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Effects of Sensory Integration to Manage Behavior Problems of Children with Autism Spectrum Disorder

Abdul Samad[1], Farheen Muhammad Aslam[2], Hiba Khan[3], Sheikh Maria Tabassum[3]

Dow University of Health Sciences[1], Bedaya Rehabilitation and Training, Abu Dhabi[2], College of Occupational Therapy, Faculty of Allied Health Sciences, Ziauddin University[3]

Corresponding Email: farheenaslam61@gmail.com

Abstract

Background: Play is an occupation that promote learning and socializing among children, physical play involves different gross motor skills and stimulate sensory processing specifically proprioception and vestibular. The objective of the study is to evaluate the impact of sensory based sports on sensory pattern of children and to discover the effect of sensory smart sports on proprioception and vestibular for behavior management.

Method: 62 Children with ASD mild to moderate were enrolled in the study from different rehab institutes from Karachi such as psyche care, learning hands and exceptional mind. The participants have definite and probable score at their proprioception and vestibular processing component at sensory profile with poor emotional and behavior regulation. They were involved in sensory smart sports for six months than reassessed on the same domain of sensory profile to check the behavior management.

Results: Significant mean variance was obtained between the pre and post score range at proprioception and vestibular processing leading.

Conclusion: Sensory integration therapy is always being use as therapeutic tool as one of the most effective intervention in management of Autism. The implementation of sensory integration ideation in sports through games culturally intact can be applied to develop and sustain interest, focus and above all develop good behavior.

Keywords

Sensory Integration Therapy, Autism, Proprioception, Vestibular, Behavior, Sensory Smart Sport.

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Introduction

Play is the fundamental realm across the lifespan especially in childhood[1]. There is different explanation of play and its method one of the study explained that play is naturally innate and driven by emotions and imagination that made it unobstructed by the external environment or the real world[2]. Play is always considered as one of the modalities for learning, it is like reconnoiter for children to discover through trial and error[3], indulge themselves in their own thought process mechanism and comprehend themselves and world around them[4].The diversity in play is vivid and it is inarguably important in human development, it could be social, solitary, active engaging functional, constructive and reflective5. Initially it was considered that play is one of the best modes of learning and leisure in early childhood which is not necessary in all circumstances[4,5]. Over the period of time many researches have emphasizes on collaboration of play and education methodology to encourage effective learning in early childhood[6].

Since play and culture are interrelated thus influence of culture on play is seen in terms of values, religious ideology and living style[7]. Thus play can be considered as procedure for development of observation, understanding and cognizing the skills that will improve adaptive functioning in children later in adult life[8]. Play that provide opportunity to children to use their senses or any particular sense is encouraged during play like splashing water, painting with hands is known as sensory play[9]. When the child gets involve in more of the sensory stimulus during play the connectivity between neuron not only increases but get richer in information and its processing. Thus sensory processing is one of the major requirements to intricate learning, creativity and imagining among children[10]. Sensory integration by the Ayres signifies to the capability to produce suitable motor and behavioral responses to stimuli. She observed hyperactive and under responses to sensory stimuli in individual with ASD and concerned two neural systems in registration and inflection these are Limbic system and proprioceptive, vestibular system[11,12]. Behavior of the Children, learning pattern and the way they get involve in the external environment depends on sensory processing[12]. Autism Spectrum Disorder (ASD) is developmental disability combination of repetitive behavior, echolalia and difficulty in social communication skill.

Children with special need has behavior, motor and emotional issues which can be intervene through sensory activities and games since sensory processing patterns reinforce behavior and learning skills in individuals as it is evident that multisensory processing is a cornerstone for meta cognition and communal abilities[13]. Children with ASDs are often gratified to play alone for

hours[14]. This play is either constructive (puzzles, computer games, blocks). Systematic (lining up object, sorting, matching) or sensory motor in nature (banging and twirling)[15]. Keeping the innovation in play, this research provided the involvement of sensory play for better sensory processing pattern to achieve goals effectively and establish better
Intervention approach while providing therapy to the children with ASD.

Methodology

Study Setting

This study was accompanied at rehabilitation organizations of Karachi that enrolled children with autism spectrum disorder. Theses institute promote rehabilitation in holistic manner thus involving multidisciplinary team of rehab specialist such as occupational therapist, speech therapist, behavior therapist and psychologist.

Target Population

ASD mild to moderate.

Study Design

Quasi-experimental study.

Duration of Study

6-8 months.

Sampling Technique

Non-Probability Purposive Sampling Technique.

Sample Size

Sample size was calculated by using Open EPI software. Therefore, at anticipated frequency of 8.6% (Khan et al., 2019) with confidence interval of 95% with margin of error at 7%, the sample size of **62** was calculated by using following formula:

Sample Selection

Inclusion Criteria

- Children diagnosed with mild to moderate Autism Spectrum Disorder.
- Both genders male/ female.

