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ORIGINAL ARTICLE

Role of Task Oriented Training on Upper Extremity Function in Spastic and Athetoid Cerebral Palsy Children

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ABSTRACT

Objective: To determine the effects of task oriented training on upper limb function of spastic and athetoid types of cerebral palsy children.

Study Design: A quasi experimental (without control group) study.

Place and Duration of Study: Campus Institute Lahore, 4 weeks of April 2019.

Material and Methods: A total of 25 patients with spastic and athetoid CP were taken by non-probability consecutive sampling for pretest and posttest from a local rehabilitation center Lahore, Pakistan. They received task oriented training for four weeks with thirty minutes session for 5 days a week along with regular physical therapy. ABILHAND-Kids questionnaire and Nine Hole Peg test were used to evaluate their performance before and after the training.

Results: The results showed significant improvement in 21 activities of ABILHAND-Kids questionnaire. Pretest and posttest measured as follow, 19.44 ± 3.52 to 24.48 ± 3.61 , p-value was 0.0001. Nine Hole Peg test scores were insignificant after four weeks of practice as compared to pretest scores. The mean score measured as; 4.92 ± 2.12 to 5.44 ± 2.45 , p-value was 0.067. There was significant difference in ambulatory status with GMFCS level ($p=0.028$) and non-significant difference in GMFCS level with Hemiparetic side ($p=0.168$ & $p=0.841$), respectively.

Conclusion: The task specific training with gross motor learning in spastic and athetoid cerebral palsy has marked role in specific training of upper extremity functions.

Key Words: *Upper extremity, Cerebral palsy, Spastic, Athetoid, Training*

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INTRODUCTION

Cerebral palsy (CP) is a disease of nervous system caused by a brain lesion that is non-progressive in nature occurring during childbirth or after it.¹ CP has many types such as spastic, ataxic, athetoid and mixed. It results in abnormal body movement, muscle coordination, muscle tone, reflexes, posture, fine and gross motor functions.

Task oriented training also known as goal directed training, activity based functional therapy, task specific training, goal focused task practice or functional therapy.² It has been gaining more interest in treating CP children in recent years due to result of scientific research that has demonstrated that the task-oriented approach has effect in children with CP. It involves a CP child to practice specific tasks and activities which have been identified as goals for intervention.³ These

goals are realistic, meaningful and important for the child and family. There are many other interventions for CP children that involve setting goals and practicing activities but for task oriented training it is necessary to begin with a goal and practice the identified activities to achieve the goal. This is an intervention that leads to effectual functional movement in children with CP by supporting tasks that are interesting.⁴

Fine motor activities for upper limb include beading, picking up small objects, cutting with scissors, using knife, crumpling and tearing paper, play dough activities, blocks building, feely bag activity, scribbling, and ring tower activities. Lower extremity (L.E) fine motor activities include kicking a ball, swinging leg over some box, picking up marble and tracing a triangle by the help of toes.⁵ But here in this research the focus of our study will be on fine motor activities of upper limb. Task oriented training consist of bilateral activities such as sword handling, drum beating, sweep a ship deck, playing with dolls or playing with construction materials, to cut with the help of scissors and pasting it, ball games and unilateral activities include to eat with the help of fork, to hold a cup and to carry and drag wooden blocks.⁶

A randomized controlled trial was conducted on ten children and results suggested that task oriented strength training program has positive functional outcomes in CP children.⁷ Even a task specific exercise plan for home has been reported to improve motor function and balance spastic CP children.⁸ A study was conducted on spastic, athetoid, diplegic and quadriplegic CP children to see the effects of child focused task specific training on balance training. The results suggested improvement in balance with all of them.⁹

CP children suffer more than one impairment in their affected arm, so task specific training should focus on all of them to improve their basic activities of daily living (ADL), functional performance and social skills as they show varied complex deviations in their movement with affected arm. In Pakistan there is little recognition of the fact that task oriented approach of upper extremity is also required for CP children.

The primary objective of the study was to measure the role of task oriented approach on CP

children for improving the gross motor functioning and the daily living activities of the child. The idea was that, if daily living activities can be used as treatment options reciprocally.

MATERIAL AND METHODS

A quasi experimental (without control group) study was done. A total of 25 children, (both gender) of age group 6-15 years with established diagnosis of cerebral palsy, spastic and athetoid and GMFCS level 1-5 from Compass Institute, Lahore Pakistan were included in the study. Sample was selected by non-probability consecutive sampling. The exclusion criteria were unstable seizures and any surgical procedures within the past 6 months. The duration of the study was 4 weeks of April 2019. The study was started after taking approval from the ethical research committee of the institution and all the parents have signed a voluntary consent form.

