

## **Health Habits Associated with Pediatric Patients of Autism Spectrum Disorder**

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### **Abstract**

The aim of the present cross-sectional study was to evaluate different habits in Autism spectrum disorder (ASD) patients. A total of 574 pediatric ASD patients were enrolled in the present study with written consent. As compared with control (9% abnormal habits), ASD patients showed significantly higher abnormal habits (98%). Among abnormal habits hyperactivity and restlessness was highest (78.91%) followed by unexplained (72.82%), food sensitivities (62.89%), anxiety and nervousness (45.29%), high male hormone (31.35%), deficiency of vitamins (28.91%) and least (15.15%) was Attentiveness. Higher percentages are due to occurrence of repetitive habits observed in many patients.

### **Key words**

Health habits, ASD, Autism, Pediatric, Shouting, Hand flapping, Jumping, Aloof

## Introduction

Autism Spectrum Disorder (ASD) is a neuro-developmental disorder (NDD) seen among children, which is characterized by the presence of marked impairment in social interaction, communication and abnormally restricted activities, interests and with presence of repetitive behaviours. Manifestations of this disorder vary greatly depending on the developmental levels and age of the individual. Autism is a complex progressive disability where symptoms are discernible in the affected infant's life in the first 3 years of age and manifest throughout the life-span [1].

Autism is a matter of great concern to the practicing pediatricians since there is sufficient documentary evidence for increase in the prevalence of autism all over the world. According to recent estimates from CDC's Autism and Developmental Disabilities Monitoring (ADDM) Network about 1 in 59 children has been identified with ASD [2].

Many of the medical conditions in ASD are treatable, often resulting in improved developmental gains and quality of life for the patient and family. In addition, the possibility exists that some of these medical conditions may suggest the presence of important biologic markers, which, if identified, can refine our ability to be more precise in categorizing clinical heterogeneity within the autism spectrum [3].

The aim of this study was to examine the prevalence of habits in ASD patients and associated comorbid conditions based on earlier behavior-based intervention, which is associated with improvements in core areas, such as social functioning and communication [4].

## Materials and Methods

The present study was approved by Gujarat University Institutional Ethics Committee (GUJIEC/11/2017) and conforms to the provision of the Declaration of Helsinki (as per revised in Edinburg 2000). Written, informed consent was taken from all participants prior to the participation in the study. The inclusion and exclusion criteria were as mentioned below: Inclusion criteria: (1) Patients were selected based on criteria of Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM V) and International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD 10). (2) Age less than 15 years were included. Exclusion criteria: (1) Patients with any other genetic disorder other than ASD were excluded. (2) Patients above 15 years of age were excluded. (3) Patients with any kind of head injury that may cause intellectual disability were excluded.

The data was collected from various clinics, doctors, therapeutic centres and Institutions in India. The forms were filled by the parents and/or caregivers.

A total of 603 control and 574 ASD patients were enrolled in the study. They were divided into three age groups (0.5 to 5.0 years, 5.1 to 10.0 years, 10.1 to 15.0 years). All participants were analysed for types of habits (Hyperactivity & Restlessness, Anxiety & Nervousness, Food sensitivities, Attention, Unexplained, High male hormone, Deficiency of vitamins) and its subtypes (jumping, hand flapping, running, nail biting, etc...).

Data was statistically analysed using Chi square test;  $p < 0.05$  was considered statistically significant.

## Results and discussion

The results shown in the Table 1 shows significant abnormal habits in ASD patients (98%) as compared to control group (9%).

Table 2 and figure 1 shows different habits in ASD patients. Groups of habits observed in ASD children were habitual hyperactivity and restlessness (78.91%) which is highest followed by unexplained (72.82%), food sensitivities (62.89%), anxiety and nervousness (45.29%), high male hormone (31.35%), deficiency of vitamins (28.91%) and attentiveness (15.15%).

Amongst individual habits, maximum (33%) abnormality was jumping and bed wetting followed by hand flapping (27%), fast movement of fingers (23%), making noise & running (20%), un-necessary laughing & putting everything in mouth (18%), clinging to mother (16%), unnecessary crying (13%), aloof (12%), echolalia & turning around and round (11%), nail biting & toe walking (10%), rocking (9%), shouting (8%), playing with private parts & hugging everyone (7%), shaking legs & arranging objects in line (6%), roaming naked in house (3%), spitting & kissing others/everyone (2%) (Table 2 and figure 1).

