



POOR TACTILE DYSFUNCTION IN CHILDREN WITH AUTISM

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Abstract: Autism spectrum disorder is characterized by persistent deficits in the ability to initiate and to sustain reciprocal social interaction and social communication, and by a range of restricted, repetitive, and inflexible patterns of behavior and interests. Sensory symptoms are prevalent in autism spectrum disorder, and prevalence rates of tactile dysfunction in children with Autism have significantly to the extent of 77%. A descriptive and qualitative study on "Poor Tactile Dysfunction in Children with Autism" was carried out to study the presence of poor tactile perception and discrimination with regard to various tactile components. The Sensory Processing Disorder Checklist by Carol Stock Kranowitz (1995) has been used for this study. Data were collected from three special schools by using direct observation, parental interview, interaction with special educators and caregivers. Data were descriptively and qualitatively analyzed. Children with poor tactile dysfunction experience difficulty in motor planning and body awareness.

Index Terms - Autism, Sensory Symptoms, Poor Tactile Dysfunction, Motor Planning, Body Awareness

I. INTRODUCTION

Autism is a complex neurobiological disorder that typically lasts throughout a person's lifetime. It is part of a group of disorders known as autism spectrum disorders (ASD). Today, 1 in 150 individuals is diagnosed with Autism, making it more common than pediatric cancer, diabetes, etc. Lorna Wing & Judith Gould, 1979, described the Autism as "Triad of Impairments." Autism is characterized by significant impairment in 3 areas of development namely Social Interaction, Social Communication and Social Imagination. What makes the spectrum even more complicated is that no two autistic people appear to have the precisely same patterns of the triad of impairments. Some researchers describe Autism as a disorder of the sense (Sensory Dysfunction) rather than a social Dysfunction (Impairment of social interaction).

Sensory Dysfunction

Our senses give us information, and we need to function in the world. Senses are directed by sense organs (or) sensory systems to the body. Traditionally we distinguish the following sensory systems, namely Vision, Hearing, Vestibular, Olfaction, Gustatory, Proprioceptive and Tactile. Sensory abnormalities are found in over 90% of those with Autism. They are considered core features by some, although there is no good evidence that sensory symptoms differentiate Autism from other developmental disorders.

Tactile Defensiveness

Tactile defensiveness (TD) refers to a pattern of observable behavioral and emotional responses, which are aversive, negative and out of proportion, to certain types of tactile stimuli that most people would find to be non-painful (Royeen & Lane, 1991). The root cause for Tactile Dysfunction is neurological disorganization in the midbrain region of the brain, which is mainly responsible for filtering incoming stimuli, and, may not adequately screen out all

extraneous tactile stimulation causing the child to perceive the input as extreme and uncomfortable. The central nervous system's ability to process tactile sensory information is distorted, causing significant discomfort to the child.

Poor Tactile Discrimination

With inefficient or immature discrimination, the child will have difficulty using his tactile sense for increasingly complex purposes. The child's brain doesn't register information about how things feel.

A child with Poor Tactile Dysfunction exhibits

- difficulty with fine motor tasks such as buttoning, zipping, and fastening clothes
- not be able to identify which part of their body was touched if they were not looking
- afraid of the dark
- a messy dresser; looks disheveled, does not notice pants are twisted, the shirt is half untucked, shoes are untied, one pant leg is up, and one is down, etc.
- difficulty using scissors, crayons, or silverware
- continues to mouth objects to explore them even after age two
- difficulty in figuring out the physical characteristics of objects; shape, size, texture, temperature, weight, etc.
- not be able to identify objects by feel, uses vision to help; such as reaching into backpack or desk to retrieve an item.

II. Literature Review

A study on "Impairment in movement skills of children with Autistic Spectrum Disorders" had done by Green et al. (2009) suggested that children with ASD, 79% had specific movement impairments on the Movement Assessment Battery (M-ABC). Children with childhood autism were more impaired than children with broader ASD and children with an IQ less than 70 were more impaired than those with IQ more than 70. This is consistent with the view that movement impairments may arise from a more severe neurological impairment. Their study results were interpreted as "Movement impairments are common in children with ASD".

Provost et al. (2007) had compared motor scores in children with ASD, children with developmental delay (DD), and children with developmental concerns without motor delay in a study on "A Comparison of Motor Delays in Young Children: Autism Spectrum Disorder, Developmental Delay, and Developmental Concerns". Descriptive analysis showed all children with ASD had delays in gross motor skills, fine motor skills, or both. Children with ASD and children with DD showed significant impairments in motor development compared to children who had developmental concerns without motor delay. Motor scores of young children with ASD differ significantly differ on motor skill measures when compared to young children with DD.

Hollins & Bensmaïa (2007) had examined that the way information about textures is captured, encoded, and processed by the somatosensory system to produce sensations of roughness/smoothness. Perception of the roughness of more delicate surfaces is mediated by detection, primarily by Pacinian afferents, of cutaneous vibrations generated when textures move across the skin the understanding of these textures isn't finely tuned in autistic individual. It was discussed in a study on "The coding of roughness".