The data was collected by using GMFCS (Gross Motor Function Classification Scale) and ABILHAND-Kids questionnaire. Nine Peg Hole test was also used to measure fine manual dexterity. All patients were tested once 1st week (baseline before start of study) and then completion of training at the end of 4th week (pretest and posttest).

The following procedure was used for evaluation of the patients: GMFCS was used as a baseline measurement to determine level of severity in CP children and leveled as 1-5 patients (GMFCS-I; child can walk and run easily but speed, balance and coordination are limited. GMFCS-II; child walks in most settings holding onto a railing and child may experience difficulty in balance. GMFCS-III; child walks using a hand-held mobility device in most settings and may climb stairs holding onto a railing with assistance. GMFCS-IV; child use different methods of mobility with physical assistance in most settings and he/she may walk with physical assistance in home. GMFCS-V and child is transported in a manual wheelchair in all settings. Child is limited in ability to maintain antigravity head and trunk posture and control leg and arm movements).¹⁰ ABILHAND-Kids questionnaire was used to assess manual ability in children with CP which consists of 21 activities with questions to be answered by the parents regarding daily activities with four

potential answers: impossible “0”(child is unable to do the task without help), difficult “1” (child is able to do the task with little difficulty without help), easy “2” (child is able to do the activity without difficulty and help) and question mark “?” (parents cannot estimate the activity as their child has never done the activity). Ten different orders of this questionnaire were used with rater selecting one of the 10 orders for each new assessment, no matter which child is selected. Children have rather poor perception of their ability as compared to their parents which led to a range of measurement, higher reliability and better reproducibility over time. The 21 items in this questionnaire define valid and reliable manual ability scale and total score was 42. Nine Peg Hole test was also used to measure fine manual dexterity. It involves picking up nine pegs one at a time from a container situated on the dominant hand side first and putting them in the holes of the pegboard one by one and return the pegs back to the container one by one. Then this process is repeated on the non-dominant side by placing the container of the pegs on the opposite side. The whole test is timed in seconds with help of stop watch. If the participant dropped the peg or if the test was interrupted by anyway during the administration of the test, the participants were stopped by the evaluator and a new trial was started. Score is based on time taken in seconds to complete the activity.

Data was collected from all the patients included in the study there was no drop out during the whole procedure till analysis. 25 patients acknowledged task oriented training of 20 sessions in 4 weeks. Every subject received regular physical therapy which included range of motion (ROM) exercises and upper limb stretching

for 10 minutes to improve affected arm function. They received task oriented training five times per week for 20 minutes and for 4 weeks. Task oriented training consisted of bilateral activities such as sword handling, drum beating, sweep a ship deck, playing with dolls or playing with construction materials, to cut with the help of scissors and pasting it, ball games and unilateral activities include to eat with the help of fork, to hold a cup and to carry and drag wooden blocks that were near to daily functions performed by the children.

Data was compared at baseline (pretest) and at the end of 4th week after training sessions (Posttest). Demographic variables, frequencies and percentages were calculated. For ABILHAND scores and Nine Hole Peg test scores mean and SD were taken. Wilcoxon Signed Rank Test was used and values were shown as mean of ranks and p-value. The non-parametric test was used because sample size was small. Chi square was used for calculating association between categorical variables hemiparetic side and ambulatory status.

RESULTS

Among 25 spastic and athetoid CP children, mean age and standard deviation was 10.36 ± 2.58 years (range 6-15). 44% were boys and 56% were girls. Wilcoxon Signed Ranks Test was applied for changes ABILHAND score of 21 activities (table 1) and for changes in Nine Peg Hole test (table 2) and for changes in 1st week (baseline before study) to 4th week. Correlation between dominant and non-dominant hand (table 3) and relationship of categorical variables hemiparetic side and ambulatory status with GMFCS level (table 4) were studied.

