

Addressing Oral Sensory Issues and Possible Remediation in Children with Autism Spectrum Disorders: Illustrated with a Case Study

A. K. Aswathy, Asha Manoharan, Arya Manoharan

Abstract—The purpose of this study are to define the nature of oral sensory issues in children with autism spectrum disorder (ASD), identify important components of the assessment and treatment of this issues specific to this population, and delineate specific therapeutic techniques designed to improve assessment and treatment within therapeutic settings. Literature review and case example is used to define the predominant nature of the oral sensory issues that are experienced by some children on the autism spectrum. Characteristics of this complex disorder that can have an impact on feeding skill and behavior are also identified. These factors are then integrated to create assessment and intervention techniques that can be used in conjunction with traditional feeding approaches to facilitate improvements in eating as well as reducing oral apraxic component in this unique population. The complex nature of ASD and its many influences on feeding skills and behavior create the need for modification to both assessment and treatment approaches. Additional research is needed to create therapeutic protocols that can be used by speech-language pathologists to effectively assess and treat feeding and oro motor apraxic difficulties that are commonly encountered in children with ASD.

Keywords—Autism, feeding, intervention, oral sensory issues, oral apraxia.

I. INTRODUCTION

SENSORY PROCESSING DISORDER (SPD) first identified in 1960's, formerly known as Sensory Integration Dysfunction, is a neurological disorder causing difficulties with taking in, processing and responding to sensory information about the environment and from within an individual's own body [1]. The senses include visual, auditory, tactile, olfaction (smell), gustatory (taste), vestibular (balance and spatial orientation) and proprioception (or kinesthetic, the sense of one's own limbs in space).

All children learn about the world through their senses. For proper speech development, the sensory and motor co-

ordination is necessary. Unusual sensory processing has been reported in autism spectrum disorders [2], [3]. Recent reports by self-advocates, neuroscientists and other researchers suggest that sensory and movement differences may play a significant part in the lives of those individuals with autism. Sensory and movement differences may include difficulties in starting, stopping, continuing, combining and switching motor action, speech, thought, memory and emotion. Although sensory differences are not currently included as core symptoms of autism spectrum disorder, they can result in some of the greatest challenges for individuals on the spectrum [4]. Individuals on ASD may perceive normal levels of sensory input as too much or too little and ineffective sensory processing can create hyper-or hyposensitivities that distract them from completing tasks. It can also result in stress and anxiety while attempting to interpret his/her environment accurately.

Research suggests 70% of all children diagnosed with autism have sensory processing disorders (SPD). The empirical evidence specified by [5]-[9], confirms the existence of sensory and motor difficulties for many children with autism at some point in their early development.

Atypical responsivity to sensory stimuli may be as high as 95% in children with autism [10]. Often these sensory processing problems are manifested in children with autism spectrum disorders as hypersensitive or hyposensitive to varying degrees and they may have trouble in one sensory modality, a few, or all of them. Speech pathologist is concerned with a child's speech production, feeding and communication skills; and children with autism demonstrate difficulties in proper feeding and speech development because of the inability to process sensory information from multiple sensory modalities. Here comes the importance of addressing the oral sensory issues in such population.

Autism can have an adverse effect on a child's ability to tolerate the sensory properties of food [11]. It was conceptualized that there are a large number of factors which influence normal feeding development. Individuals with autism spectrum disorders monitor impaired sensory modulation (sensory seeking, sensory avoidance), aversion to oral care and absence of oral exploratory phase, sensitivity to taste, texture, smell, sight of food and gastro intestinal problem. They also demonstrate eating abnormalities in the form of mechanical eating, gulping, shoveling, stuffing food, not chewing, throwing food, spitting or vomiting, avoidance of utensils or food to lips, excessive fads or refusals, holding

Aswathy A. K. is with the Audiology and Speech Language Pathology department, Institute for Communicative and Cognitive Neurosciences, Pulayanarkotta, Trivandrum, Kerala, India (phone: 9539782099; e-mail: aswathynair.akl@gmail.com).

Asha Manoharan was with Audiology and Speech Language Pathology department, Institute for Communicative and Cognitive Neurosciences, Shoranur, Palaghat, Kerala, India. She is now with Comprehensive Stroke Care Program, Sree Chitra Tirunal Institute for Medical Sciences and Technology (e-mail: manoharan.asha@gmail.com).

Arya Manoharan was with the Audiology and Speech Language Pathology department, Institute for Communicative and Cognitive Neurosciences, Shoranur, Palaghat, Kerala, India. She is now with Speech Language Pathology Department, ABLE UK, Dubai Health Care City, Dubai, UAE (e-mail: aryamanoharan@gmail.com).

food in the mouth for long periods [12]. Oral sensitivity issues in children with autism can be of two different types: Oral hyper sensitivity and Oral hypo sensitivity. The characteristics features exhibited by children with oral hypersensitivities otherwise called oral defensiveness include:

- Dislikes having teeth brushed and/or face washed.
- Limited food repertoire and/or may avoid certain food textures - especially mixed textures
- Take their food off the fork or spoon using only their teeth, keeping their lips retracted
- will gag easily when eating and may only get food down by taking a drink with it
- Exhibit signs of tactile defensiveness such as; disliking being touched, avoiding messy play - glue, mud, sand, finger paints, etc. or, may not pick up eating utensil or food with a grasp that involves the palm of his hand.