Stewart et al. (2006) had compared praxis in 21 high-functioning children with autism spectrum disorders (ASD) with 24 typically developing controls using a traditional approach in which performance was evaluated through a detailed examination of error types. Children with ASD produced only fewer correct responses not only during Gesture to Imitation but also during Gesture to Command and with Tool Use. Body-part-for-tool errors were more common in children with ASD, suggesting dyspraxia is not entirely attributable to motor deficits. The findings indicated that Autism is associated with a generalized praxis deficit, rather than a deficit specific to imitation.

A study by Hollins et al. (2002) on "Vibrotactation and texture perception" suggested that fine-texture discrimination is also impaired when vibrotactile channels are desensitized by adaptations. Vibrotactile adaptation fails to enhance spatial localization in adults with autism (Tommerdahl et al. 2006).

Research on "Interventions to Facilitate Auditory, Visual, and Motor Integration in Autism" had done by Dawson & Watling (2000) and the evidence was reviewed on the prevalence of sensory and motor abnormalities in Autism and the effectiveness of three interventions designed to address such defects—sensory integration therapy, traditional occupational therapy, and auditory integration training. Although sensory processing and motor abnormalities are neither universal nor specific to Autism, the prevalence of such abnormalities in Autism is relatively high.

Manjiviona & Prior (1995) compared the motor impairment levels of Asperger syndrome and high functioning autistic children using a standardized test, the Test of Motor Impairment-Henderson Revision. The two groups did not differ on either total or subscale impairment scores. Intelligence level was negatively correlated with motor impairment, although the relationship was mostly accounted for by the Asperger children. There was considerable variability within both clinical groups, but 50% of Asperger children and 67% of autistic children showed a clinically significant level of motor impairment. Results offer no support for clumsiness as a diagnostically differentiating feature of these disorders; this was inferred by them in a study on "Comparison of Asperger syndrome and high-functioning autistic children on a Test of Motor Impairment".

III. METHOD

A Descriptive and Qualitative analysis was carried out to study poor tactile perception and discrimination with regard to various tactile components. Simple random sampling was used by the researcher in the selection of the sample. The sample comprised of 30 children with Autism in the age group of 5–15 years. A self-prepared questionnaire to collect the demographic data of child was used, which elicited responses such as name, age, sex, level of Autism, etc. The Sensory Processing Disorder Checklist (Poor tactile perception and discrimination) by Carol Kranowitz (1995) has been used for this study. Data were collected from 3 special schools by using direct observation, parental interview, interaction with special educators and caregivers. Data were analyzed in two parts: Part I Descriptive and Part II Quantitative.

IV. RESULTS AND DISCUSSION

Poor tactile perception and discrimination

If the defensive system is not integrated by the time a child is three or four, then the discriminating system can't arise to "take charge". With inefficient or immature discrimination, the child will have difficulty using his tactile sense for an increasingly complex purpose like learning at school. The child's brain does not register information about how things feel. They order to touch and handle them repeatedly to learn about their weight, texture, and shape. Poor tactile perception and discrimination are discussed under two headings, respectively, A) Motor Planning and B) Body Awareness.

Part I: Descriptive Analysis

A) Motor planning

The more a child touches and explores objects, and the more he/she learns from his/her body in different ways, the better his/her motor planning and motor skills become: Mastering one motor skill leads to trying another that is more challenging. The child who feels uncomfortable in his/her skin may have poor motor planning or dyspraxia. The child may not move smoothly or may have trouble in planning and organizing his/her movements.

For example, Srivignesh works hard to draw a flower. Awkwardly holding a crayon, he draws a circle, dots for petals and a line for a stem. Cutting with scissor is so difficult for Kilash that he skips those steps and tapes the whole sheet on the wall.

Few children with Autism have difficulty in holding, using and manipulating tools such as crayons, scissor, and spoon. They avoid initiating tactile experiences such as picking up toys that are attractive to other children. Often they drop things from hand (butter finger).

Prem, Kilash, and Srivignesh frequently have poor self-help skills; they are messy dresser and eater. Kilash does not notice if pants are twisted, buttons are loosened, the shirt is half untucked, shoes are untied, one pant leg is up, and one is down. For a few children, gross and fine motor skills are delayed, making it very difficult in figuring out the physical characteristics of object, shape, size, texture, temperature, etc.

Whenever its time to play "Over and under ", it is tough for Harini to play. Her movements are slow and awkward. She feels uncomfortable to hold the ball, and sometimes she drops it. When she interrupts or slows down the game, the other kids get angry. Movement games are no fun at all for her.

B) Body awareness

The tactile sense, along with the proprioceptive sense, affects a person's unconscious awareness of individual body parts, and how the body parts relate to one another and the surrounding environment. With good tactile perception and discrimination, a child develops body awareness (body percept) which is like a map of the body and can then move purposefully and quickly. The child will be aware of where he is and what he is doing.

