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RESEARCH ARTICLE
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EFFECTS OF CLASSIC CONSTRAINT INDUCED MOVEMENT THERAPY AND ITS MODIFIED FORM ON QUALITY OF LIFE OF CHILDREN WITH HEMIPLEGIC CEREBRAL PALSY

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ABSTARCT

Objective: To see the effects of classic constraint induced movement therapy (CCIMT) and its modified form (MCIMT) on quality of life of children with hemiplegic cerebral palsy (HCP).

Methods: A RCT was conducted in NIRM hospital, Islamabad. Children (n=40) with hemiplegic CP were randomly allocated in CCIMT and MCIMT. 4-12 years old children with ipsilateral, bilateral or severely asymmetrical impairment having wrist extension (20°) and fingers flexion (10°) were included. CCIMT group received 6 hrs of daily task training of affected hand, five days a week for 3 weeks. MCIMT group received same protocol as CCIMT group for 2 weeks, but MCIMT group received 2 hrs of daily task training involving both hands, 5 days a week, for 1 week. The outcomes tools, CP (Quality Of Life) and Kid screen were used at baseline, mid and post treatment assessment.

Results: Both treatment approaches equally improved psychosocial life of children with HCP. On CPQOL tool, two domains (participation & physical health and Family health) showed significant difference (p vale=0.042 and p value=0.025 respectively) favouring the CCIMT. But there was no significant difference was found regarding other domains of tools.

Conclusion: It concluded that both treatment approaches are effective to enhance the quality of life (psychosocial life) of children with HCP.

Keywords: Constraint induced movement therapy, Cerebral palsy, CPQOL, QUEST

Trial Registration: ClinicalTrials.gov Identifier: NCT03691506
https://clinicaltrials.gov/ct2/show/NCT03691506

INTRODUCTION:

CP is a group of everlasting movement disorder caused by lack of ability of brain to control the muscles (1).Children with CP are at increased danger of psychological problems. In Hemiplegic cerebral palsy; patients have the impairments in one side of their body (upper and lower limbs) (2). These impairments (decease range of motion, strength, coordination and sensation) often affecting their bimanual activities and limit the participation.(3)

Usually, hemiplegic CP receive occupational and physical therapy services to increase the functional skill. Traditional treatment of patient with hemiplegic consists of increasing the awareness of involved limb and training the patient to integrate the affected side into the ,activities along with unaffected side.(4) CIMT is a technique to treat the hemiplegic patients that facilitates the use of hemi paretic upper limb through constrains of the unimpaired limb (5). CIMT can overcome the learned non use of impaired side through forcing the brain 'plasticity toward more physiological and effective activation pattern.(6) In recent years, classic CIMT and its different modified forms are used to treat the children with hemiplegic CP (7). Classic CIMT was initially used for adults with neurological disorders and consequent motor impairment, and involves the restraint of unimpaired UE with mitt, slings or other form of device for 90 percent of day for 15 consecutive days. The patient engages in 6 hrs of rigorous training of involved UE for 10 to 15 days using a set of tasks involving repeated actions (8). Alterations in classic procedure were made for children. The MCIMT protocols similarly include the constraint of sound limb. But there are modifications in constraint's types, intensity of treatment, dose of innervations.(9) Another type of MCIMT, in which CIMT and bimanual intensive training (BIT),both are used for treatment purpose (10).CIMT impact without a dose-equivalent comparison group showed a large effect in CP children (11) MCIMT enhanced isolated functions of hemiparetic arm better than BIT, but both methods equally improved the spontaneous hand use.(12, 13) Studies have confirmed that the children's parents receiving CIMT showed positive and sustained change in their social well-being.(14) CIMT improves the physical well –being, psychological well-being, mood and emotions.(15) Literature shows that both CCIMT and MCIMT are effective treatments to improve the UE functions and quality of life of children with CP. However conflicting evidence is present on which one of these is more effective and no final conclusion can be made to date. This study intends to add to the literature and contribute in reaching final conclusion about the superiority of either intervention. The purpose of this study was to see the psychosocial effect (quality of life) of CIMT and its modified form on HCP.