TABLE 1: Descriptive analysis of ABILHAND score pre and posttest

	N	Mean	Std. Deviation	Minimum	Maximum		
Pretest ABILHAND Score	25	19.44	3.525	14	26		
Posttest ABILHAND Score	25	24.48	3.607	18	30		
Wilcoxon signed ranks test							
		N	Mean Rank	Sum of Rank	Z	Asymp. Sig. (2-tailed)	
Posttest ABILHAND Score	Negative	0	.00	.00	-		
Pretest ABILHAND Score	Positive	25	13.00	325.00	4.434	.0001	

TABLE 2: Analysis of nine hole peg test score pre and posttest

	N	Mean	Std. Deviation	Minimum	Maximum		
Nine Peg Hole pretest	25	4.92	2.12	1	9		
Nine Peg Hole posttest	25	5.44	2.451	1	9		
Wilcoxon signed ranks test							
	N	Mean Rank	Sum of Rank	Z	Asymp. Sig. (2-tailed)		
Posttest Nine Peg Hole	Negative	2	8	16	-1.833	.067	
Pretest Nine Peg Hole	Positive	10	6.2	62			
	Ties	13					
	Total	25					

TABLE 3: Analysis of dominant and non-dominanthand pre and posttest

	N	Mean	Std. Deviation	Minimum	Maximum		
Dominant Hand pretest	25	3.56	1.294	1	6		
Dominant Hand posttest	25	4.04	1.567	1	6		
Non Dominant Hand pretest	25	1.36	1.150	0	4		
Non Dominant Hand posttest	25	1.48	1.085	0	4		
Wilcoxon signed ranks test							
	N	Mean Rank	Sum of Rank	Z	Asymp. Sig. (2-tailed)		
Dominant Hand posttest	Negative	3	11.00	33.00	-1.884	.060	
Dominant Hand pretest	Positive	13	7.92	103.00			
	Ties	9					
	Total	25					
Non Dominant Hand posttest	Negative	5	6.00	30.00	-0.775	0.439	
Non Dominant Hand pretest	Positive	7	6.86	48.00			
	Ties	13					
	Total	25					

TABLE 4: Relationship of hemiparetic side and ambulatory status with GMFCS level

GMFCS Level	Low	High	Total	Chi-Square	p-value
L1	7	9	16	1.960	.162
L5	6	3	9		
Total	13	12	25		
Hemiparetic Side				0.040	.841
Right	8	5	13		
Left	6	6	12		
Total	14	11	25		
Ambulatory Status				4.840	.0283
Able to walk	4	3	7		
Unable to walk	8	10	18		
Total	12	13	25		

DISCUSSION

In this study, after implementation of task oriented technique to see its effects on affected arm function in children with spastic as well as athetoid variety, a substantial improvement was seen in the activities of daily living as demonstrated by a

significant variation in ABILHAND questionnaire. There was improvement seen in 21 activities of ABILHAND-Kids questionnaire. The results of Nine Hole Peg test showed a very little improvement in dominant hand and were not considered significant with no improvement at all in non-dominant hand. So, overall nine hole

test results were insignificant. The findings of the results proposed that task-specific upper extremity practice may facilitate children with cerebral palsy to accomplish daily activities without assistance which is vital for effective social participation.

Reports from previous studies suggest that muscle strengthening and the amount of practice performed to learn a particular skill are most important factors for motor skill recovery. Findings of this study are similar to the findings reported by Chiang-Soong Song who studied 12 children aged 7-12 years with spastic CP to see the impact of task oriented training on functions of affected arm. The results revealed improvement in functional activities like manual dexterity, fine motor skills and their basic daily activities.⁴ The findings were also little similar to randomized controlled trial conducted by Kim et al. in which 12 children with CP were studied to see impacts of task specific training with and without trunk constraint on quality of upper extremity function and the results suggested more enhancement in trunk constraint group.¹¹ The results of a study performed by Blundell et al. on spastic, diplegic and ataxic CP patients to evaluate the effectiveness of task oriented strength training on lower extremity strength and motor performance, showed improvement.⁷ Similarly a preliminary study was conducted on ten children and results suggested that task oriented strength training program has positive functional outcomes in CP children.⁸ A lot of studies had been performed to see the result of task oriented training on lower limbs^{11,12} and on balance training.

The outcomes of this study indicated that task specific training of affected arm reduced its dysfunction and also significantly improved its functional performance in accordance with ABILHAND-Kids questionnaire. However, the results of this study cannot be generalized and were limited because of no control or comparison groups, no blinding, smaller sample size, no follow-up measures and the duration of intervention in this study was less as compared to previous studies. Therefore there is requirement of further study in this regard in the long run. There is further need of understanding the concept of task oriented training. There should be increasing number of centers that use this training

and emphasis on improving arm function in CP children.

CONCLUSION

The task specific training with gross motor learning in spastic and athetoid cerebral palsy has marked role in specific training of upper extremity functions.

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Conflict of interest: None

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