

EFFECTIVENESS OF MOTOR TRAINING PROTOCOL ON MOTOR PROFICIENCIES IN CHILDREN WITH DEVELOPMENTAL COORDINATION DISORDER

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ABSTRACT

BACKGROUND: Developmental Coordination Disorder is characterized by the motor impairments of motor coordination in all functional activities. Child with Learning Disability are prone to have motor deficit which leads to poor performance in academics and ADL activities.

OBJECTIVE: To find out the effectiveness of motor training protocol on motor proficiencies in children with Developmental Coordination Disorder.

METHODOLOGY: The Quasi Experimental study was done in 40 Learning Disability with Developmental Coordination Disorder children of age 7-12 years were taken and divided into 2 groups. Exercise protocol was given to experimental group and conventional therapy for control group. Bruininks- Oseretsky Test-2 for Motor proficiency was used as an outcome measure.

RESULTS: The results of the study showed, both the groups showed significant improvement in all domains, while fine-motor composite is highly significant for both groups.

CONCLUSION: The study concludes that there is significant improvement in fine motor composite after 8 weeks of motor proficiency training protocol among Learning Disability children with Developmental Coordination Disorder.

KEYWORDS: Developmental Coordination Disorder, Learning Disability, BruininksOseretskyTest-2 for Motor Proficiency, fine motor composite, gross motor composite and battery composite.

INTRODUCTION

“Clumsiness”, “awkward”, “mild brain dysfunction” are the most common words used to describe the children with Developmental Coordination Disorder (DCD). These are characterized by impairments of motor coordination function in all functional activities. Developmental Coordination Disorder is seen in young children of age 5-15 i.e. in school children. About 0.8% were found to have Developmental Coordination Disorder, where girls were 1.1% and boys, 0.8%.¹

In West India, the prevalence of Developmental Coordination Disorder was found to be 3.16% for the age group of 8-9 years and 2% for 12-13 years.² In Chennai it was found to be about 1.37% for an age group of 5-12years.³ and in Karnataka the prevalence among boys was 19.31% and in girls, 23.23% in the age group of 5-15years.³

Development is a continuous process of learning qualitatively and quantitatively from birth till death. This is a progressive change of the nervous system. This change progresses the motor proficiency from childhood and remains till adulthood. The motor proficiency is purely a hand and mind function. The child's motor proficiency also changes with the age.

The American Psychiatric Association (APA) and World Health Organization (WHO) defined inclusion and exclusion criteria based on impairment of development in motor coordination, delayed milestones, poor performance in sports activities, untidy handwriting which leads to disturbances in academics and daily living activities. It may not be as severe as cerebral palsy but it is also a developmental disorder. Exclusion criteria are those with an Intelligence Quotient (IQ) below 70.

The motor proficiency is very important in functional activities, enhancing the performance of child in all aspects of life such as balance, visual-motor, bilateral coordination, agility etc. These activities are needed in children to cherish childhood days as games, academics are related to it.

Research shows that Developmental Coordination Disorder are related to gross and fine motor skills, postural control and proprioception with poor upper and lower limb impairments. About 50% of children with Learning Disability have motor deficits. The importance of physical activity for health, growth and development for child will improve with proper Interventions.

Learning Disability (LD) is a neurodevelopmental disorder of biological origin which leads to learning difficulties and age-appropriate problems in early school academic skills. The Developmental Coordination Disorder is often misinterpreted as Learning Disability. Learning Disability is defined according to their academic performance. Things which are identified by teachers are dyslexia, dysgraphia, dyscalculia and dysmetria. And all are completely related to motor proficiency. Children with Developmental Coordination Disorder are not affected by difficulties, but known to have low self-esteem in physical activities. In many pediatric centers, Learning Disability children are taught with physical and cognition activity based on Activity of Daily Living (ADL).

Since these children have motor deficit, these activities help in improving the motor proficiency, enhanced performance, balance etc. These activities also help in their academics such as coping from board, walking in a straight line, bilateral coordination, concentration, focused training.