In contrast children with oral hyposensitivity exhibit:

- Love and crave intense flavours, i.e., sweet, sour, salty, spicy and usually become "condiment kids".
- Avoid mixed textures as well since it is difficult to chew and swallow properly when you can't "feel" the food in your mouth correctly
- Messy eaters; getting food all over their face and/or leaving bits of food in their mouths at the end of a meal
- Often take large bites and stuff their mouths, or even "pocket" food in their cheeks
- Inclined to not chew their food thoroughly before swallowing (at risk for choking)
- Drool excessively beyond the teething stage
- Always seem to have something in their mouths; toys, pens, pencil tips, gum, candy, or inedible objects (i.e., paper clips, rubber bands, shirt sleeves and collars)

Evidences from the clinical experience suggested the coexistence of both the conditions, eventually leading to problem with the feeding and reduced speech intelligibility. It has been observed that the research projecting these issues is sparse. Hence the present study is a preliminary attempt aimed at highlighting the importance of addressing the oral sensory issues, components of assessment and the possible remediation in children with autism through a case illustration.

II. PROCEDURE

A. Case Study

The case X, male aged 3.5 years born to non-consanguineous parentage came to Institute of Communicative and Cognitive Neurosciences (ICCONS), Shoranur with the complaints of age inappropriate speech and language skills, inadequate pre-linguistic skills and social behaviour, excessive drooling saliva smearing, strong food preferences, feeding difficulties & stereotypic behaviors.

The assessment began with initial case history followed by detailed evaluation concerning the areas of neurology, speech, language, oral sensitivity issues and behaviors. The case history evidenced history of seizures in the maternal side and hearing loss in paternal side. Birth history revealed premature

vaginal delivery with immediate birth cry and normal birth colour and birth weight of 1.900 k.g. The child was admitted in NICU for 5 days due to low birth weight. Developmental history reveals normal motor development. Speech milestones were attained normally until an age of 1 year of life, further language milestones were reported to be delayed. Neurological examination revealed abnormalities in EEG.

On behavioral assessment with Vineland Social Maturity Scale (VSMS) child showed a Social Age (SA) of 3 years 2 months and Social Quotient (SQ) of 79. According to VSMS diagnosis made was Borderline Social and Adaptive function.

Speech and Language assessment revealed that the child has poor pre-linguistic skills. The mode of expression was mainly non-verbal. On administration of Receptive Expressive Emergent Language Scale (REELS) the child had a Receptive Language Age (RLA) of 30–33 months and an Expressive Language Age (ELA) of 14–16 months. According to Autistic Behavior Composite Checklist Profile the child shows autistic features like impairment in pre-linguistic learning behavior, impairment in sensory perceptual skills (licking and mouthing), interest towards spinning objects, impairment in social interaction. According to DSM–IV criteria for autism spectrum disorders, there was a qualitative impairment in social interaction, communication, restricted repetitive and stereotyped patterns of behavior, interest and activities.

In addition, oral sensitivity assessment was carried out through an interview with the caretaker on child's food preference in terms of texture, temperature, taste, smell, color and consistency. A thorough assessment was carried out to confirm the oral sensitivity with the food items of our consideration by an expert speech language pathologist. The results are depicted in Table I.

TABLE I
ORAL SENSITIVITY ASSESSMENT

Senses	Reactions	
	Hypersensitivity	Hyposensitivity
Touch	Lips (lower > upper), cheeks showed decreased touch sensitivity thresholds which has been demonstrated as refusal to food intake when touched	Tongue movements were initiated only when chunks of food were presented.
Temperature	-	The child chose hot food stuffs than cold ones. The child preferred hard textures such as chappathi, fried potatoes with chillies, murukku, pappad
Texture	-	The child favoured spicy food.
Taste	-	-
Smell	The child exhibited gag reflexes for different smells and preferred only food items such as idly and chappathi	-

The overall results suggested the existence of oral hyper and hyposensitive reactions in the child. Since the process of food conception is the outcome of proper co-ordination of senses, olfaction, gustation, and proprioception, which

explains the suggested underlying cause of such atypical reactions to food items in the present case illustration.

B. Intervention Plan

A holistic approach was considered while addressing the oral sensory issues in the present case. As speech pathologist is more concerned with the overall speech development, it was found that working on these specific issues in turn will have a positive effect on the same. Thus in the present case, the therapeutic goals planned for tackling the oral sensory concern focused on improving the feeding skills as a gateway to the oral communication.

The intervention strategies considered includes,

- Steps in eating (To improve eating habits through multi modal stimulation).
- Food transition hierarchy (To improve the tolerance to food textures).
- Systematic desensitization.
- Oral motor exercises.
- Oral sensory exercises.