- Aged 3to 14 years.

Exclusion Criteria

- ASD Children with any physical disability.
- ASD with comorbidity.
- Epileptic condition.
- Excessive self -harm attitude.

Data Collection Tool

Data was collected by short sensory profile, consisting of 7 items consisting on tactile sensitivity, taste/smell sensitivity, movement sensitivity, under- responsive/seeks sensation, auditory filtering, low energy/weak, and visual/auditory sensitivity respectively. Each of the items is based on total raw score on the responses of 5-point likert scale i.e. “always”, “frequently”, “occasionally”, “seldom” and “never”. The total scoring of each individual was classified on typical, probable and definite difference respectively based on the analysis of sensory processing abilities. The proprioception and vestibular component was mainly focused to evaluate the changes in the behavioral patterns.

Data Collection Procedure

Data was accompanied from special children institutions of Karachi. Participants recruited via purposive sampling technique on the basis of inclusion criteria. Before, the commencement of intervention, the guardians/caregivers of participants gave informed consent for voluntarily participation. After obtaining the consent, the intervention was provided as follows:

The recruited participants developed the understanding of sensory smart sports prior to play the games. The sensory smart sports comprised of different games involving enhancement of sensory integration that have been played for 15-20 minutes, 3 days/week for 4 weeks. All the participants got assessed at baseline and after the completion of intervention. The games included during sensory smart sports were hopscotch, in and out, treasure hunting, monkey bar climbing and rolling, rope climbing and cycling.

Data Analysis Strategy

Data entered and investigated on SPSS (Statistical Package for Social Sciences) version-20. The demographic features of the participants were signified through mean, frequency and standard deviations whereas the participant responses were evaluated through percentage and frequency, Paired T-Test applied to analyze within the group difference. In case of skewed data, Wilcoxon Signed-Rank Test applied, whilst $p<0.05$ considered significant.

Ethical Considerations

Ethical consideration was reserved via verbal and written consent by the guardian before starting the data collection. All evidence of the participants kept anonymous under

investigator's supervision.

Results

The sample was majorly 5 to 6-year-old, whereas 3-4 year and 7-8 year children in the study was of same proportion with very few were 9 or above age (Figure-1).

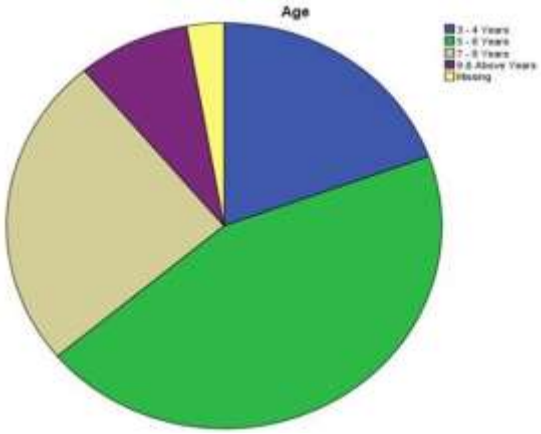

Figure-1 Age ranges of participants

Figure-2 is representing that the participant receiving behavior therapy with Occupational Therapy (OT) in combination is equal to that of participant enrolled for occupational therapy and speech therapy (ST), this further have evaluated to rule out the impact of sensory sport on candidate without behavioral therapy (BT). Very few of the participant were enroll for three of the therapies that is speech, occupational and behavioral.

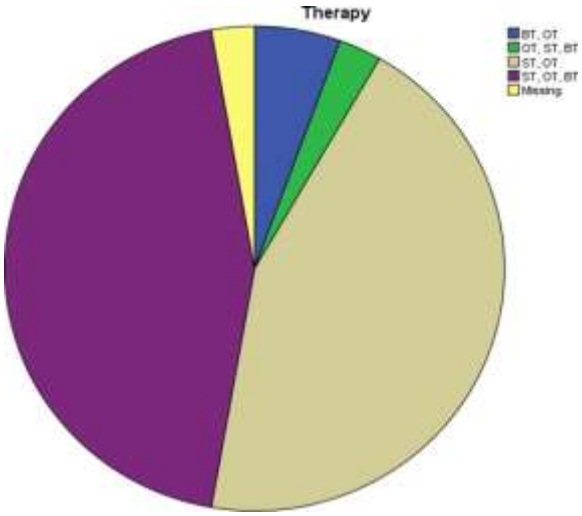

Figure-2 Participants receiving therapy

Furthermore, the number of siblings was also determining in the demographic data to monitor the reinforcement of sport within the family occupation and its impact later on behavior, fifty percent of the participant have 1 or more than 1 sibling whereas twenty-five percent of the participant had no siblings and fifteen percent had more than 3 siblings (Figure-3).

