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Effect of bimanual therapy on hand arm use among hemiparetic cerebral palsy children

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Abstract

Background: Spastic hemiplegia is a type of cerebral palsy. Daily life comprises a range of activities that more or less demand the use of two hands. This study aims to find out the effects of bimanual therapy to improve the hand arm use among the children with hemiparetic cerebral palsy.

Methods: 10 children with hemiparetic cerebral palsy were treated in bimanual therapy. Interventions lasted for 8 weeks, 3 hrs/day, children's hand arm use experience questionnaire (CHEQ) was used to assess the children's bilateral upper limb functions before and after intervention.

Results: Bimanual therapy showed significant improvements on hand arm use. There was significant difference in grasp, time and feeling bothered of posttest in CHEQ.

Conclusion: Bimanual therapy was more effective in improving the hand arm use in daily activities among the children with hemiparetic cerebral palsy.

Keywords: Cerebral palsy, bimanual therapy, children's hand use experience questionnaire

Introduction

Hemiplegic cerebral palsy is a non-progressive damage in premature growing brain which causes movement disorders in one side of the body. These impairments frequently cause considerable functional disability in the children because of difficulties in performing two-handed task^[1].

Daily life comprises a range of activities that more or less demand the use of two hands. Children with unilateral cerebral palsy are generally able to take part in the same activities as their peers but, commonly they have difficulties when skilful collaborative use of two hands is needed^[2,3]. They also avoid certain activities when their hand function bothers them a lot. Other activities are performed using only the non-involved hand, even if they typically require use of both hands. It has been assessed specifically by children's hand use experience questionnaire^[4].

Even though there are other assessment methods available for bimanual activities, the unique feature of CHEQ concerns the combination of different quality aspects of hand functions are used. In CHEQ, three different aspects of hand use, selected like efficacy of grasp, the time it takes to perform bimanual activities and whether the person feels bothered or not when doing them are socially important aspects for children. These aspects were important and described separate qualities of hand use were confirmed by the result showing that each of them formed a unique dimension with high internal consistency. Moreover, each scale demonstrated a high degree of ratings, indicating that the participants regarded all three aspects as valid^[5,6].

Evidence of the effectiveness of traditional therapies for children with hemiplegia has been found to be lacking, or they require repetitive and laborious actions with reduced compliance limiting their potential effectiveness. Bimanual therapy is an interventional approach to increase functional independence during activities of daily living by bilateral coordination of hand and arm^[1].

Methods

- **Study Design:** An experimental study was conducted to find out the effect of bimanual therapy on hand arm use among the children with hemiparetic Cerebral Palsy.
- **Sample:** 10 subjects were selected after giving due consideration to inclusion and exclusion criteria.

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- **Sampling method:** Random sampling technique was used to select the samples.
- **Inclusion Criteria**
 1. Diagnosed hemiplegic cerebral palsy
 2. Both gender with children aged 8 to 12 years
 3. The ability to lift the involved arm from the table surface to six inches above
- **Exclusion Criteria**
 1. Prior upper limb surgery
 2. Botulinum toxin A injection in the upper limb within 6 month prior to study
 3. Visual& cognitive problems

• **Outcome measures**

The Children’s Hand-use Experience Questionnaire (CHEQ).

The Children’s Hand Experience Questionnaire (CHEQ) is a 29-item questionnaire of independence in typical daily bimanual activities using the affected/hemiplegic hand with good reliability and item validity reported. The Children’s Hand-use Experience Questionnaire (CHEQ) is a questionnaire designed for children between 6 to 17 years of age with functional limitations in one hand. The CHEQ describes the use of the assisting hand during various activities that are typically completed with two hands. The CHEQ records if a client performs the task; if yes, do they use two hands to complete the task? If two hands are incorporated in performance than the questionnaire uses a four-point scale to describe three components of use: how effective is grip or support of the assisting hand, how does the time to completion compare with your peers, and how bothered are you by the use of the affected hand? This questionnaire can be completed by apparent or child. The questionnaire can be completed on the Internet or printed and given to the family to complete. When the questionnaire is completed on the Internet, a report is automatically generated with responses listed per activity and charts describing the participation, the hand use, and the three components of hand use [6].

Procedure

10 hemi paretic cerebral palsy children were selected for the study and consents were obtained from the parents prior to enrolment. Pre evaluation was done for hand arm use experience by the children’s Hand-use Experience Questionnaire and the children were treated by bimanual therapy. Interventions were delivered daily 3 hours and the same was continued for a period of 8 weeks. Post intervention readings were taken after 8 weeks on the outcome parameter.

Bimanual activities were selected and directions were given to the child before the start of each task in order to specify how each hand would be used during the activity and to avoid use of non-involved extremity only. If a child attempted to use the non-involved hand, the task was paused and the child was reminded of the task rules, at the same time avoid urging the child to use his/her involved hand. Task difficulty was graded by speed and accuracy. The principle of bimanual therapy is to promote intensive practice and repetition in part- and whole-task movements, increasing complex bimanual skills, in timing, accuracy and fine manipulation. The training includes Bottle and marbles

activities, Dough activities, Throwing or catching different sized balls, Transferring cube from non-affected to the affected hand and towering cubes, Stacking rings, Stringing beads, Alternate banging and clapping movements, Fastening clothing, button and unbutton buttons, open and close zip, Twist the lid of the jar, Twist and press a lock and its key and Cutting of paper by scissors [7-9].

The data were collected from the samples and processed with the application of paired t- test for pre and post intervention.

Data analysis and Results

Table 1: Comparison between Pre and Post in CHEQ

Variables	Mean values		Standard deviation	Calculated t value	Table value
	Pre mean	Post mean			
Grasp	1.92	3.0	0.25	13.52*	3.25
Time	1.74	2.59	0.24	11.19*	
Feeling bothered	1.82	2.6	0.27	9.25*	

Table 1 displays the CHEQ value of pre and post treatment. The results shows that there is significant differences in improvement of grasp, time and feeling bothered (13.52, 11.19 and 9.25) which is greater than table value (3.25) at 0.005 levels. Hence the study shows significant improvement on CHEQ scores in Bimanual Therapy.

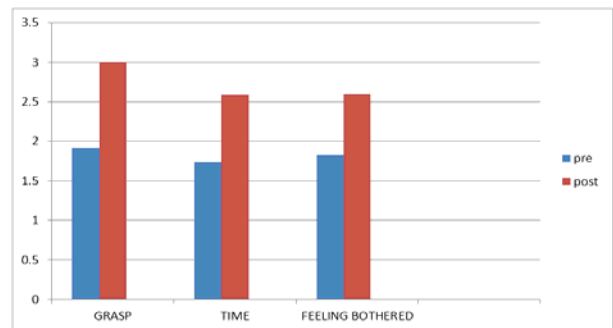


Fig 1

Discussion

Present study was done to find out the effectiveness of bimanual therapy to improve hand arm use in children with hemiparetic cerebral palsy.

The hemiparetic cerebral palsy children have the problem in coordination of bimanual activities. Hence the functional limitations in activities such as dressing, eating, and playing sports are improved followed by bimanual therapy. It has a positive impact on fine-motor performance of those children. It is based on the intensity of training is far greater, providing sufficient opportunity for practice using principles of motor learning and encouraging the use of the involved hand in any manner and in particular to focus on how the hand and arm are performing at the end-point of the activities [9].

The result of this study showed that bimanual therapy has better improvement in hand arm use in children with hemiparetic cerebral palsy.

Conclusion

Bimanual therapy is an effective treatment method in improving hand arm use among children with hemiparetic cerebral palsy.

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