EFFECT OF SEQUENTIAL ORAL SENSORY APPROACH ON AVOIDANT/RESTRICTVE FOOD INTAKE DISODER AMONG CHILDREN WITH AUTISM SPECTRUM DISORDER

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ABSTRACT

BACKGROUND: Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by deficits in social, communication and behaviors. As they have sensory integration issues, they express abnormal feeding behavior along with other behavioural issues. The sequential oral sensory (SOS) approach is a transdisciplinary program designed to assess and treat the children with ASD who exhibits issues in food intake. **AIMS AND OBJECTIVES:** This study aims to determine the effect of SOS approach on avoidant/restrictive food intake disorder (ARFID) among children with ASD. **MATERIALS AND METHODS:** This study included 31 children with ASD using Indian Scale for Assessment of Autism (ISAA), aged between 3 to 6 years having ARFID. The experimental group (16) received SOS approach, while the participants (14) in control group received conventional occupational therapy. The outcome measure was assessed using Brief Autism Mealtime Inventory (BAMBI) scale. **RESULTS:** The results showed that the experimental group had statistically significant improvement among ASD diagnosed children with ARFID, indicating the effectiveness of SOS approach. **CONCLUSION:** This study concluded that the effect of sos approach proved its effect on children with autism.

KEYWORDS: Sequential oral sensory approach, Avoidance restrictive food intake disorder, Autism spectrum disorder, Feeding, Nutrition

INTRODUCTION

Children with autism spectrum disorder (ASD) often have speech and behavior problems. But their nutritional issues are a particular concern to families and health care providers as they affect children's performance and health. Compared to typically developing children, individuals with ASD may experience feeding and eating difficulties. Children with ASD may exhibit inappropriate feeding behaviors, including overeating, less independent feeding, a need for increased feeding time, and limited food choices.[1]The Diagnostic and Statistical Manual of Mental Disorders 5th edition identifies Avoidant/restrictive food intake disorder (ARFID) as an eating or feeding

disturbance characterised by significant weight loss, nutritional deficits, dependence on health supplements and impaired psychosocial functioning.[2]

Eating disorders (ED) are a group of mental health conditions characterized by disordered eating behavior and distorted attitudes towards food, weight, and body image. These disorders tend to be resistant to treatment and have a long and debilitating course. According to the World Health Organization they are the second leading cause of death among young people after traffic accidents. The most common types of ED are anorexia nervosa (AN), bulimia nervosa (BN), and binge-eating disorder (BED). In AN, the patient has a bad body image and is very afraid of weight and restricts food intake, often starving and losing body weight. . Patients with BN who engage in binge eating may engage in purging behaviors such as vomiting or using medications to get rid of what they have eaten. They also have a bad body image and are very afraid of gaining weight. BED is characterized by episodes of binge eating in which a person eats large amounts of food in a short period of time and loses control over their eating behavior. Feeling guilty or ashamed after eating too much. These diseases can have physical and psychological effects, including malnutrition, digestive problems, electrolyte imbalances, depression, anxiety and social isolation. For this reason, the medical community in the United States considers these diseases to be true epidemics that affect all social and ethnic groups. Although it looks different, the concept of psychology is the same: a big and different view of the physical condition on which the subject's condition depends. Causes may include environmental, genetic, psychological, and sociocultural factors. This multifactorial etiopathogenesis is reflected in the uniqueness of these diseases in each person.[3]

The Sequential Oral Sensory (SOS) Approach is a transdisciplinary program that evaluates and addresses the underlying reasons a child may struggle with eating. It assesses seven key areas: organs, muscles, sensory, learning, development, nutrition, and environment, to provide a comprehensive understanding of the child's feeding issues. The approach integrates sensory, motor, Oro motor, behavioral, medical, and nutritional factors for both assessment and intervention. Success in the SOS Approach is measured by the child's sustained interest in trying new foods, the development of appropriate eating skills, adequate calorie intake for growth, and improved family dynamics around mealtimes, fostering healthy relationships with food.[4] As per a recent survey, about 46 to 89% of children with autism are food selective when compared to typically developing children. Children with ARFID are at risk for nutritional problems and occupational dysfunction during daily meals. The rising food selectivity cases in neurodiverse children may need an effective treatment approach to reduce food aversion.[5] To facilitate optimal occupational performance in ASD diagnosed ARFID children, this study aimed to explore the effectiveness of SOS therapy among them.