The analysis for the frequency and duration of Pediatric therapy services were also done in 1994. But still there are many misinterpretation and confusions in treating the child with DCD, which include cognitive ability, motivational level, physical environment, age, functional goals etc. A recent systemic review concluded that little children have specific difficulties in performance of ADL and participation in ADL. For learning ADL, studies emphasized that more effort is needed to improve their functional activities.³

In protocol, we can also add goal assistance training for skill acquisition development. And some treatment based on sensory stimulation such as tactile, vestibular, and visual, proprioception. During the last decade, Task-oriented approach were highly recommended as it improves the motor competence, functional motor skills, cognitive orientation and also enhanced the problem solving techniques.

Increasing interest among the children in both academics and recreational makes the family as well as the therapist for easy identification, management and to create trust for long term impact. The need to think from narrow medical aspect to bio-social educational model is important in case for longterm.⁷

Children with Developmental Coordination Disorder show high prevalence of health problems than children with general population. Considering the importance of early intervention of the children with learning disability, the motor proficiency has to be checked as age progress for all children starting from pre-primary to secondary school. Understanding

the complex nature of the children with Learning Disability and Developmental Coordination Disorder, early intervention has to be started than neglecting the child in all aspects.^{7,8}

Early investigation and diagnosis of Learning disability along with Developmental Coordination Disorder is considered to be important among the young children. A separate exercise protocol can be prepared and best outcome measures has to be standardized for better results.

METHODOLOGY

It's an quasi-experimental study with pre and post-test type, 8 weeks duration, by convenient sampling 40 samples were taken using inclusion and exclusion criteria, an informed consent was obtained from private clinics in and around Chennai. Institutional Ethical clearance was obtained before starting the study. Inclusion criteria was children aged 7-12 years, diagnosed case of learning disability who meet DCD criteria score 15-57, below 15 percentile BOT-2 test for motor proficiency, children who understand and responds to instructions and attending rehabilitation center regularly. Exclusion criteria were orthopedic or neurological problems, severe coordination disorder score, visual deficit children.

In this study 85 children were screened for Developmental Coordination Disorder among Learning Disability, from which only 40 children were selected according to inclusion and exclusion criteria. An informed consent was obtained from the child and parent with detailed explanation of procedure. The selected children were divided into two groups, Group A as experimental group and Group B as control group.

A diagnostic test of Developmental Coordination Disorder Questionnaire (DCDQ-07), was used to suspect DCD with the help of scoring and it was done for both the groups. The motor proficiency was checked using Bruininks- Oseretsky Test- 2, as a Pre and Post-test outcome measure.

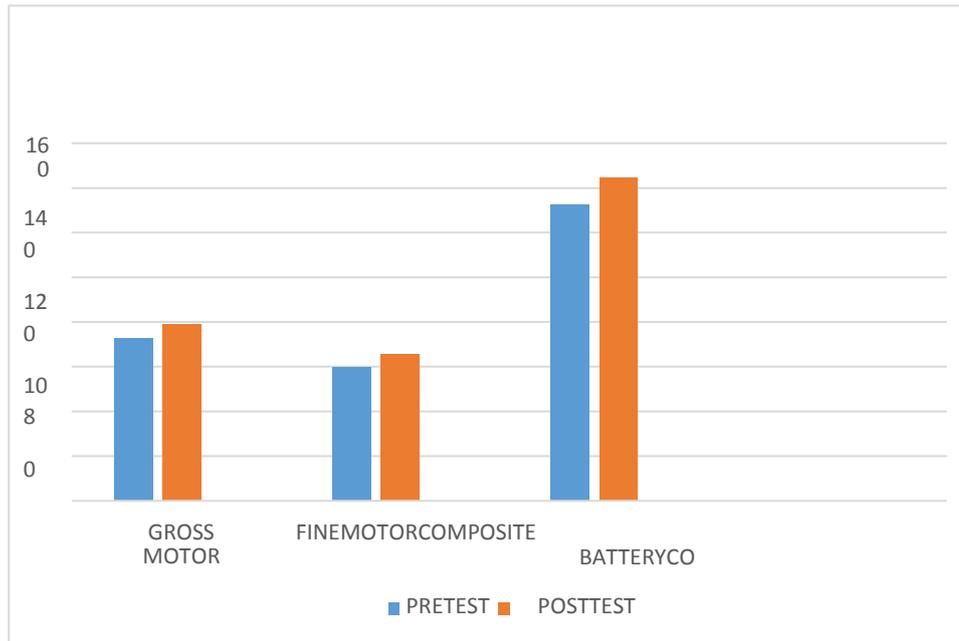
Group A- 20 children (Experimental group) were given with an exercise intervention program of motor training along with progression. Group B- 20 children (Control group) was given with conventional therapy of fine motor and coordination exercises. Separate exercise protocol for each week duration of 30min/day -3 days per week for 8 weeks.

