

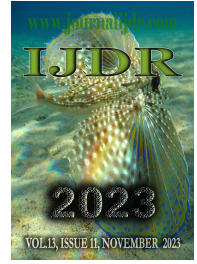


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RESEARCH ARTICLE

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THE EFFECTS OF PHYSICAL ACTIVITIES ON SELECTED PROBLEM BEHAVIORS OF CHILDREN WITH AUTISM SPECTRUM DISORDERS

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ABSTRACT

The purpose of this present study was to investigate the effects of physical activities on selected problem behaviors of children with autism spectrum disorders. The study assigned twenty school aged children with Autism Spectrum Disorder from a special school and were randomly divided into physical activity group (n=10) and control groups (n=10). A total sixteen participants were completed the study with regularity. For the experimental group structured physical activity interventions were implemented for 12 weeks with the regular scheduled program, while participants of control group received their regular special school activities and interventions only without any physical exercises. The assessments on selected problem behaviors of Autism Spectrum Disorder participants were done at baseline and post-intervention (after 12 weeks). Results of the study revealed that regular physical activity participation for 12 weeks decreased selected problem behaviors of children with Autism Spectrum Disorder but that were not significant.

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INTRODUCTION

Autism Spectrum Disorder (ASD) is generally defined as a common and complex neurodevelopmental disorder. The last few decades have witnessed a dramatic global increase in prevalence and awareness of ASD. An estimated 1 in 68 school-aged children have been identified as having ASD (Christensen *et al.*, 2016) and recently it was 1 in 54 children diagnosed with ASD (Centre for Disease Control and Prevention (CDC), 2023). In India, the prevalence rate of ASD is increasing and it was reported higher percentage in urban population (0.11) than the percentage of the rural population (0.09) with an estimated number of around 1.7-2 million children (Chauhan *et al.*, 2019; Mahapatra *et al.*, 2019). However, India still lacks an accurate estimation of the prevalence of autism due to the lack of standardized tests for ASD encompassing its intrinsic cultural diversity and multilingualistic population (Rudra *et al.*, 2017). Despite such challenges, the current scenario in India has been witnessing an increased prevalence of ASD as the most common developmental disorder in children (Juneja & Sairam, 2018). Autism Spectrum Disorder (ASD) is a group of complex neurodevelopmental disorders or impairments, it ranging from moderate to severe varying degrees of impairments. These impairments are social communication and interaction, expressive and receptive communication, restricted and repetitive behavior, self-injurious behavior and different problem behaviors (APA, 2022). The symptoms of ASD vary a lot from individual to individual but it usually manifests in children as early as

eighteen months, where the characteristic features differ from typical development and various other developmental conditions (Zeidan *et al.*, 2022). Children with ASD commonly experience various emotional and behavioral problems, generally indicated as 'problem behaviors'. Such problem behaviors include internalizing and externalizing behaviors such as physical aggression, self-injury, inattention, hyperactivity, anxiety, depression, withdrawal, unusual response of different external stimulus and self-stimulatory behaviors such as hand flapping, rocking, and spinning (Lindor *et al.*, 2019; Williams *et al.*, 2018). Exhibition of temper tantrums, impulsiveness, and non-compliance is also seen frequently in children with ASD with either motoric or vocal expressions of frustration, anger, and extreme distress. Such problem behaviors interfere with children's optimal development, functioning, social interactions, and relationships (McGuire, 2016). The exact causes of ASD are unknown. However, various genetic and non-genetic factors, by themselves or in combination, are considered risk factors for the development of ASD. The etiology of ASD can be multifactorial, with genetic and non-genetic factors. Children with ASD exhibits different unique needs, strengths and challenges. Due to challenges, comorbidities, heterogeneity and for fulfilling specific demands and needs of ASD children, several interventions are coming up to provide the unequal needs of this autism population (Hyman *et al.*, 2020). The interventions for children with ASD fall into many categories: Behavioral, Developmental, Social relational, Psychological, Educational, Pharmacological, and Complementary and Alternative (CAM), each encompassing multiple outcomes that

can overlap across domains (Hyman *et al.*, 2020). These CAM therapies are art, music, yoga, physical exercise, dance and acupuncture etc. are emerging as promising interventions for children with ASD (Brondino *et al.*, 2015). Physical activity plays a vital role in people's life from many aspects, especially important for children because it not only improve their physical condition, but also their self-esteem, social skill, and behavior and establish a positive health and lifestyle for their future lifespan. Physical exercise is defined as a subset of physical activity that is planned, structured, and repetitive; has a final or an intermediate objective; and involves the improvement or maintenance of physical fitness and overall health. The beneficial effects of physical activity intervention on children with ASD have garnered a lot of interest over the last decade. At present it is found that little evidences are available on the utilization of structured physical activity program for problem behavior of children with ASD; a few studies had conducted in India and there is very less studies or possibly hardly any study available in West Bengal. Therefore, this study was planned to investigate the effects of structured physical activity on selected problem behaviors of children with ASD.

