS version 21.0 was used to examine the entire set of data. An average age of 4.35 ± 1.26 years was considered during this study (Table 1).

Table 1: Frequency distribution of age

Variable	Value
Mean	4.35
SD	1.26
Minimum	3 years
Maximum	8 years

Abbreviation: SD; Standard Deviation

Assessment of Visual Behaviour in Autism disorder

A total of 52 patients were treated, of which 40 (76.9%) were boys and 12 (23.1%) were girls (Table 2).

Table 2: Participants demographic characteristics

Demographics		N=Frequency	%Frequency
Gender	Boys	40	76.9%
	Girls	12	23.1%

Frequency of sense of vision variables includes diagnosed visual defect observed in 11.5% of patients, difficulty in tracking the eyes was found among 30.7% of patients, while not recorded in all other autism patient.

An avoiding brightly lit rooms was recorded in 26.9% of patients, discriminating colours and shapes was found in 80.7% of patients, and frequency of standing in front of a mirror was recorded in 75% of patients (Table 3).

Table 3: A structured questionnaire used for determination of visual defects

Variable	Yes%	No%
Have a diagnosed visual defect	6(11.6)	46(88.4)
Have difficulty eye-tracking	16(30.7)	36(69.3)
Avoid being in a room with bright light	14(26.9)	38(73.1)
Have difficulty discriminating colours and shapes	42(80.7)	10(19.3)
Stands in front of a mirror or reflective surfaces for longer periods	39(75)	13(25)

DISCUSSION

Autism is a disorder of stereotyped behaviour. The stereotypies are usually repetition in behaviour and perceived as age in-appropriation, attention, context, duration or intensity (Kargas et al., 2015; Gal et al., 2002; Wiggins

et al., 2009). The goal of the current study was to gain a general understanding of the sight processing difficulties experienced by children with an autism spectrum disorder. The current descriptive study was carried out Children's Hospital Lahore's

Assessment of Visual Behaviour in Autism disorder

Developmental Paediatrics Department and The Institute of Child Health, Lahore. The appearance of symptoms in this disease start to develop before the age of 3 years and similar were recorded in this study (CDCP, 2007). The disease later on exist for an individual's life. This disease affects all races, nations and socioeconomic groups. Its frequency is four times higher in boys than girls and similar results were noticed in the current study with higher percentage that found in boys as compared to girls. According to the findings of the current study, eye tracking is less common than the trouble differentiating in colours and shapes. Children with autism are also more likely to stand in front of a mirror and these findings were in line with those of Dunn, whose study on sensory processing patterns resulted in a model of that pattern (Dun et al., 2002).

It is also reported by Coulter, (2009) that integration of sensory information is a frequently recorded problem that found in individuals with Autism Spectrum Disorders (ASD). In this problem not probably affected area is vision and the visual symptoms are pervasive and severe. The similar sort of issue in vision also recorded in the present study. These visual symptoms are due to an individual's unique sensory-processing abilities and are biologically based in origin. It was noticed in the present study that autism

patients were unable to differentiate colour and similar was reported in a study that children with ASD are unable to discrimination in colours (Franklin et al., 2008). Ludlow et al. (2006) also reported persons suffered in autism only prefer to eat colourless foods and not like to play with certain colourful toys.

Poor eye tracking and fixation skills were noticed in the present study and also reported by Brenner et al. (2007) that highly contribute in gaze version. While, Takarae et al. (2007) reported that difficulty in eye tracking and lack of control in eye movements in the individuals of autism might be due to problem in fronto-striatal and cerebellar circuitry. Similarly, problems to stand in front of mirror and avoiding bright light are also recorded in the patients.

CONCLUSION

It was concluded that the visual problems particularly in differentiation in eye colours, followed by difficulty in standing in front of mirror and eye tracking were high in the patients of autism spectrum disorder. Particularly, the area of standing in front of mirrors was high followed by discriminating colours.

ACKNOWLEDGEMENT

The authors of the present investigations gratefully acknowledge Paediatrics Department of Children's Hospital and The Institute of Child

Health, Lahore staff for their cooperation.

ETHICAL APPROVAL

The study was approved by the institutional ethical review committee.

CONFLICT OF INTEREST

The authors declare there is no conflict of interest.

