



THE EFFECTIVENESS OF AEROBIC TRAINING AND PLAY THERAPY IN IMPROVING EXECUTIVE FUNCTION IN CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER

Tejaswini L	MPT Pediatrics
Dr Thummala S Pavani	PT, PhD, Professor, MPT Research Coordinator, Florence College of Physiotherapy
Dr Rachana M	PT, Assistant Professor, Florence College of Physiotherapy

KEYWORDS :

INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most common neurodevelopmental disorders observed in children and adolescents. It is characterized by developmentally inappropriate levels of inattention, hyperactivity, and impulsivity that interfere with daily functioning and development. Globally, ADHD affects approximately 5–7% of children, and a significant proportion of individuals continue to experience symptoms into adolescence and adulthood.¹

The etiology of ADHD is multifactorial, involving a combination of genetic, neurobiological, and environmental factors. Genetic influences play a major role, with heritability estimates suggesting that ADHD is highly familial.

Aerobic exercise is now considered a helpful method for managing ADHD symptoms in children without using only medicines. Activities like running, cycling, swimming, and brisk walking can improve attention and reduce hyperactive behaviour. Regular exercise also helps children feel calmer and reduces stress and anxiety.

Structured play therapy is an effective intervention that combines physical activity with cognitive and social engagement. Structured play therapy involves guided activities that include movement, rules, problem-solving, and interaction with peers.

The combination of aerobic exercise and structured play therapy provides a comprehensive approach to managing ADHD. While aerobic exercise improves brain function and physical fitness, structured play therapy enhances cognitive and social skills in an interactive and enjoyable manner.¹⁷ Therefore, this study is needed to compare the effectiveness of aerobic training and play therapy in improving executive function in children with ADHD.

Objectives of the Study

- To determine the effect of aerobic exercise training in improving executive function in children with attention deficit hyperactivity disorder.
- To determine the effect of play therapy in improving executive function in children with attention deficit hyperactivity disorder.
- To compare the effectiveness of aerobic exercise training and play therapy in improving executive function in children with attention deficit hyperactivity disorder.

METHODOLOGY

Source of Data: Florence college of Physiotherapy

Study Design: Comparative study

Study Subjects: Children with ADHD

Study Duration: 6 months

Sampling Technique: Convenient sampling technique.

Sampling Size: 40

Sample size for a prevalence study based on the previous research study with an expected proportion of 0.054 (5.48%) of

injury, the following formula for estimating sample size for proportions With 10% drop out the required sample size - 36
With 20% drop out the required sample size - 32

Inclusion Criteria

- Children aged 6–12 years.⁴⁷
- Clinically diagnosed with ADHD by a pediatrician/psychiatrist based on DSM-5 criteria.¹⁰
- Both male and female children.²³

Exclusion Criteria

- Children with significant neurological disorders (e.g., cerebral palsy, autism spectrum disorder, intellectual disability).¹⁰
- Children with uncontrolled epilepsy or history of recent head injury.⁵⁰
- Children with musculoskeletal disorders affecting participation in exercise.⁵¹

Methods of Data Collection

Ethical clearance has been obtained from the ethical committee of Florence college of physiotherapy Bangalore (ANNEXURE-I).

Procedure

All the 56 subjects aged between 6 to 12 years will be randomly allocated into 2 groups by chit method in which Group 1: will receive the aerobic Exercise training and Group 2 will receive structured play therapy.

Group A

Children will take part in a moderate-intensity aerobic training program for 8 weeks. The program will be conducted 3 times per week, and each session will last for 30 minutes. Every session will begin with a 5-minute warm-up to prepare the body for exercise. At the end of the session, children will complete a 5-minute cool-down to help the body relax and recover after exercise.

Group: 2

Each session will include five activities of about 6 minutes each to improve inhibitory control, working memory, and cognitive flexibility. The activities include ball tapping using only one hand, jumping while naming animals, sorting objects by size, crossing an obstacle course in a colour sequence, and walking while counting or naming animals.¹⁷

Data Analysis & Results

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24, with a significance level of p value less than 0.05 and a 95% confidence interval set for all analysis.

Table-1 Comparison of SCWT Score Between Group – A and Group - B in Pre and Post Test

Test	Group - A		Group - B		t - test	df	Significance
	Mean	S.D	Mean	S.D			

Pre Test	104.50	8.62	102.64	7.55	.674	33	.505*
Post Test	111.55	8.63	122.29	8.18	-3.77	33	.001**

This table shows that there is no significant difference in pre-test values between Group A & Group B at $P > 0.05$. Whereas there is a statistically significant difference in post-test values between Group A & Group B at $P \leq 0.05$.