The procedures applied on each intervention strategy have been shown in Table II.

TABLE II
INTERVENTION STRATEGIES

Steps in eating	Food transition hierarchy	Systematic desensitization	Oral motor exercises	Oral sensory exercises
	Start with a strained food	Play face touch game with rubber dolls		
	Next with thickened strained food			
	Blended food	Kiss your child's face and/or let him kiss your face.	Usage of chewy tubes to improve the chewing skills and increased tongue movements thereby reducing drooling and oral apraxic component	Tactile stimulation on lips to improve the awareness/desensitization
Check the tolerance to a particular food item	Thickened blended food	Playful taking turns through touching		Icing to improve the oral stimulation and awareness
Interact while presenting the food and allow the child to make a choice.	Soft lumpy food			
	Hard munchies	Encourage child to explore the toys in the mouth	Tongue push-ups, tongue pops, back and forth tongue movements and tongue walks for improving the motor coordination	Brushing of lips and gums to improve the tactile awareness
Check for smell, touch and taste reaction towards the food.	Meltable hard solids			
	Soft cubes	Wipe the face with warm clothes apply		
	Soft mechanical single texture	Deep pressure	Blowing, sucking and whistling for tongue and lip strengthening.	Vibratory stimulation to tongue, lips, cheeks to improve proprioception.
	Mixed texture	Keep spoon at lips for longer period with food preferred by child.		
	Hard mechanical food			

III. THERAPY OUTCOME

After providing therapy for two continuous weeks' progress were observed in the following areas:

- Reduction in drooling and saliva smearing.
- Increased tolerance to different food consistency and textures.
- Reduction in oral apraxia and increased verbal output.
- Increased back movements of tongue demonstrated by increased sucking rate through straw.
- Overall improvement in speech intelligibility.
- Reduction in verbal stereotypes.

IV. IMPLICATION

Present study provides evidence for the importance of implementing oral sensory assessment in the general assessment protocol in ASD. Therefore, knowing the oral sensory issues in children with ASD enhances the development of proper intervention strategies and working on specific which goals contribute to a better prognosis.

V. FUTURE DIRECTIONS

- The effectiveness of these intervention strategies can be

confirmed by replicating the same study on a larger population.

- Specific strategies for hyper and hyposensitivity can be formulated.

REFERENCES

- [1] Ayres, A. J. (1963) Eleanor Clark Slagle Lecture. The development of perceptual motor abilities: A theoretical basis for treatment of dysfunction. *American Journal of Occupational Therapy*, 17, 221-225.
- [2] Amy E. Z. Baker, Alison Lane, Many T. Angley and Robyn L. Young. (2007), The Relationship Between Sensory Processing Patterns and Behavioural Responsiveness in Autistic Disorder: A Pilot Study. *Journal of Autism and Developmental Disorders* Volume 38, Number 5, 867-875.
- [3] Laura Crane, Lorna Goddard, Linda Pring. (2007) Sensory processing in adults with autism spectrum disorders. 10.1177/1362361309103794 *Autism* May 2009 vol. 13 no. 3 215-228.
- [4] Aspy, R., & Grossman, B. G. (2007) The Ziggurat model: A framework for designing comprehensive interventions for individuals with high-functioning autism and Asperger Syndrome. Shawnee Mission, KS: Autism Asperger Publishing Company.
- [5] Adrien, J. L., Ornitz, E., Barthelemy, C., Sauvage, D., & Lelord, G. (1987) The presence or absence of certain behaviors associated with infantile autism in severely retarded autistic and nonautistic retarded children and very young normal children. *Journal of Autism and Developmental Disorders*, 17, 407-416.

- [6] Baranek, G. T. (1999) Autism during infancy: A retrospective video analysis of sensory-motor and social behaviors at 9–12 months of age. *Journal of Autism and Developmental Disorders*, 29, 213–224.
- [7] Dahlgren, S. O., & Gillberg, C. (1989) Symptoms in the first two years of life: A preliminary population study of infantile autism. *European Archives of Psychology and Neurological Sciences*, 238, 169–174.
- [8] Hoshino, Y., Kumashiro, H., Yashima, Y., Tachibana, R., Watanabe, M., & Furukawa, H. (1982) Early symptoms of autistic children and its diagnostic significance. *Folia Psychiatrica Neurologica Japonica*, 36, 367–374.
- [9] Ornitz, E. M., Guthrie, D., & Farley, A. H. (1977) The early development of autistic children. *Journal of Autism and Developmental Disorders*, 7, 207–229.
- [10] Joanne Flangan (2009) “Sensory Processing disorder” *Pediatric news*. BNET.
- [11] Twachtman-Reilly, J., Amaral, S., and Zebrowski, P. (2008) Addressing Feeding Disorders in Children on the Autism Spectrum in School-Based Settings: Physiological and Behavioral Issues. *Language, Speech and Hearing Services in Schools*. Vol. 39. 261-272.
- [12] Sharon M. Greis, Stephanie M. Hunt (2008) Texture Progression: The Effects of Oral Sensory Defensiveness on Oral Motor Function in ASD.