Materials and methods

Study design

This study is a quantitative quasi-experimental research design with convenient sampling technique. This study was conducted in Communikare Rehabilitation center in Chennai, Tamil Nadu.

Participants:

The study included 31 children with ASD in total. The samples underwent screening for Autism using the Indian Scale for Assessment of Autism (ISAA) and for Avoidant/Restrictive Food Intake Disorder (ARFID) with the Short ARFID screen completed by a parent or caregiver. Participating in the study are boys and girls between 3 to 6 years old, who have autism spectrum disorder and experience food refusal, as well as children falling within the moderate to severe range on the ARFID scale. The criteria for withdrawal encompass children having different diagnoses, children aged below 3 and above 6, and children with issues other than avoidance restrictive food intake disorder (ARFID).

Instrument:

1. Brief Autism Mealtime Behavior Inventory (BAMBI)

Originally designed as a 20-item scale, the BAMBI evaluates feeding issues in children diagnosed with autism. The items are formulated to prompt the caregiver to indicate the frequency at which their child consumes specific foods. Behavioral items are rated on a five-point scale, with respondents able to choose options from 1 (never) to 5 (always), with the middle point also included. The total frequency was calculated by adding up all the items, including reverse scores, where higher scores pointed towards more concerning eating habits. Initial psychometric analyses in the first study indicated a reliability coefficient of 0. 61 for the complete scale. Exploratory factor analysis revealed that three independent factors accounted for 45% of the variance in the total behavior problem score. Nine items contributed notably to the eating disorder/behavior disorder factor, explaining 20% of the variability. Five items that loaded on a single factor explained a small portion of the total variance, contributing to 18% of the variance, while the five items on another factor remained inconclusive in their interpretation. In this study, items that did not align with any factor during the pilot study were removed. To grasp the third factor better, comparable items were included which matched the content of certain items linked to the third factor, like those concerning ritual practices such as food.[6]

Procedure

The research was conducted at Communikare Rehabilitation Centre with ethical approval granted by Saveetha College of Occupational Therapy. Official consent was obtained from the patient and the relevant center in an informed manner. The patients were provided with details about the procedure, and those who expressed interest in the therapy were chosen utilizing a convenient sampling method. After the ISAA, a brief screening for ARFID was carried out to identify instances of food refusal in individuals with ASD. 30 individuals were chosen according to the selection criteria, and their initial pre-test measurements were evaluated using BAMBI. They were assigned randomly to the experimental group (n=16) receiving the sequential oral sensory approach and to the control group (n=15) undergoing conventional occupational therapy for a study period of 12 weeks (36 sessions). Every session had a duration of 45 minutes. Upon completion of the study period, the post-test measurements were evaluated and analyzed utilizing suitable statistical techniques based on the outcome measure.