MATERIALS AND METHODS

Participants

As per understandability of the children/adolescents, the motivation, interest and availability of the parents, 20 children already diagnosed from Pradip Center for Autism Management, Kolkata, West Bengal, India, were selected as samples for this study and randomly divided into experimental (n=10) and control groups (n=10). The diagnosis of autism spectrum disorders (ASD) was confirmed by using the Indian Scale for Assessment of Autism (ISAA). The children with moderate level of ASD were selected as sample for this study. So, the purposive sampling method was used and as it is a study on behavior so, both male and female children were included in the sample. The chronological age of the subjects was 8 to 14 years, and the mental age of the samples were not considered for this study. The children who had a minimum of one year of special school education were selected as a sample only. A total of sixteen participants (n=16) completed the study. The demographic variables between the experimental group and control group were listed in Table 1.

Research design and procedures

A randomized controlled pre-post experimental design was employed for this study. The aim of the study was to explore the effect of physical activity intervention program on problem behaviors of children with ASD. The experimental group and control group were attending their regular classes in special school's curriculum. Simultaneously, Physical activity group attended the physical activity intervention program for 3 months; 36 exercise sessions; 3 alternative days in a week; each session was 45-60 minutes; approx. 3 hours per week. All sessions were conducted in an empty hall room of Pradip Center for Autism Management, Kolkata, West Bengal, India. The control group followed their regular institutional classes and other school activities only.

Physical activity intervention program

For implementation of PA intervention program, a one-on-one method was applied. The structured physical exercise modules were designed to address the special needs of the children with ASD, keeping in mind their strengths, limitations, and contraindications. Each physical activity session included four phases; A. Preparatory phase, B. Specific activity phase, C. Minor game phase and D. Cooling down phase. Details of PA intervention program have mentioned in table 2.

Data collection and analysis

The problem behavior of the ASD participants was assessed by Problem Behavior Checklist, which is a standardized questionnaire consisted with 15 items and a total 52 questions with 5 points rating scale. The assessments for this study were done by parents of the ASD children, class teachers of the special school (Pradip: Center for Autism Management) and two Clinical psychologists. The final scores were done by making an average from these three scores, obtained by these three assessors. The average scores were considered as final data for analysis for this study. To make the data more accurate, authentic and reliable, the average scores were taken. For comparative analysis of the data on behavior variable the independent two tailed t-test were applied and the significance level significance level was set at 0.05 ($P < 0.05$).

Table 1. The demographic details of participants having moderate level of ASD

Variables	Experimental group (n=10)	Control group (n=10)
Age (Mean, SD)	9.5(.92)	10.1(2.2)
Gender (male/female)	5/3	5/3
Level of autism	Moderate level of ASD	Moderate level of ASD