Table-1 Test of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig
Proprioception Pre	**.131**	**35**	**.139**	**.966**	**35**	**.354**
Proprioception Post	**.152**	**35**	**.041**	**.912**	**35**	**.009**
Vestibular Process Pre	**.083**	**35**	**.200***	**.980**	**35**	**.754**
Vestibular Process Post	**.126**	**35**	**.178**	**.970**	**35**	**.431**

**This is a lower bound of the true significance.*
a. Lilliefors Significance

The difference in the scores at pre and post level of proprioception and vestibular that are mainly responsible for behavior is quite significant after the sensory sports intervention during Occupational therapy. The score improved towards probable and typical range at the sensory profile of individual participant.

Table-2 Showing Pre-Post mean value of Sensory Profile

Variable		N	Mean	Std. deviation	Std.Error Mean	P Value (<0.05)
Proprioception	Pre	35	30.0286	5.71626	.96622	<0.05
	Post		40.6286	6.23598	1.05407	
Vestibular	Pre		39.2857	8.34045	1.40979	<0.05
	Post		52.5143	8.00137	1.35248	

Paired t- test exposed that children in their raw scores of pre and post vestibular and proprioception category on the SSP had significantly moved to higher mean score ranging in probable and typical borderline (Table-2).

Discussion

Our study effects of sensory integration to manage behavior of autism spectrum disorder showed a significant result by giving pre and post sensory input through smart play. One of the studies was conducted in 2022 that associated the sensory profile finding with parental stress and children behavior, this eminently stated that sensory factors could influence on the child behavior and make him or her a difficult child. Findings suggested to maximize the sensory play in daily routine to channelize the energy of children into positive means[16]. our study also stated that sensory issues specifically proprioception and vestibular which has impact on behavior development can be improve by sensory sports that involve proprioception and vestibular activities.

The study which was published in 2019 stated that sensory issues are associated with autism spectrum disorder and these issues are affecting their social life such as social communication, social cognition and social attention, in their research they also found that the children with ASD facing problems with adaptive functioning and visual exploration[17]. Though it is similar to the sensory sports results on behavior but specifically those sports that involve proprioception and vestibular is highlighted in this study and later they appear as behavioral issues[18].

There is another recent study in 2023 regarding floor time play with ASD presented that floor games along with sensory integration therapy has also same results in behavior outcome their study showed progress in social interaction, communication, emotional functioning and expression[19]. If we carry on the same intervention plan with additional floor time it could be possible to have more long lasting behavior changes according to the need of environment as floor games have enriched resources of sensory stimulation and variability of learning.

As sensory profile helps to identify either the behavior is derived from any sensory issues as it could assess the seeking or avoiding behavior of child and identify the reason behind it, also detects the sensitivity level and the registration.one of the study was held in 2022 in which different sensory activities was introduced to children with autism spectrum disorder and the result showed that sensory activities helped to overcome multiple sensory needs and provided learning environment with less restrictions and also influence the motor performance and outcome of behavior[20]. Further there is a study which was published in 2023 regarding how does the physical activity have positive effects on the behavior and co morbid conditions in ASD[21], as our research is also based on the sensory play which is giving the evidence of by getting involve in proprioceptive and vestibular sensory games has positive effects on behavior management as children with ASD acquired a medium to channelized their energy into purposeful means, the games included in study was sensory smart sports such as hopscotch, in and out, treasure

hunting, monkey bar climbing and rolling, rope climbing and cycling they all require physical strength and utilize maximum energy which later helps the child to decrease behavior which follows due to sensory issues. The size of the sample of this study was small and did not included children who diagnosed with moderate to severe autism spectrum disorder. It would be recommended to increase sample size and include all category of ASD to demonstrate a better impression on result. This study did not employ any behavior rating scale that could identify the difference at hyperactivity, aggression, behavior problem, anxiety etc. between pre and post therapy. It is also possible to run both SSP and Anxiety traits scale together as it shows reliability in the combination too and better analysis can be made.

Conclusion

Sensory integration therapy is always being use as therapeutic tool as one of the most effective intervention in management of Autism. The implementation of sensory integration ideation in sports through games culturally intact can be applied to develop and sustain interest, focus and above all develop good behavior.

Ethical Approval
0197120035DPT.

Acknowledgment
None.

Conflict of Interest
None.

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None.

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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design: Samad A, Aslam FM

Acquisition, Analysis or Interpretation of Data: Khan H, Tabassum SM

Manuscript Writing & Approval: Samad A, Aslam F

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.