Intervention Protocol Sessions

SESSION	INTERVENTION
1 – 2	Introduction and Establishing Rapport – Self introduction and explanation about the purpose of the intervention. Establishing rapport with the individual by engaging in casual conversation and showing genuine interest. Identification of the individual's strengths, interests, and preferences. Pre-test was assessed
3 – 5	Understanding the SOS Approach – Parent Education about the SOS approach and its purpose. Explanation of the sensory aspects of feeding and their impact on eating behavior. Discussion about the importance of positive reinforcement in promoting desired eating behaviors
6 – 8	Sensory Exploration – Engaging the children in sensory play activities to introduce the individual to different textures, tastes, and smells. Encouraging the individual to explore and interact with different foods using their senses. Gradually, introducing new foods and textures based on the individual's comfort level.
9 – 12	Gradual Exposure and Desensitization - Creating a hierarchy of food items, starting with preferred and familiar foods. Gradually introduce new or challenging foods from the hierarchy. Encouraging the individual to engage with and try new foods using positive reinforcement
13 – 16	Oral Motor Skill Development - Introducing exercises and activities to improve oral motor skills, such as lip and tongue movements. Incorporation of oral motor toys or tools to promote muscle strength and coordination. Reinforce the individual's efforts and progress during oral motor exercises
17 – 20	Mealtime Routine and Structure - Establishing a consistent meal time outline and structure, including designated eating areas and times. Provision of visual supports, such as a visual schedule or social stories, to help the individual understand expectations. Using positive reinforcement to reward appropriate mealtime behaviors, such as sitting at the table and trying new foods.
21 – 24	Peer Modeling and Social Interaction - Providing opportunities for the individual food serve and interaction with their peers during mealtimes. Promoting positive eating behaviors and food exploration by Peer modelling. With the use of positive reinforcement, the individual's efforts in imitating positive eating behaviors is acknowledged.
25 – 28	Gradual Fading of Support – Gradual reduction of the level of support provided during meals, encouraging more independence. Monitoring the individual's progress and providing additional reinforcement for independent eating. Addressing the challenges or concerns that arise during this phase of fading support
29 – 32	Generalization and Maintenance- Creating opportunities for the individuals to practice their eating skills in different settings (e.g., home, school, community). Reinforcing the individual to generalize the learned skills by trying new foods and maintaining positive

	eating behaviors. The ongoing positive reinforcement is pursued to support this generalization phase.
33 – 36	Review and Transition Plan- The progress made throughout the intervention was reviewed and the post-test evaluated the progress.

Data analysis method

Collected information was captured on a Microsoft Excel 2010 spreadsheet. IBM SPSS version 23.0 was utilized to perform the statistical analyses. The Wilcoxon signed-rank test was applied to analyze the statistical differences between pre- and post-test within same group, whereas the Mann Whitney U test was used to measure the differences between the groups. The control group and experimental group data were normally distributed and t- test was utilized to demonstrate that the control group and experimental group valued for each position were significantly different. Clear measurable measures were employed to analyze the quantitative information collect within this study. $P<0.01$ and an alpha level of $P=0.05$ was considered to be statistically significant.

Results

Table 1 Statistical analysis of pre-test and post- test in control group

Test	Mean	SD	N	Z value	p value
Control_Pretest	58.8667	13.44229	14	-3.471	0.033*
Control_Post	55.1333	13.55869	14		

Significant at 5% alpha level

In table 1, since the p value of 0.033 is lesser than 0.05, alternate hypothesis is accepted. Hence, there is statistically significant difference between pre- test and post test scores in the Control Group of the BAMBI. This suggests that the intervention received by the control group had significant improvement as shown in figure 1.

Figure 1. Comparison between pre-test and post-test in control group

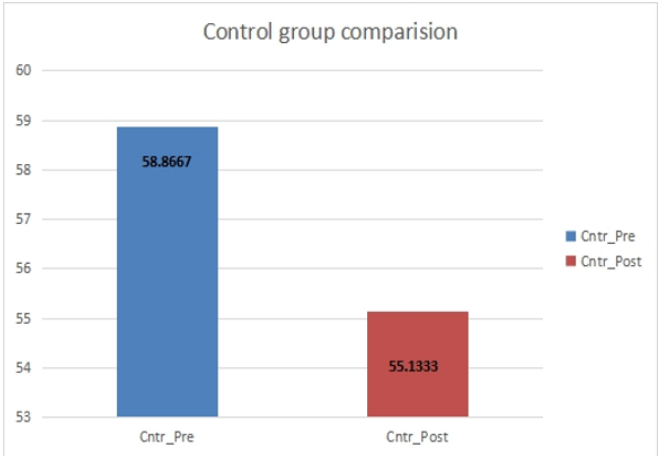


Table 2 Statistical analysis of pre-test and post-test in experimental group

Test	Mean	SD	N	Z value	p value
Experimental_Pre	61.75	2.88675	15	-3.527	0.000*
Experimental_Post	55.0625	2.56824	15		

* Significant at 5% alpha level

In the Experimental group, since the p value of 0.00 is less than 0.05, alternate hypothesis is accepted as shown in table 2. Hence, there is statistically significant difference in Experimental Group between pre-test and post test scores of BAMBI. This suggests that the intervention received by the experimental group had significant improvement as represented in figure 2.