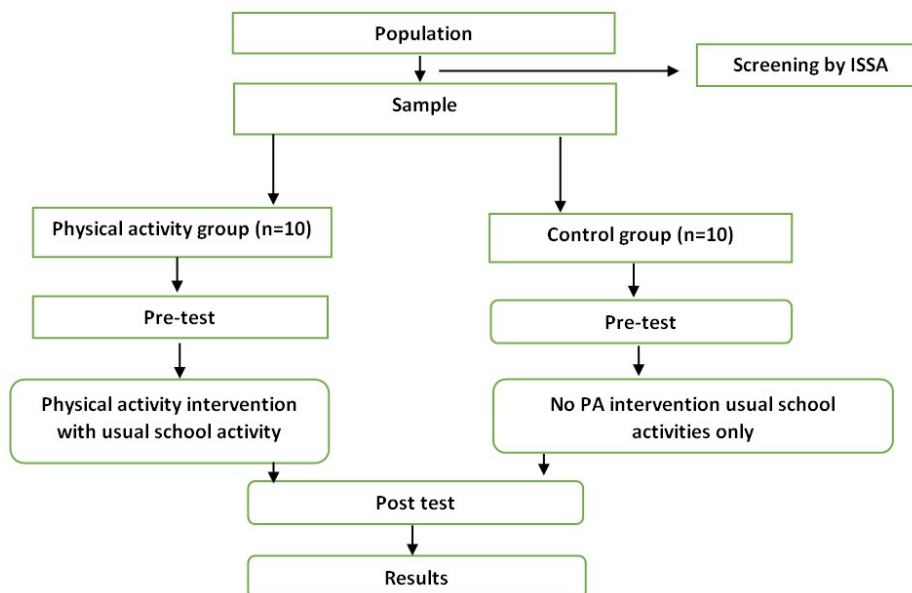


Figure 1. Experimental design

Table 2. Physical activity intervention program

Preparatory Phase		Specific Activity Phase				Minor Game Phase	Cooling Down Phase
Warm-up activity	Stretching activity	Calisthenics/apparatus drills	Jumping exercise	Balancing exercise	Objects/Ball holding exercise	Single /Group games	Relaxation movements
5-15 Minutes		20-30 Minutes				5-10 Mins	3-5 Mins
a.Walking b.Jogging c.Running	a.Bending b.Twisting c.Rotating e.Pulling f.Pushing exercises	2-count, 4-count, 8-count exercise. (Free hand and with apparatus)	a.Hopping (single & both leg) b. Jumping while body in motion.	a.Hurdle step over b.Bear crawls c.Knee bend standing	Carrying ball and other object (by single & both hands)	a. Single games with balls. b.Peer group games c.Games with music	a. Light Walking movements. b. Light Sitting movements c. Light Lying movements (Supination/Pronation)

Table 3. Comparison between Physical activity group and Control group on selected problem behavior variables

Variable	Groups	N	Pre -test Mean & Std.	Post -test Mean & Std.	Cal. t value
Auditory Problem Behaviors	Physical activity group	8	8.68 ± 1.41	7.94 ± 1.15	0.264
	Control group	8	7.94 ± 2.43	8.94 ± 1.40	0.334
Tactile Problem Behaviors	Physical activity group	8	16.13 ± 2.22	15.88 ± 1.13	0.781
	Control group	8	16.31 ± 2.56	16.5 ± 0.93	0.850
Gustatory-olfactory Problem Behaviors	Physical activity group	8	12.5 ± 2.46	11.63 ± 1.92	0.441
	Control group	8	12.19 ± 1.31	13.56 ± 0.68	0.023

Level of significance 0.05, t.05 (14) = 2.145

RESULTS

The t-test showed results on selected problem behavior variables (Auditory Problem Behaviors, Tactile Problem Behaviors and Gustatory-olfactory Problem Behaviors) was not significant but the experimental group revealed certain improvement. The results have been given below in Table 3.

DISCUSSION ON FINDINGS

The results of this study showed that following 12 weeks structured PA intervention has not significantly decreased Auditory problem behavior, Tactile problem behavior and Gustatory-Olfactory problem behavior of children/adolescents with ASD. The documented evidences from different research report it was found PA intervention has a positive relationship with motor skills (Gabriels *et al.*, 2012; Marzouki *et al.*, (2022)), communication skills (Radhakrishna *et al.*, 2010), social behaviors and skills (Zhao *et al.* 2018, Yu *et al.*, 2018), social dysfunction (Movahedi *et al.* 2013), repetitive and stereotype behaviors (Bahrami *et al.*, 2012, Tse, Pang, & Lee, (2018)) of people with ASD. But evidences are very less, for drawing firm conclusions on PA and ASD severity researcher must needs to go deeper. In this present study an attempt was made to find out some connection between PA and Auditory, Tactile and Gustatory-Olfactory problem behavior of ASD, and the results found not significant. Although, the PA program was designed based on the guidelines, recommendations on physical activity, some previous successful researches, the development characteristics, and the special needs for children with ASD. There are a few studies on PA and Problem behavior of ASD and some studies reported that appropriate duration of intervention may effects on Problem behaviors and other autism related outcomes.

CONCLUSIONS

In conclusion, this study was the first step towards gaining a better understanding of Physical activity intervention on auditory, tactile and gustatory-olfactory problem behavior of children with ASD. It is also provided that in future research development of more comprehensive and inclusive PA programs for children with ASD are needed to fulfill the gaps of PA intervention and autism spectrum disorders.

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Ethical approval: The 'Institution Ethics Committee' for Human Research, Jadavpur University has duly justified and provisionally approved this study.

Authors contribution: Both the authors have contributed equally. The critical revision of the work. was done by GCS.

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Conflict interest: Both the authors certify that they have no conflict of interest in this study to disclose.

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