METHODS:

This study was registered on 1st October, 2018 and the first participant was randomized on 15th October, 2018. Data completion was done on 1st March 2019. It was a single blinded randomized control trail conducted in (NIRM) National Institute of Rehabilitation Medicine, Islamabad. Patients with hemiplegic CP were randomly allocated in CCIMT group (n=20) and modified CIMT group (n=20). Sample size of 40 participants, 15 in each group, was calculated by open Epitool calculator with 95 % CI, power 80% and ratio of sample size (Group II/Group I) was 1 using the primary outcome measure(16).Parents of all participants signed the informed consent form.Riphah research ethical committee approved the study. 4-12 years old children with ipsilateral, bilateral or severely asymmetrical impairment having wrist extension (20°) and fingers flexion (10°) were included. Assessment was done three times at baseline (0 week), 2nd week and at 3rd week of intervention. The outcome tools used for assessment were Cerebral Palsy (Quality Of Life) and Kid screen Test.

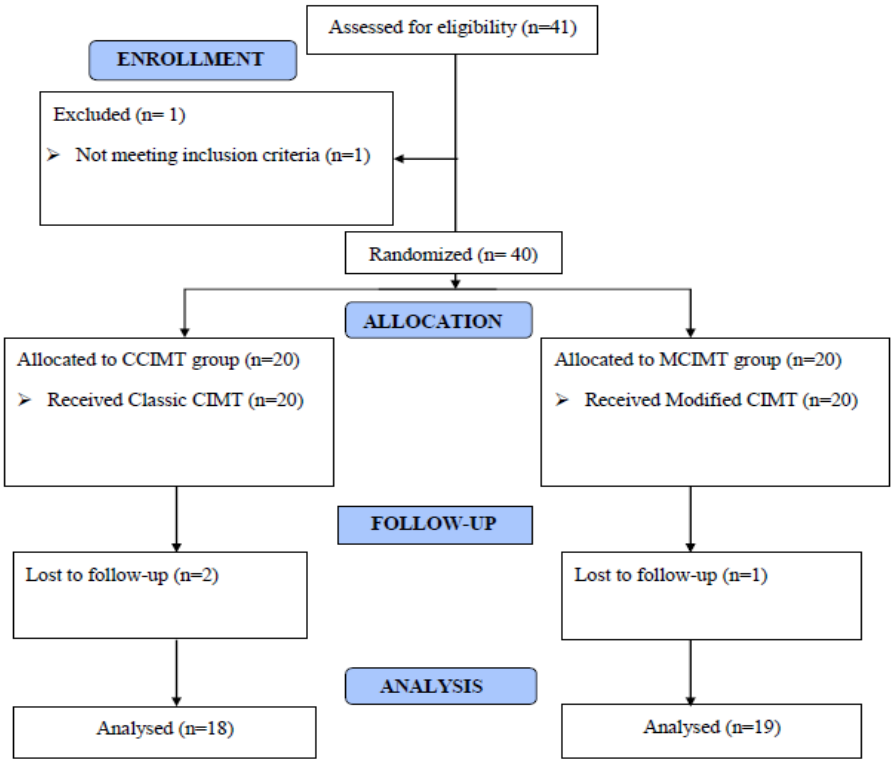

Figure 1: CONSORT Diagram

Intervention:

CCIMT group received daily task practice of impaired limb for 6 hrs. a day, five days a week, for 3 weeks and constraint of unaffected upper limb with mitt, sling for 90% of the waking hours for 3 weeks.(8) MCIMT group received same protocol as CCIMT group for 2 weeks, and received daily task training involving both hands for 2 hrs. a day, 5 days per week, for 2 week. Home setting is used for providing therapy to children with hemiplegic CP, so that children can do the practice in natural environment. Parents were guided about the timing of restraint and treatment program to be applied. Parents were answerable for their child's adherence and accomplishment of treatment plan. To ensure the progress and protocol adherence, contact was maintained with parents. Type of removable constraint was used. A mitt that was restraining the both elbow and hand was constraint by sling strapped to the trunk. For convenience of parents of children; the tasks (similar to daily activities) were given in printed form. The daily tasks to be practiced were compromised of upper extremity reach, grasp, manipulation and releasing activities and also weight bearing on UL. The participant's distribution in groups is shown below in figure 1:

Analysis:

Comparison between CCIMT group and MCIMT group was done through SPSS 21. After applying Shapiro Wilk Test for normality both parametric and non-parametric tests were applied for within group and between group analyses. Results of Shapiro-Wilk test of current study showed that for some variables, the distribution was normal so, parametric tests were applied and for other variables, the distribution of data was not normal so, non-parametric tests were applied. The P value of all the variables, except,CP(QOL), Social well-being and Feelings about function were significant ($p<0.05$).For this reason, the non-parametric test was used to assess the difference (table 1). Mann Whitney U test was applied to check the difference between two groups at baseline, 2nd week and after 3rd week of training and comparison within the group was made by applying the Friedman Test. All statistical analyses were performed through SPSS 23. The P value was non-significant ($p>0.05$) of , CP (QOL), CP (QOL) Social well-being and CP (QOL) Feeling about functioning (table 2). For this reason, the parametric test was used to assess the difference. Independent sample

T-test was applied to check the differences between two groups at baseline, 2nd week and after 3rd week of training and comparison within the group was made by applying the One Way Repeated Measure ANOVA.

RESULTS:

The mean and standard deviation (SD) of age (in years) in CCIMT group was 8.3±0.52 years and in MCIMT group was 7.63±0.49 years with 20 patients in each group. In CCIMT group, 2 children did not continue the treatment plan due to parent's problems. In MCIMT group, 1 child left the treatment due to seizures and unstable health condition. There were total 37 participants in this study, 17 males and 20 females. Group wise gender distribution was; 10 males and 8 females in CCIMT group and 7 males and 12 females in MCIMT group. Frequency of left and right hemiplegic cerebral palsy were ,5 Left hemiplegic CP, 13 right hemiplegic CP in CCIMT group and 12 right hemiplegic CP,7 Left HCP in MCIMT group.

After applying the treatments for three weeks, mid and post treatment scores were taken. Total scores of all outcome measures (Table 1) showed non-significant difference ($p > 0.05$). There was a significant difference ($p<0.05$) for participation & physical health and family heath (CPQOL). (Table 2).While there was non-significant difference for other domain of outcome measures (Table 2).CCIMT is effective in enhancing the participation& physical health and family heath (CPQOL) while there was no superiority observed of CIMT over MCIMT in CPQOL(social well being, feelings about functioning, emotional well being, access to services, pain & impact of disability). Both treatments had an equal effects on the psychosocial life of children.

Table 1: Shows the mean and SD of CPQOL and Kid screen with P-values.

Variables	CCIMT Group Mean ± SD	MCIMT Group Mean ± SD	P –value
CP (QOL) 0 week	47.4 ± 6.7	53.4 ± 5.9	0.033
CP (QOL) 2 week	48.5 ± 6.7	54.2 ± 5.8	0.021
CP (QOL) 3 week	52.4 ± 7.5	57.4 ± 5.6	0.0I9
Kid screen 0 week	65.5 ± 10.5	63.1 ± 13.1	0.935
Kid screen 2 week	67 ± 9.9	66 ± 17	0.692
Kid screen 3 week	76 ± 8.5	78 ± 10	0.533