Figure 2. Comparison between pre- test and post- test in experimental group

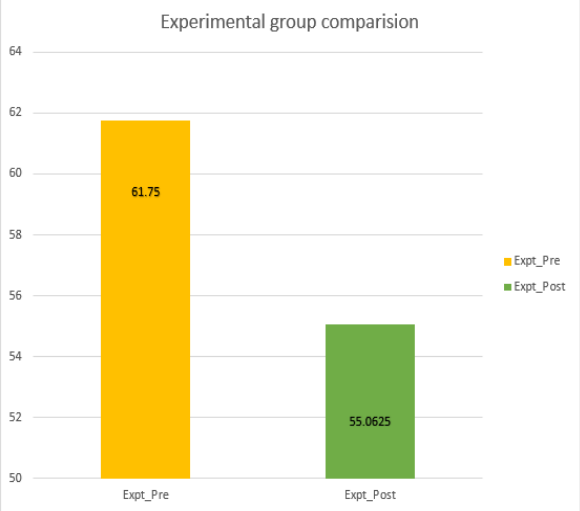


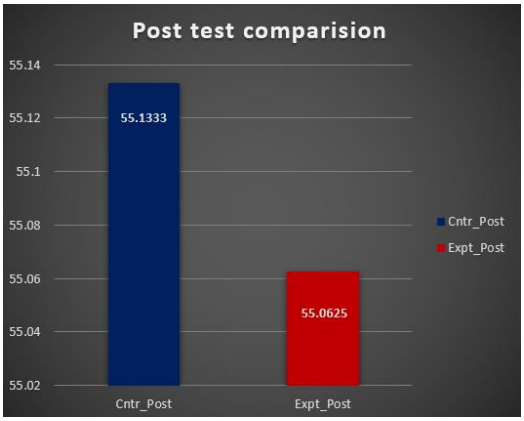
Table 3. Statistical analysis between the post- test scores of the control and experimental group

Group	Mean	SD	N	Z value	p value
Control Post	55.1333	13.55869	14	-2.253	0.024*
Experimental PostS	55.0625	2.56824	15		

*Significant at 5% alpha level

In table 3, since the p value of 0.024 is lesser than 0.05, alternate hypothesis is accepted. Hence, there is statistically significant difference in post test scores between Experimental and Control Group of the BAMBI. This suggests that the intervention received by the experimental group had more improvement when compared to the control group as demonstrated in figure 3.

Figure No. 3 Comparison between the post- test scores of the control and experimental group



Discussion

The study was aimed to determine the effect of sequential oral sensory approach in avoidance restrictive food intake disorder (ARFID) among children with Autism spectrum disorder. The

study was conducted for 3 months with Autism spectrum disorder children from the CommuniKare Multi Rehab Clinic.

A total of 31 children were selected and a conventional sample technique adapted to the experimental group and control group in every 14 children. Avoidant restrictive food intake disorder in both the control and experimental group was assessed by using the BAMBI scale. The experimental group alone underwent sequential oral sensory approach and Avoidant restrictive food intake disorder based therapy for three months, whereas control group undergone conventional occupational therapy. After three months of intervention, the post-test evaluation was done for both groups and the scores were calculated and results analyzed. Table 1 and figure 1 showed the statistical analysis of Bambi scale in control group. Since the p value of 0.033 is lesser than 0.05, alternate hypothesis is accepted. Hence, there is statistically significant difference between pre- test and post test scores in the Control Group of the BAMBI. This suggests that the intervention received by the control group had significant improvement. The same result was obtained from the previous study which aimed to investigate the effect of sensory based feeding treatment for toddlers with food refusal. The study thus concluded that sensory based feeding intervention improves feeding in toddlers[7].

