

Effects of Constraint- Induced movement therapy on hemiplegic cerebral palsy patients

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Abstract

Aim: To Study the effects of constraint-induced movement therapy on hemiplegic cerebral palsy patients.

Methodology: Both groups; control (n=15) and experimental (n=15) underwent treatment for six times a week for 3 months.

Result: Significant findings were obtained.

Conclusion: The research conducted and the results obtained seem particularly important for the CIMT practice and for the organization of rehabilitation programs in the dedicated health care service.

Keywords: Cerebral Palsy; Movement Therapy; Hemiplegic.

1. Introduction

Cerebral palsy (CP) refers to a group of permanent disorders of the development of movement and posture, causing activity limitations, which are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain. Damage to the central nervous system cause disorders in neuromuscular, musculoskeletal and sensorial systems. These disorders result in posture and movement deficiencies [1]. The causes of motor disorders are developmental retardation, abnormal muscle tone, muscle weakness, postural control deficiencies, sensorial problems, behavioral problems, orthopedic problems, abnormal movement patterns, reflex, activity, asymmetry and deformities [2].

Within the scope of the assessment to be performed in terms of motor activities are changes in the muscle tone, co-contraction capacities of the muscles, involuntary extremity and body movements, stabilization of the extremities, correction, balance and protective reactions, sitting balance, upper extremity and hand functions and sensory-perception problems; orthotics, need of mobilization tools and other aid, cooperation of the family and their knowledge on the disease also needs to be assessed[3]. Modern therapy methods in CP rehabilitation aim to develop the maximum functionality and independence possible for the child by using the present neuro motor potential. The dynamic motor control

approaches based on changing the motor patterns and configuration of the tasks rather than the hierarchical modeling of the neurological motor development are used for rehabilitation [4].

These findings support a unilateral approach to treatment in children with hemiplegic cerebral palsy. Constraint-induced movement therapy (CIMT) is emerging as a treatment approach for use with children with hemiplegic cerebral palsy. It aims to increase spontaneous use of the affected upper limb and thereby limit the effects of developmental disregard. CIMT is based on two fundamental principles: constraint of the non-affected limb and massed practice of therapeutic tasks with the affected limb [5]. The CIMT involves 2 components. First, the child's unimpaired upper extremity will be constrained in an upper limb sling. Second, the pediatric CIMT training procedures by shaping will begin. Shaping involves presenting interesting and useful activities to the child in ways that provided immediate, frequent, and repetitive rewards (primarily verbal praise, smiles, and supportive gestures, with some food and toys) for the child's efforts and increasingly functional use of the impaired extremity.

2. Subjects and Methods

The subjects who fulfilled the inclusion and exclusion criteria were randomly assigned to one of two groups after obtaining written informed consent from the parents. Duration of study of both groups underwent treatment for six times a week for 3 months. At first baseline measurement was taken from Besta scale to evaluate the upper limb function for 30 subjects. [6]

Following instruments were used for Assessment Scoring on Besta scale: Goniometry, Measurement Tape, Gym Ball, Trampoline, Brush, Small balls, Coin, Doll. Data analysis was carried out after collecting the data for the two outcomes measures of the patients of both the groups. The comparison was done by Besta Scale for the control group (a) and experimental group (b). As the comparison was between two groups and the sample size was small (n=30) so unpaired t- test was used.

Table 1: Procedure

	Group-A	Group-B
Description	Control Group	Experimental Group
Number of patients	N-15	N-15
Therapy	Conventional Physiotherapy	Constraint Induced Movement Therapy
Duration of Study	3 Months	3 Months
Frequency of Treatment	6 times in a week	6 times in a week
Duration of Therapy	1 hour	2 hour
Follow up time	Pre test- day zero Post test-3 months	Pre test- day zero Post test-3 months

3. Results

The main results demonstrate a significant effect of both intensive 11 programs on the upper limb function. CIMT results particularly effective in grasp function, while bimanual intensive rehabilitation program results particularly efficacious in activity of daily living tasks.

The traditional treatment does not show a significant modification of upper limb function. The patterns of brain plasticity and the process cortical reorganization following injury seem to play a crucial role in upper limb function modifications after intense treatment.

Table 2: The table 2 is the tabulated value of all 30 participants; the control group test, experimental group test and the absolute differences.