REFERENCES

1. American Psychiatric Association (2013). Autism spectrum disorder. Retrieved from <http://www.dsm5.org/proposed-revisions/pages/proposed-revision.aspx?rid=94>.
2. Autism society (2015). About autism. [ONLINE] Available at: <http://www.autism-society.org/what-is/>.
3. Baker AE, Lane A, Angley MT, Young RL (2008). The relationship between sensory processing patterns and behavioral responsiveness in autistic disorder: A pilot study. *J. Aut. Develop. Disord.* 38(1): 867–875.
4. Baranek GT, David FJ, Poe MD, Stone WL, Watson LR (2006). Sensory Experiences Questionnaire: Discriminating sensory features in young children with autism, developmental delays, and typical development. *J. Child Psy. Psy. Allied Dis.* 47: 591–601.
5. Baranek GT, Foster LG, Berkson G (1997). Sensory defensiveness in persons with developmental disabilities. *Occup. Therapy J. Res.* 17(1): 173–185.
6. Ben-Sasson A, Cermak SA, Orsmond GI, Tager-Flusberg H, Carter AS, Kadlec MB, Dunn W (2007). Extreme sensory modulation behaviors in toddlers with autism spectrum disorders. *Am. J. Occup. Therap.* 61(1): 584–592.
7. Brenner L, Turner K, Muller R (2007). Eye movement and visual search: Are there elementary abnormalities in autism? *J. Aut. Dev. Disord.* 37(7):1289- 309.
8. Brown C, Tollefson N, Dunn W, Cromwell R, Filion D (2001). The adult sensory profile: Measuring patterns of sensory processing. *Am. J. Occup. Ther.* 55(1): 75-82.
9. Centers for Disease Control and Prevention (CDCP). Autism Spectrum Disorders Overview. 2007
10. Cermak S, Ben-Sasson A (1997). Sensory processing disorders in children with autism: Nature, assessment and intervention. In R.Gabriels & D.Hill (Eds.), *Growing up with autism: Working with school age children and adolescents* (pp. 95–123). New York: Guilford.
11. Coulter RA (2009). Understanding the Visual Symptoms of Individuals with Autism Spectrum Disorder (ASD). *Optom. Vis. Develop.* 40(3).

12. Dawson G, Osterling J, Meltzoff A, Kuhl P (2000). Case study of the development of an infant with autism from birth to 2 years of age. *J. Appl. Develop. Psychol.* 21: 299–313.
13. Dunn W, Myles BS, Orr S (2002). Sensory processing issues associated with Asperger syndrome: A preliminary investigation. *Am. J. Occup. Ther.* 56(1): 97-102.
14. Franklin A, Snowden P, Burley R, Notman L, Alder E (2008). Color perception in children with autism. *J. Autism Dev. Disord.* 38(10): 1837-1847.
15. Gal E, Dyck M, Passmore A (2002). Sensory differences and stereotyped movements in children with autism. *Behav. Change.* 19: 207–219.
16. Kargas N, López B, Reddy V, Morris P (2015). The relationship between auditory processing and restricted, repetitive behaviors in adults with autism spectrum disorders. *J. Autism Dev. Disord.* 45(3): 658-668.
17. Larson E (2006). Caregiving and autism: How does children's propensity for routinization influence participation in family activities?. *OTJR: Occupation, Participation and Health*, 26(1): 69–79.
18. Loomes R, Hull L, Mandy WPL (2017). What is the male-to-female ratio in autism spectrum disorder? A systematic review and meta-analysis. *J. Am. Acad. Child Adoles. Psych.* 56(6): 466-474.
19. Ludlow A, Wilkins A, Heaton P (2006). The effect on coloured overlays on reading ability in children with autism. *J. Autism Dev. Disord.* 36(4): 507-516.
20. Ming X, Patel R, Kang V, Chokroverty S, Julu PO (2016). Respiratory and autonomic dysfunction in children with autism spectrum disorders. *Bra. Develop.* 38(2): 225-232.
21. Miguel OH, Sampaio A, Martínez-Regueiro R, Gómez-Guerrero L, López-Dóriga CG, Gómez S, Carracedo Á, Fernández-Prieto M (2017). Touch processing and social behavior in ASD. *J. Autism Dev. Disord.* 47(8): 2425-2433.
22. O'Neill M, Jones R (1997). Sensory-perceptual abnormalities In autism—a case for more research? *J. Autism Dev. Disord.* 27(1): 283–293.
23. Rogers SJ, Hepburn S, & Wehner, E. (2003). Parent reports of sensory symptoms in toddlers with autism and those with other developmental disorders. *J. Autism Dev. Disord.* 33: 631–642.
24. Schaaf RC (2010). Interventions that address sensory dysfunction for individuals with autism spectrum disorders: Preliminary evidence for the superiority of

- sensory integration compared to other sensory approaches. In B. Reichow, D. Cicchetti, P. Doehring, & F. Volkmar (Eds.), *Evidence-based practices in autism spectrum disorders* (pp. 245–273). New York: Springer
25. Silverman JL, Thurm A, Ethridge SB, Soller MM, Petkova SP, Abel T, Bauman MD, Brodtkin ES, Harony-Nicolas H, Wöhr M, Halladay A (2022). Reconsidering animal models used to study autism spectrum disorder: current state and optimizing future. *Genes Brain Behav.* 21(5): e12803.
 26. Takarae Y, Nancy J, Minshew N, Luna B, Krisky C, Sweeney J (2004). Pursuit eye movement deficit in autism. *Brain.* 127(12): 2584-2594.
 27. Wiggins LD, Robins DL, Bakeman R, Adamson LB (2009). Brief report: Sensory abnormalities as distinguishing symptoms of autism spectrum disorders in young children. *J. Autism Dev. Disord.* 39(1): 1087–1091.