After the completion of 8 weeks program, post-test was assessed to check the improvement for motor proficiency.

Bruininks Oseretsky Test -2 has been used as an outcome measure for motor proficiency. The domains in this test are Gross motor composite subtests are running and agility, balance, bilateral coordination and strength were checked where as in fine motor- upper limb coordination, response speed, visual- motor control and upper limb speed and hand dexterity. It has reliability value of 0.92.

Each gross motor subtests has separate scoring and combined score of 320, individual score Fine Motor score(81),Manual coordination score(84),Body coordination(61),Running and agility score of(94). It has the reliability value of 0.92 and highly used for the children with motor deficits and to test motor proficiencies such as fine-motor and gross motor composite.¹⁶

BAR DIAGRAM 1: PRETEST AND POST TEST OF BOT-2 SCORES FOR EXPERIMENTAL GROUP



BAR DIAGRAM 2: PRETEST AND POST TEST OF BOT- 2 SCORE FOR CONTROL GROUP

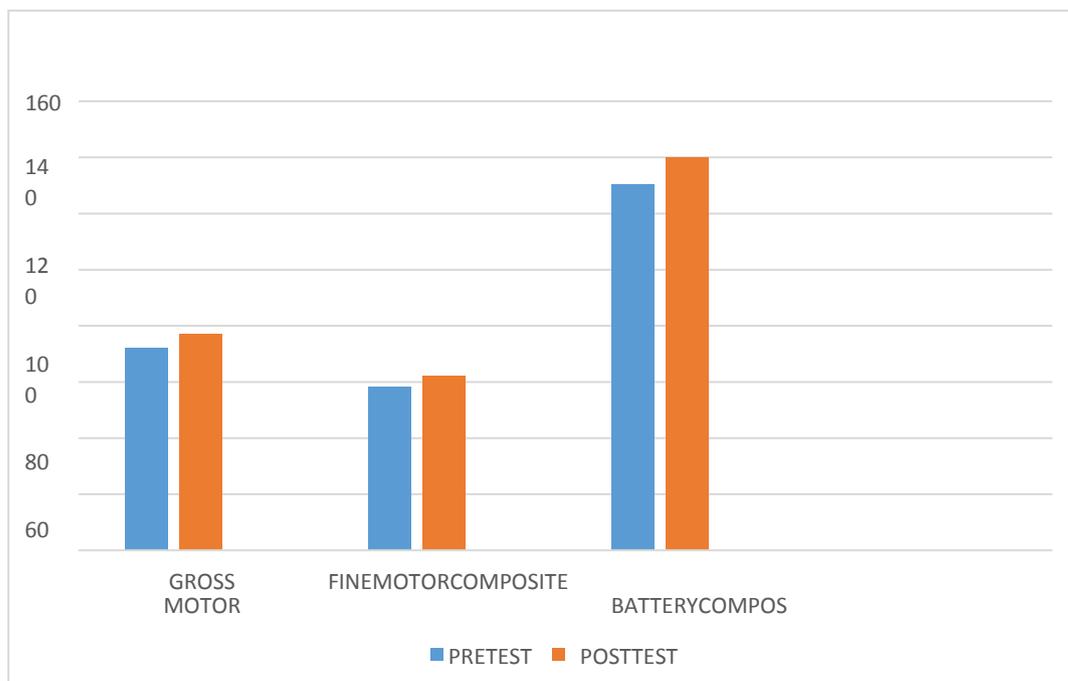
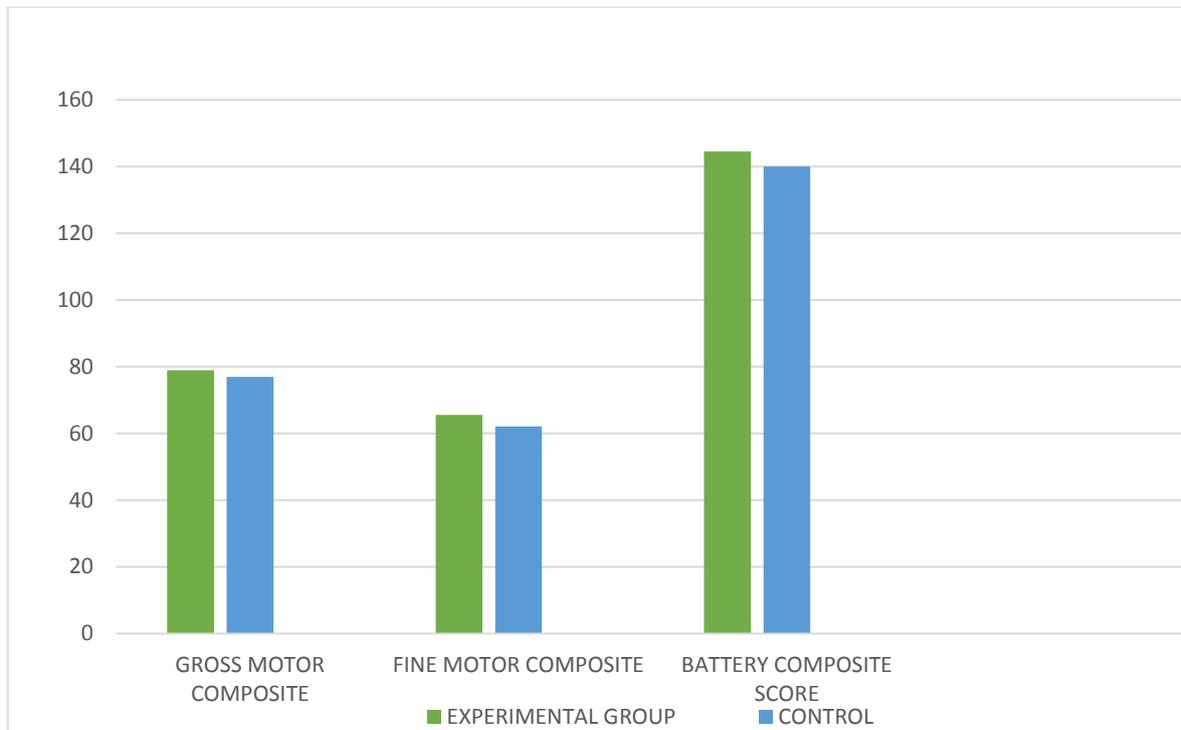


TABLE 1: COMPARISON OF POST-TEST OF BOT-2 SCORE FOR EXPERIMENTAL AND CONTROL GROUP

DOMAIN	EXPERIMENTAL GROUP		CONTROL GROUP		p-value
	MEAN	S.D	MEAN	S.D	
GROSS MOTOR COMPOSITE	78.95	6.32	76.90	8.2	0.360
FINE MOTOR COMPOSITE	65.55	3.05	62.10	3.7	0.003
BATTERY COMPOSITE SCORE	144.50	7.5	140	10.4	0.127