Children with ASD may also have unusually strong reactions to one or more of their five senses. In our data revealed that fast movement of fingers (23%), hand flapping (27%) and jumping (27%) due to their interest and reaction towards situation they expose. Others are excessively bothered by loud noises. Many children may be bothered by these things, but children with ASD often have a stronger reaction to above things. Children with ASD may also do the same thing over and over again. For example, they may repeatedly flap their hands, jump, or walk on tiptoes. This is common. It is something that many parents talk about when they describe their children. Child may be doing these things to help calm themselves during stressful situations or to help occupy or entertain themselves [5].

Intrusive and abnormal movements appear in ASD including repetitive hand flapping, stereotypy, and self-injurious behaviours [6].

Children with ASD may also have unusually intense and prolonged emotional reactions. For example, they may get very angry and started unnecessary crying with no such reason. These emotions do not match the situation they find themselves in. These reactions may occur as a result of anxiety they feel when making changes in routine.

Children with ASD may have no interested/involved in many activities in such activities like playing with peers and learning new things. They are more interested in arranging things in line, talk constantly and fast movement of fingers while feeling uneasy.

Accardo and Whitman examined the relationship between toe-walking and language development in 799 children referred for developmental evaluation. They reported that the frequency of toe-walking increased as the severity of language impairment increased. Subsequently the investigators reported a 24% incidence of toe-walking in a general pediatric population [7].

Findings suggest that the motor impairments are not the mere results of epilepsy or developmental regression, rather they are part of the overall brain dysfunction of autism spectrum disorders [8].

A perspective on autism echolalia that requires us to listen attentively to things that are said again and again, rather than to dismiss them as insignificant [9].

A convincing factor for gender differences in the ASDs is the consistently differential exposure of the immature brain to male and female sex hormones. Boys are exposed to higher intrauterine testosterone (TST) levels than girls, owing to the addition of the TST foetal boys secrete to the androgens the

mother's adrenal provides to foetuses of either sex. Levels in boys are especially elevated during the first few weeks after birth due to additive stimulation of residual maternal androgens and gonadotrophins to boys' own androgen production. Androgens continue to be higher throughout childhood in boys, albeit at more modest levels, until the pubertal surge [10]. Baron Cohen and colleagues characterized as "the extreme male brain" [11] [12]. In typically developing children [13], and others; Bergman et al. in 2010, linked heightened amniotic fluid TST levels to later behavioural characteristics potentially relevant to autism [14]. The effects of androgen hormones on nerve cells with adenosine receptors (ARs) in the brainstem and those with ARs in the amygdala are potentially multiplicative and thus liable to enhance androgen effects on the brain [15].

Table 1: Showing habits of pediatric autism spectrum disorder patients and control children

Habits	Control (603)		ASD (574)	
	Number	%	Number	%
Normal	549	91	12*	02
Abnormal	54	09	562*	98

Level of significance:

\* $p < 0.05$ , as compared with control (Chi square test)

Table 2: Showing prevalence of habits in pediatric autism spectrum disorder patients