Participants no. (Con. physio.=15 +CIMT 15=30)	Control Group test	Experimental Group test	Difference	Absolute Difference
1	13	11	02	02
2	08	14	-06	06
3	16	16	00	00
4	01	02	-01	01
5	12	15	-03	03
6	10	12	-02	02
7	14	16	-02	02
8	10	11	-01	01
9	09	11	-02	02
10	08	11	-03	03
11	09	11	-02	02
12	13	14	-01	01
13	15	17	-02	02
14	06	08	-02	02
15	11	14	-03	03

Con. Physio: conventional physiotherapy; CIMT: Constraint-Induced Movement Therapy

Table 3 showing the comparison of mean of control and experimental group, the mean value of control group is 10.40 and experimental group mean is 12.20, so experimental mean is more than control group and the standard deviation of both groups are 3.832 and 3.764 respectively, so experimental Standard deviation is less than control group.

Table 3: Table 3 showing the comparison of mean of control and experimental group

Sr. No.	Treatment Condition	N	Mean	Standard Deviation
1	Control group	15	10.40	3.832
2	Experimental Group	15	12.20	3.764

Table 4 shows statistical analysis by Wilcoxon sign rank test (unpaired T test), Where the P value is 0.005 which is a significant value, and hence it shows that there is significant improvement in Group-B followed the CIMT therapy.

	Experimental group.- Control group
Z	-2.860 ^a
Asymp. Sig. (2-tailed)	.005

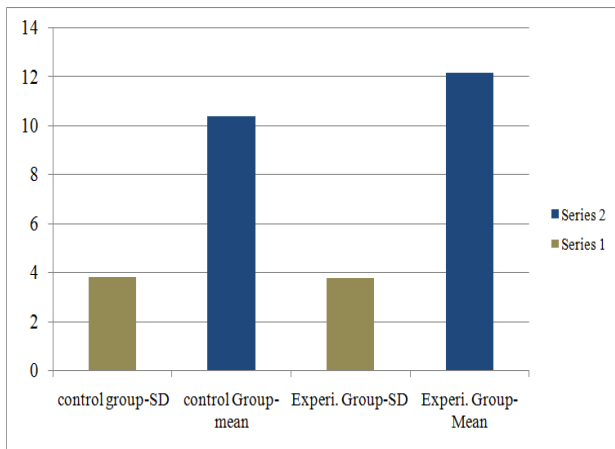


Figure 1: Showing the comparison of means and Standard deviation of control and experimental group.

4. Discussion

In current study, children aged 18 months-8 years with a diagnosis of spastic hemiplegic CP took part in a CIMT intervention within 3 months for 2 hours per day for 6 consecutive weekdays. Clinical studies using CIMT have previously been demonstrated to be effective in the pediatric population with spastic hemiplegic CP. Taub *et al* showed that CIMT has also been successfully applied outside of a clinical setting in this population, yielding positive outcomes for the youth involved. The results obtained in current study further support the use of CIMT in children with CP, as several overall benefits were observed following the intervention like Improvements in the Grasps Assessment was done using Besta Scale for all participants. The important clinical implication has many daily tasks requiring children to effectively grasp and manipulate objects. Several activities performed during the treatment session were specifically geared towards improving grasp; as such, it was anticipated that participants would improve in this area. This study has found that following CIMT, participants demonstrated statistically significant improvements in grasping ability.

In Case-Smith & Ramey *et al*[8] study, follow-up assessments were performed; the improvements were maintained for 6 months following the intervention.[9] According to them If children increased their spontaneous use of the affected limb, then it is reasonable to infer that

they would be more inclined to use both arms to catch themselves when balance is lost. Children with CP often experience impairments in balance and motor control due to spasticity and muscle contractures, these impairments can lead to falls. These findings support the results of the current study, and the functional implications of the improvements observed in the current study are both relevant and important. More efficient grasping capabilities would allow children to perform a variety of functional tasks with increased efficiency, including self-care tasks such as feeding and dressing; they may also allow increased participation in other activities such as play. Statistically significant improvements were observed in the Group B of the Besta Scale; this finding is consistent with previous research demonstrating improvements on standardized tests of motor performance.

Although previous studies have reported improvements on tests of standardized motor performance, and in our study we have found varying degrees of improvement using a variety of different motor activities according to Besta Scale. Present study shows that the mean of control group and experimental group, the mean value of control group is 10.40 and experimental group mean is 12.20, so experimental mean is more than the mean of control group and the standard deviation of both groups are ±3.832 and ±3.764 respectively, so experimental Standard deviation is less than control group Standard Deviation, it shows significant improvement in the findings of this study and Wilcoxon value is 0.005 this which proves the significant improvement because if the of p value is less than 0.005, then the result is significant .

5. Conclusion

The research conducted and the results obtained seem particularly important for the CIMT practice and for the organization of rehabilitation programs in the dedicated health care service. Further research is needed on these issues, since; if these results will be confirmed they could dramatically change the approach to children with hemiplegic cerebral palsy and modify sensitively their disease’s natural history.

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