Table 2: Domains of CPQOL of CCIMT and MCIMT groups with p-values

Variables	CCIMT (Mean ± SD)	MCIMT (Mean ± SD)	P Value
SW at 0 week	56.2 ± 10.3	58.5 ± 12.3	0.616
SW at 2 week	56.3 ± 10.4	59.4 ± 11.4	0.553
SW at 3 week	60.1 ± 11.4	62.3 ± 11.1	0.867
FAF at 0 week	50.2 ± 11.5	56.2 ± 10.4	0.162
FAF at 2 week	51.4 ± 11.4	56.1 ± 10.6	0.287
FAF at 3 week	55.3 ± 11.3	59.2 ± 10.6	0.234
PPH at 0 week	50.4 ± 13.4	58.3 ± 9.6	0.083
PPH at 2 week	50.4 ± 13.1	58.3 ± 9.8	0.083
PPH at 3 week	55.3 ± 12.3	62.1 ± 8.8	0.042*
EWB at 0 week	62.4 ± 7.9	66.2 ± 10.9	0.658
EWB at 2 week	62.4 ± 7.9	66.1 ± 10.9	0.341
EWB at 3 week	65.4 ± 8.1	68.3 ± 9.8	0.310
AS at 0 week	47.2± 11.1	57.4 ± 11.5	0.012
AS at 2 week	48.5 ± 10.4	58.4 ± 10.6	0.012
AS at 3 week	52.3 ± 10.4	61.4 ± 8.5	0.012
PID at 0 week	14.4 ± 10.6	19.5± 11.9	0.216
PID at 2 week	14.5 ± 10.3	19.2 ± 11.9	0.216
PID at 3 week	14.8 ± 10.4	19.4 ± 11.9	0.216
FH at 0 week	61.3 ± 8.6	67..3 ± 6.2	0.081

FH at 2 week	61.3 ± 8.7	68.4 ± 6.3	0.03*
FH at 3 week	65.4 ± 8.2	70.3 ± 7.2	0.02*

SW: Social well-being FAF: Feelings about functioning
PPH: Participation & physical health EWB: Emotional wellbeing & self-esteem
AS: Access to services PID: Pain & impact of disability
FH: Family health

DISCUSSION:

Overall, results of this study showed that both treatment approaches are effective, because there was no statistically significant difference ($p>0.05$) was found between the groups although within group analysis showed significant ($p<0.05$) results. Both treatments had beneficial effects on the psychosocial life of children.(21) CCIMT is effective in enhancing the participation & physical health and family heath (CPQOL) while there was no difference observed between CCIMT and MCIMT in others domains of CPQOL(7).

In domains of CPQOL a statistically significant difference was found between the groups regarding participation & physical health and family health, favoring the CCIMT; but there was no significant difference in other domains of CPQOL between the groups. In all the domains of CPQOL, equally significant improvement was found in both groups at each follow-up period. Although, total mean score of CPQOL of both groups was improved after intervention.(24) Both groups showed significant improvement on Kid screen 27 at different time intervals (2nd and after 3rd week), but there was no significant improvement between the groups. In past a study was conducted on HCP, to see the effect of rigorous UL rehabilitation on quality of life. Leanne Sakzewski compared the CCIMT and BIM training. According to literature, there was a improvement in perception of Participation & Physical health and Feelings about functioning in both groups after interventions, a change was appeared in Family heath in BIM not in CIMT (25). It also showed the change in mood and emotions on Kid screen 52 in CIMT group. Both past and present studies followed the same treatment protocols (6 hours a day).

This study has some limitations which need consideration, this study lacked the dose-response relationship is between treatment outcome and amount of both less-affected limb restraint and more-affected limb training. A major concern in the practitioner community is that there are strong pressures to recommend only the amount (intensity) of rehabilitation therapy for which health care payers are currently willing to reimburse.

CONCLUSION: The study concluded that CCIMT participation, physical and family health of CP children than MCIMT. Finally, it is concluded that both treatment approaches can be used to improve the psychosocial life (quality of life) of children with HCP under supervision.

Declaration of interest: None.

Financial Disclosure: None.

Ethical Approval: From Riphah Research Ethical Committee, Riphah International university Islamabad

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