Habit Groups	Type of habits	Number of ASD patients as per age groups			Total Number (574 Patients)	Total group Numbers and percentage
		0.5 to 5.0 years	5.1 to 10.0 years	10.1 to 15.0 years		
Hyperactivity & Restlessness	Jumping	86 (15)	83 (14)	18 (3)	187 (33)	453 (78.91)
	Hand flapping	79 (14)	55 (10)	28 (5)	154 (27)	
	Running	78 (14)	32 (6)	2 (0)	112 (20)	
Anxiety & Nervousness	Nail biting	47 (8)	6 (1)	2 (0)	55 (10)	260 (45.29)
	Shaking legs	15 (3)	17 (3)	5 (1)	37 (6)	
	Making noise	75 (13)	32(6)	8 (1)	115 (20)	
	Rocking/Moving to & From	31 (5)	18 (3)	4 (1)	53 (9)	
Food sensitivities	Unnecessary laughing	72 (13)	26 (5)	7 (1)	105 (18)	361 (62.89)
	Unnecessary crying	64 (11)	11 (2)	2 (0)	77 (13)	
	Shouting	16 (3)	28 (5)	1 (0)	45 (8)	
	Fast movement of fingers	86 (15)	41 (7)	7 (1)	134 (23)	
Attentiveness	Spitting	6 (1)	4 (1)	2 (0)	12 (2)	87 (15.15)
	Toe walking	45 (8)	11 (2)	1 (0)	57 (10)	
	Roaming naked in house	11 (2)	7 (1)	0 (0)	18 (3)	
Unexplained	Aloof	34 (6)	29 (5)	5 (1)	68 (12)	418 (72.82)
	Echolalia	45 (8)	17 (3)	2 (0)	64 (11)	
	Turning around and round	49 (9)	12 (2)	3 (1)	64 (11)	
	Arranging objects in line	24 (4)	10 (2)	1 (0)	35 (6)	
	Bed-wetting/no toilet control	173 (30)	10 (2)	4 (1)	187 (33)	
High male hormone	Hugging everyone	31 (5)	8 (1)	1 (0)	40 (7)	180 (31.35)
	Clinging to mother/Always want her	76 (13)	11 (2)	2 (0)	89 (16)	
	Kissing others/everyone	6 (1)	2 (0)	1 (0)	9 (2)	
	Playing with private parts	27 (5)	12 (2)	3 (1)	42 (7)	
Deficiency of vitamins	Chalk/Mud/Wall leaking	56 (10)	7 (1)	0 (0)	63 (11)	166 (28.91)
	Putting everything in mouth	76 (13)	20 (3)	7 (1)	103 (18)	