The child with poor tactile perception and discrimination lacks good body awareness. Harini is uncomfortable using her body in her environment because to her moving means touching. She has difficulty in orienting her arms and hands, legs and feet to get dressed. She would rather stand in a corner than risk mingling with an unpredictable group. Shifting her position may even make her conscious of how uncomfortable she is in her clothes.

Aishwarya does not know where her body parts are or how they are related to one another. When the researcher asked Aishwarya to point out her eyes, pointing out by using the index finger is very hard for her, she was not able to touch and point out eyes. She hates the "Head and Shoulders' song. She always gets her body parts mixed up, and she is embarrassed. By touching (tactile perception & discrimination) the objects, children store memories of their characteristics and relationships to one another. These children may not be able to identify objects by feel, instead use vision and olfaction to help.

Part II: Quantitative analysis

The researcher also used the Statistical Package for Social Science (SPSS) for further interpretation and analysis. Concerning variables and the dimension of the components of poor tactile dysfunction following Statistical analysis was done.

Table 1

T-test between the Age of the respondents and Poor Tactile Dysfunction

S.No	Age (years)	n	Mean	SD	Statistical Inference
1	5–10	22	2.82	2.575	$t = 0.312$ $df = 28$ $P > 0.05$ Not Significant
2	11–15	8	2.50	2.138	

Table 1 indicates that there is no significant difference between the age of the respondents and poor dysfunction. The mean value is almost similar in both the age groups. Age of the person does not seem to have a direct effect on poor dysfunction in children with Autism.

Table 2

T-test between Gender of the respondents and Poor Tactile Dysfunction

S. No	Sex	N	Mean	SD	Statistical Inference
1	Male	21	3.00	2.569	$t = 0.914$ $df = 28$ $P > 0.05$ Not Significant
2	Female	9	2.11	2.088	

The ability to identify parts of their body when touched, to identify objects by feel or touch is absent in both the male and female groups. It is evident in Table 2, which reflects that there is no significant difference between the gender of the respondents and poor tactile dysfunction.

Table 3

One Way Analysis of Variance among Level of Autism and Poor Tactile Dysfunction						
S.No	Level of Autism	Df	S.S	M.S	Mean	Statistical Inference
1	Between Groups	2	2.221	1.110	G1=2.33 G2=3.13 G3=2.69	F=0.177 P>0.05 Not Significant
2	Within Groups	27	169.646	6.283		

G1, Mild; G2, Moderate; G3, Severe.

Inefficient or immature discrimination towards various tactile experiences is observed in mild, moderate and severe levels of Autism. All the groups (levels of Autism) have difficulty in identifying objects by feel; they seek other senses such as vision to find out objects rather than touch. It is interpreted in a study by Provost (2007) as "*Children with Autism Spectrum Disorder (ASD) have delays in gross motor skills, fine motor skills or both*".

Table 4

Inter Correlation Matrix between Motor Plan and Body Awareness		
	Motor Plan	Body Awareness
Motor Plan	1	
Body Awareness	0.866**	1

**Correlation is significant at the 0.01 level (two-tailed).

The inter-correlation matrix (Table 4) indicates that there is a positive correlation between motor plan and body awareness. Prem and Sri Vignesh have poor self-help skills, and they are messy dressers and messy eaters, and also they are not able to identify which parts of their body was touched if they were not looking (Body awareness). The child with poor tactile perception and discrimination lacks good body awareness (Stock Kranowitz, 1995). Many of the respondents who have poor motor planning like difficulty in using crayons, difficulty in fastening clothes also lack in body awareness.

V) SIGNIFICANT FINDINGS OF THE STUDY

- ✓ There is no significant difference between the age of the respondents and Poor Tactile Dysfunction (Table 1.)
- ✓ There is no significant difference between the gender of the respondents and Poor Tactile Dysfunction (Table 2)
- ✓ There is no significant association between the level of Autism and Poor Tactile Dysfunction (Table 3.)
- ✓ There is a significant positive correlation between the sub-dimensions of Poor Tactile Dysfunction (Table 4).

VI) CONCLUSION

The tactile system plays a major part in determining physical, mental, and emotional human behavior (Kranowitz 1998). This critical system gives us information that is necessary for us to participate in everyday activities (eg: eating, dressing, etc). A study of this kind surely helps parents and professionals to understand and cope with the specific demands of these children and plan intervention strategies to suit their needs.

AUTHOR'S BIOGRAPHY

Shameem Banu Showkath Hussain holds a Master degree in Rehabilitation Science and Certification to teach English Language Learners and Learning Disabled/Dyslexic. She is an Associate Member of the Academy of Orton-Gillingham General Practitioners and Educators (AOGPE), NY. She is passionate to work with students' with diversified language and learning needs.

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