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
• **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 months 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.

**Procedure**

10 hemiparetic 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.

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

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean values</th>
<th>Standard deviation</th>
<th>Calculated $t$ value</th>
<th>Table value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre mean</td>
<td>Post mean</td>
<td>Calculated $t$ value</td>
<td>Table value</td>
<td></td>
</tr>
<tr>
<td>Grasp</td>
<td>1.92</td>
<td>1.45</td>
<td>13.52</td>
<td>3.25</td>
</tr>
<tr>
<td>Time</td>
<td>1.74</td>
<td>1.26</td>
<td>11.19</td>
<td>3.25</td>
</tr>
<tr>
<td>Feeling bothered</td>
<td>1.82</td>
<td>1.35</td>
<td>9.25</td>
<td>3.25</td>
</tr>
</tbody>
</table>

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.

**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.

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.
References