**Bold** values in parenthesis indicate percent

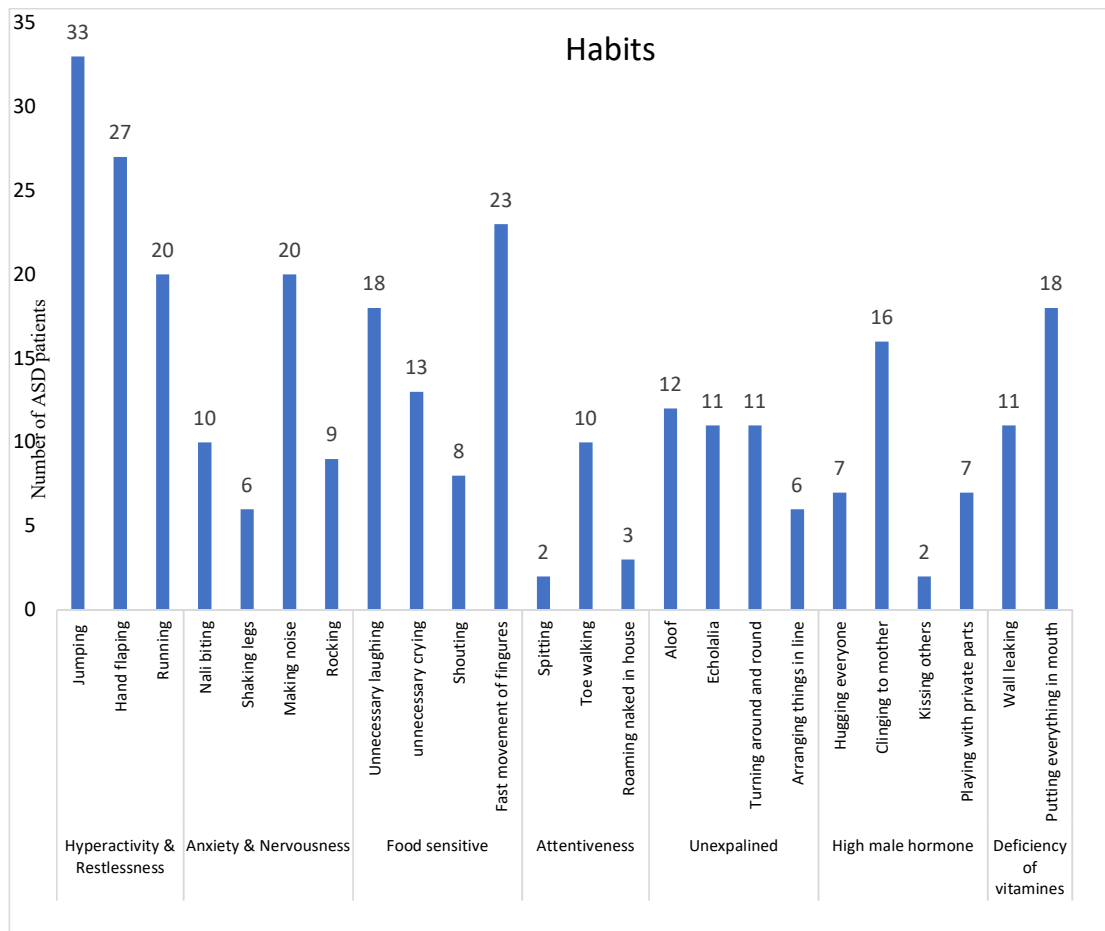


Figure 1: Showing percentage of different habits with its different types (7) and subtypes (24).

## Disclosure

The authors declared no conflict of interest.

## References

- [1] Landa, R. J. (2008). *Diagnosis of autism spectrum disorders in the first 3 years of life. Nature Reviews Neurology*, 4(3), 138.
- [2] Baio, J., Wiggins, L., Christensen, D. L., Maenner, M. J., Daniels, J., Warren, Z. et al. (2018). *Prevalence of autism spectrum disorder among children aged 8 years—Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2014. MMWR Surveillance Summaries*, 67(6), 1.
- [3] Bauman, M. L. (2010). *Medical comorbidities in autism: challenges to diagnosis and treatment. Neurotherapeutics*, 7(3), 320-327.
- [4] Matson, J. L., & Nebel-Schwalm, M. S. (2007). *Comorbid psychopathology with autism spectrum disorder in children: An overview. Research in developmental disabilities*, 28(4), 341-352.
- [5] South M, Ozonoff S, McMahon WM. *Repetitive behavior to profile in Asperger's syndrome and high-functioning autism. J Autism Dev Disord* 2005;359:145–58.
- [6] Mooney EL, Gray KM, Tonge BJ. *Early features of autism: repetitive behaviors in young children. Eur Child Adolesc Psychiatry* 2006;15(1):12–8.
- [7] Accardo P, Morrow J, Heaney MS, Whitman B, Tomazic T. *Toewalking and language development. Clin Pediatr* 1992;31:158–60.
- [8] Ming, X., Brimacombe, M., & Wagner, G. C. (2007). *Prevalence of motor impairment in autism spectrum disorders. Brain and Development*, 29(9), 565-570.
- [9] Sterponi, L., & Shankey, J. (2014). *Rethinking echolalia: Repetition as interactional resource in the communication of a child with autism. Journal of child language*, 41(2), 275-304.
- [10] Gilmartin, B. G. (1987). *Peer group antecedents of severe love-shyness in males. Journal of personality*, 55(3), 467-489.
- [11] Baron-Cohen, S., Auyeung, B., Ashwin, E., & Knickmeyer, R. (2009). *Fetal testosterone and autistic traits: a response to three fascinating commentaries. British journal of psychology (London, England: 1953)*, 100(Pt 1), 39.
- [12] Baron-Cohen, S., Knickmeyer, R. C., & Belmonte, M. K. (2005). *Sex differences in the brain: implications for explaining autism. Science*, 310(5749), 819-823.
- [13] Auyeung, B., Baron-Cohen, S., Ashwin, E., Knickmeyer, R., Taylor, K., & Hackett, G. (2009). *Fetal testosterone and autistic traits. British Journal of Psychology*, 100(1), 1-22.

- [14] Bergman, K., Glover, V., Sarkar, P., Abbott, D. H., & O'Connor, T. G. (2010). *In utero cortisol and testosterone exposure and fear reactivity in infancy. Hormones and behavior, 57(3), 306-312.*
- [15] Pfaff, D. W., Rapin, I., & Goldman, S. (2011). *Male predominance in autism: neuroendocrine influences on arousal and social anxiety. Autism Research, 4(3), 163-176.*