Table 2 and figure 2 showed the statistical analysis of Bambi scale in experimental group.Since the p value of 0.00 is less than 0.05, alternate hypothesis is accepted. Hence, there is statistically significant difference in Experimental Group between pre-test and post test scores of BAMBI. This suggests that the intervention received by the experimental group had significant improvement. The same result was obtained from the previous study to determine if the SOS approach to feeding is effective in children with feeding problems. The results showed that there was significant increase in acceptance of variety of foods and texture, improved oral motor skills and increased independence in self feeding[8].

Table 3 and figure 3 showed the statistical analysis of post tests between experimental group and control group. Since the p value of 0.024 is lesser than 0.05, alternate hypothesis is accepted. Hence, there is statistically significant difference in post test scores between Experimental and Control Group of the BAMBI. This suggests that the intervention received by the experimental group had more improvement when compared to the control group. The study done in the previous article was to determine the effectiveness of the sequential oral sensory approach group feeding program with 37 children. The results concluded that SOS approach showed significant improvement in feeding problems with Autism Spectrum Disorder compared to traditional occupational therapy[9].

Conclusion

The results demonstrated a significant improvement in the experimental group compared to the control group following the Sequential Oral Sensory Approach intervention. This study thus confirms the effectiveness of the Sequential Oral Sensory Approach in treating Avoidant Restrictive Food Intake Disorder (ARFID) in children with Autism Spectrum Disorder.

Limitations and recommendations

Limitations included that this study was done on a small sample size, study was done for a shorter duration of time, study was not compared with gender differences. Recommendations include study can be done with a larger sample size, study can be done for a longer duration of time, study can be done with gender differences, study can be done with different age groups.

CONFLICT OF INTEREST:

The authors have no potential conflicts of interest

Reference

[1] Adams SN. Feeding and swallowing issues in autism spectrum disorders. Neuropsychiatric Disease and Treatment [Internet]. 2022 Oct 1;Volume 18:2311–21. Available from: https://doi.org/10.2147/ndt.s332523

[2] Ma F. Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5). In: Springer eBooks [Internet]. 2020. p. 1–12. Available from: https://doi.org/10.1007/978-3-319-69892-2_419-2

[3] Di Cara M, Rizzo C, Corallo F, Cardile D, Calabrò RS, Quartarone A, et al. Avoidant Restrictive Food Intake Disorder: A Narrative review of types and characteristics of therapeutic interventions. Children [Internet]. 2023 Jul 28;10(8):1297. Available from: https://doi.org/10.3390/children10081297

[4] Toomey KA, Ross ES. SOS approach to feeding. Perspectives on Swallowing and Swallowing Disorders (Dysphagia) [Internet]. 2011 Oct 1;20(3):82–7. Available from: https://doi.org/10.1044/sasd20.3.82

[5] Caldwell AR, Skidmore ER, Terhorst L, Raina KD, Rogers JC, Danford CA, et al. Promoting Routines of Exploration and Play during Mealtime: Estimated Effects and Identified Barriers. Occupational Therapy in Health Care [Internet]. 2021 Aug 2;36(1):46–62. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9745914/

[6] Lukens CT, Linscheid TR. Development and Validation of an Inventory to Assess Mealtime Behavior Problems in Children with Autism. Journal of Autism and Developmental Disorders [Internet]. 2007 Jun 19;38(2):342–52. Available from: https://doi.org/10.1007/s10803-007-0401-5

[7] Kim AR, Kwon JY, Yi SH, Kim EH. Sensory Based feeding intervention for toddlers with food refusal: a randomized controlled trial. Annals of Rehabilitation Medicine [Internet]. 2021 Oct 31;45(5):393–400. Available from: https://doi.org/10.5535/arm.21076

[8] Amy Dow. 2015. *Individual Case Study: The SOS Approach to Feeding.* Capstone. Nova Southeastern University. Retrieved from NSUWorks, College of Health Care Sciences – Occupational Therapy Department. (48) https://nsuworks.nova.edu/hpd_ot_student_dissertations/48

[9] The effectiveness of the Sequential Oral Sensory Approach group feeding program - ProQuest. Available from: https://www.proquest.com/docview/304762667