Table – 2 Comparison of TOL Score Between Group – A and Group - B in Pre and Post Test

Test	Group - A		Group - B		t - test	df	Significance
	Mean	S.D	Mean	S.D			
Pre-test	19.33	2.78	19.17	2.32	.180	33	.858*
Post Test	25.44	2.54	30.41	2.76	-5.53	33	.001**

This table shows that there is no significant difference in pretest values between Group A & Group B at $P > 0.05$. The above table shows that statistically significant difference in posttest values between Group A & Group B at $P \leq 0.05$.

Table- 3 Comparison of SCWT Score Within Group – A and Group - B Between Pre-test and Post Test

Groups	Pre Test		Post Test		t - test	Significance
	Mean	S.D	Mean	S.D		
Group- A	104.50	8.62	111.55	8.63	-22.18	.001**
Group- B	102.64	7.55	122.29	8.18	-13.27	.001**

There is a statistically significant difference between the pretest and posttest values within Group A and Group B at $P \leq 0.05$.

Table – 4 Comparison of TOL Score within Group – A and

Groups	Pre Test		Post Test		t - test	Significance
	Mean	S.D	Mean	S.D		
Group- A	19.33	2.78	25.44	2.54	-7.38	.001**
Group- B	19.17	2.32	30.41	2.76	-34.00	.001**

The above table reveals there is a statistically significant difference between the pretest and posttest values within Group A and Group B at $P \leq 0.05$.

On comparing the Mean Values of Group A & Group B on TSCAWT Score, it shows a significant increase in the posttest mean values in both groups, but (Group B) shows 122.29 ± 8.18 which has the higher mean value is more effective than (Group A) 111.55 ± 8.63 at $P \leq 0.05$. Hence the null hypothesis is rejected.

On comparing the Mean Values of Group A & Group B on TOL Score, it shows a significant increase in the posttest mean values in both groups, but (Group B) shows 30.41 ± 2.76 which has the higher mean value is more effective than (Group A) 25.44 ± 2.54 at $P \leq 0.05$. Hence the null hypothesis is rejected.

On comparing Pretest and Posttest within Group A & Group B on TSCAWT Score & TOL Score shows significant difference in the mean values at $P \leq 0.05$.

DISCUSSION

Attention Deficit Hyperactivity Disorder (ADHD) is a common neurodevelopmental disorder characterized by recurrent patterns of impulsivity, hyperactivity, and inattention that impede a child's growth and functioning. A study conducted by Yang G et al; (2024) concluded that Aerobic exercise therapy significantly improved executive functioning in Children with ADHD, showing above moderate Effect sizes especially in inhibitory control, cognitive flexibility and working memory.

The table - 1 compares the SCWT score between group A and group B in pre and post -test and reveals that there is no significant difference in pre- test values between Group A & Group B at $P > 0.05$, whereas a statistically significant difference can be observed in the post-test values between Group A & Group B at $P \leq 0.05$. The table - 2 reveals compares the TOL scores between group - A and group - B in pre and

post-test which revealed that there is no significant difference in pre-test values between Group A & Group B at $P > 0.05$, whereas there is a statistically significant difference in post-test values between Group A & Group B at $P \leq 0.05$. The table - 3 compares the SCWT scores within group - A and group- B between pre-test and post-test. Where a statistically significant difference between the pre-test and post -test values within Group A and Group B at $P \leq 0.05$ was observed

The table – 4 compares the TOL scores within group - A and group - B between pre-test and post-test. Where a statistically significant difference between the pre-test and post-test values within Group A and Group B at $P \leq 0.05$ was observed.

These findings suggest that both aerobic training and play therapy are effective interventions for enhancing executive functioning in children with ADHD.

Studies conducted by (Pontifex et al., 2013; Chang et al., 2012) unveiled the benefits of Aerobic training in children with ADHD to increase cerebral blood flow, enhance dopamine and norepinephrine regulation, and improve neural plasticity these factors strongly associated with attention and executive control. Hence the improvement seen in Group A can be attributed to the physiological benefits of aerobic exercise.

In conclusion, the study establishes that both aerobic training and structured play therapy are effective in improving executive function in children with ADHD. However, structured play therapy appears to be more effective than aerobic exercise alone, as it directly targets executive function components through engaging in meaningful activities.

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