BAR DIAGRAM 3: COMPARISON OF POST-TEST OF BOT-2 SCORE FOR EXPERIMENTAL AND CONTROL GROUP



RESULTS

BAR DIAGRAM 1, shows the pre-test and post-test values of Brunininks Oseretsky Test-2 for Experimental group, motor proficiency – gross motor mean value is 72.70 has been increased to 78.95 in post-test. Fine motor composite mean value is 59.90 increased to 65.55. Battery composite score is 132.60 and post-test value is 144.50. There is significant increase in all domains of BOT scores at ($p<0.00$).

BAR DIAGRAM 2, shows the pre-test and post-test values of Bruininks-Oseretsky Test-2 for Control group, motor proficiency – gross motor mean value is 71.95 has been increased to 76.90 in post-test. Fine motor composite mean value is 58.35 increased to 62.10. Battery composite score is 130.30 and post-test value is 140. The significant increase in all domains of BOT score at ($p<0.00$).

TABLE 1& BAR DIAGRAM 3, shows the comparison of post-test values of BOT-2 score for experimental and control group, gross-motor composite and battery composite score shows a non-significant value of 0.360 and 0.127, fine- motor composite shows significant value ($p<0.003$).

DISCUSSION

The purpose of this study was to find out the effectiveness of motor training protocol on motor proficiencies in children with Developmental Coordination Disorder. This seemed to be important because many researchers suggest that early identification and treatment of Developmental Coordination Disorder among school-aged population.

In this study, selected children were divided into two groups according to the procedure, Group A- Experimental group had intervention program of 8 weeks based on the physical activity related to motor proficiency. The activities help to improve the motor proficiencies such as balance, coordination, speed and agility etc. These motor proficiencies also help them in functional activities and to participate in recreational activities.

This goes in hand with a study of **JaneJ.Yuetal(2018)** which concluded that, motor skill interventions help in motor competence and performance along with cognition, emotional and psychological aspects in Developmental Coordination Disorder children.¹⁹

Sonill S. Maharaj et al (2016) concluded that early intervention and exercise helped to improve the Developmental Coordination Children and recommended the frequency of exercises.¹⁷

Group B- Control group had conventional therapy of fine motor and coordination

exercises for 8 weeks. As these exercises are more related to the functional activities, it may help the child to learn and implement it.

Tony Szturm et al (2014) concluded that motivating exercises and learning approaches to enhance fine motor exercises is needed for young children.²⁰

Boudien C T Flapper et al (2006) reported that impairment in manual dexterity, poor handwriting and performance in sports, needs more exercises for school going children.²¹

The results showed, significant improvement in fine motor composite administered with physical activity exercise program for experimental and conventional group, with the significant value of 0.003, whereas the gross motor composite and battery composite score was a non-significant value at $p < 0.360$ and 0.127 respectively. The results also shows that mean difference between both the groups were significant for fine motor composite, while other components of both groups were not significant.

So, this suggests that exercise intervention and functional activities for Learning Disability with Developmental Coordination Disorder is essential. May be long duration of exercise program can improve the gross motor composite.

There were few difficulties while doing study such as making the child to understand about the exercise, the motor proficiency test and screening of Developmental Coordination Disorder among Learning Disability took longer duration.

A minor change in the child's motor proficiency may affect the child's quality of life. Intervention programme for these children helps early recovery and performance of daily functional activities which leads to participation in all activities.

CONCLUSION

This study concluded that experimental and control group have significant improvement in all domains respectively while only fine motor composite has highly significant value after 8 weeks in both the groups among Learning Disability children with Developmental Coordination Disorder.

This study recommends that early identification of DCD and parental involvement for therapy are essential to make the intervention program effective along with Daily Living Activities. The limitations are Smaller sample size, less Study duration. Recommendations are the relationship between parental analysis and therapist analysis can be compared, The

correlation between the academics and DCD can be examined, Parental involvement in exercise intervention program can be implemented.

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