

Effect of Constraint Induced Movement Therapy Versus Motor Relearning Programme to Enhance Upper Limb Motor Function In Stroke Patients: A Quasi Experimental Study

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Abstract:-

Objective: Effect of constraint induced movement therapy versus motor relearning programme to enhance upper limb motor function in stroke patients

Design: Quasi experimental study

Settings: The present study was conducted at OPD of University College of Physiotherapy, Faridkot, IPD and OPD of Department of Neurology and Neurosurgery of Guru Gobind Singh Medical College and Hospital, Faridkot, Punjab.

Participants: A total of 30 post-stroke patients with upper limb impairment were randomly allocated into two equal groups comprises 15 patients each. Group A received constraint induced movement therapy and Group B received motor relearning programme. The total duration of intervention was 1 hour per session and frequency of 8 weeks, with 5 sessions per week.

Main Outcome Measures: The outcome measures included were Motor Assessment Scale (MAS) and Modified Rankin Scale (MRS).

Results: The present study revealed that both parameters within the groups had significantly improved in the preintervention analysis. However, post-intervention scores of all the parameters of Group A revealed considerable high improvement at a significant level of ($p < 0.05$) when compared to Group B.

Conclusion: Group A (CIMT) shows significantly more improvement as compared to group B (MRP) in terms of motor function and degree of disability.

Keywords:- Constraint Induced Movement Therapy, Hemiplegia, Motor Relearning Programme, Stroke.

I. INTRODUCTION

A stroke is defined as "rapidly developing clinical indications of focal (or global) impairment of brain function, lasting longer than 24 hours or resulting in death, with no clear cause other than of vascular origin" by the World Health Organisation in 1970 [1]. Stroke is the most prevalent neurological condition that can be fatal and is the leading cause of adult long-term disability worldwide. In India, stroke is a significant health issue [2]. Worldwide, stroke is thought to cause 4.5 million fatalities each year. In India, it is anticipated that stroke prevalence rates will vary from 84–262/100,000 in rural areas to 334–424/100,000 in urban areas. Ischemic strokes accounted for 73% of instances, intracerebral haemorrhages for 21.7 percent and subarachnoid haemorrhages for 4% [3].

Stroke may result in paralysis, difficulty walking, blurred vision, slurred speech, numbness or weakening of the muscles, confusion or stiff muscles etc. The rehabilitation of the upper extremities is challenging. Although many therapy, including the Neuro developmental Technique (NDT), splinting, biofeedback, and electrical stimulation, have been established, it is still unknown which method is best for regaining upper limb function. To improve motor function in the hemiplegic upper extremity there are two frequently used therapies which includes Motor Relearning Programme (MRP) and Constraint-Induced Movement Therapy (CIMT) [4]. Exercises that focus on a particular task are typically regarded to benefit stroke victims since they are believed to encourage brain plasticity [5]. Around 1982 in Australia, Janet H. Carr and Roberta Shepherd created the Motor Relearning Programme (MRP) [6]. This approach includes a number of motor learning theory ideas and provides practical instructions for reinforcing functional skills (such as balanced sitting, sitting and standing, transfer skills, and walking) [7].

II. MATERIALS AND METHODS

A. Participants

The study included a total of 30 patients, aged 40 to 65 years, with MMSE score more than 23, both sexes with ischemic and hemorrhagic stroke and involvement of unilateral side with duration between 1 to 6 months, and Brunnstrom stages 4 and 5. Patients with visual or auditory impairments, mental impairment, any musculoskeletal disorder, multiple strokes, neoplasms, uncontrolled hypertension, high blood sugar levels and patients who have already undergone any neurosurgical procedures (craniotomy, epilepsy surgery, brain aneurysm surgery) were all excluded from the study.

B. Study Procedures

The patients signed consent forms after being divided into two groups (Group A and Group B) having 15 patients each. Group A was the experimental group, where all patients received constraint induced movement therapy along with conventional physiotherapy for 8 weeks, with 5 sessions lasting an hour each. In Group B, which was also an experimental group, all patients received motor relearning programme for 8 weeks, with 5 sessions lasting an hour each. In order to compare results, patients were assessed on the first day of treatment and once more at the end of the fourth month after completion of the treatment. The outcome measures were Modified Rankin Scale (MRS) and Motor Assessment Scale (MAS).

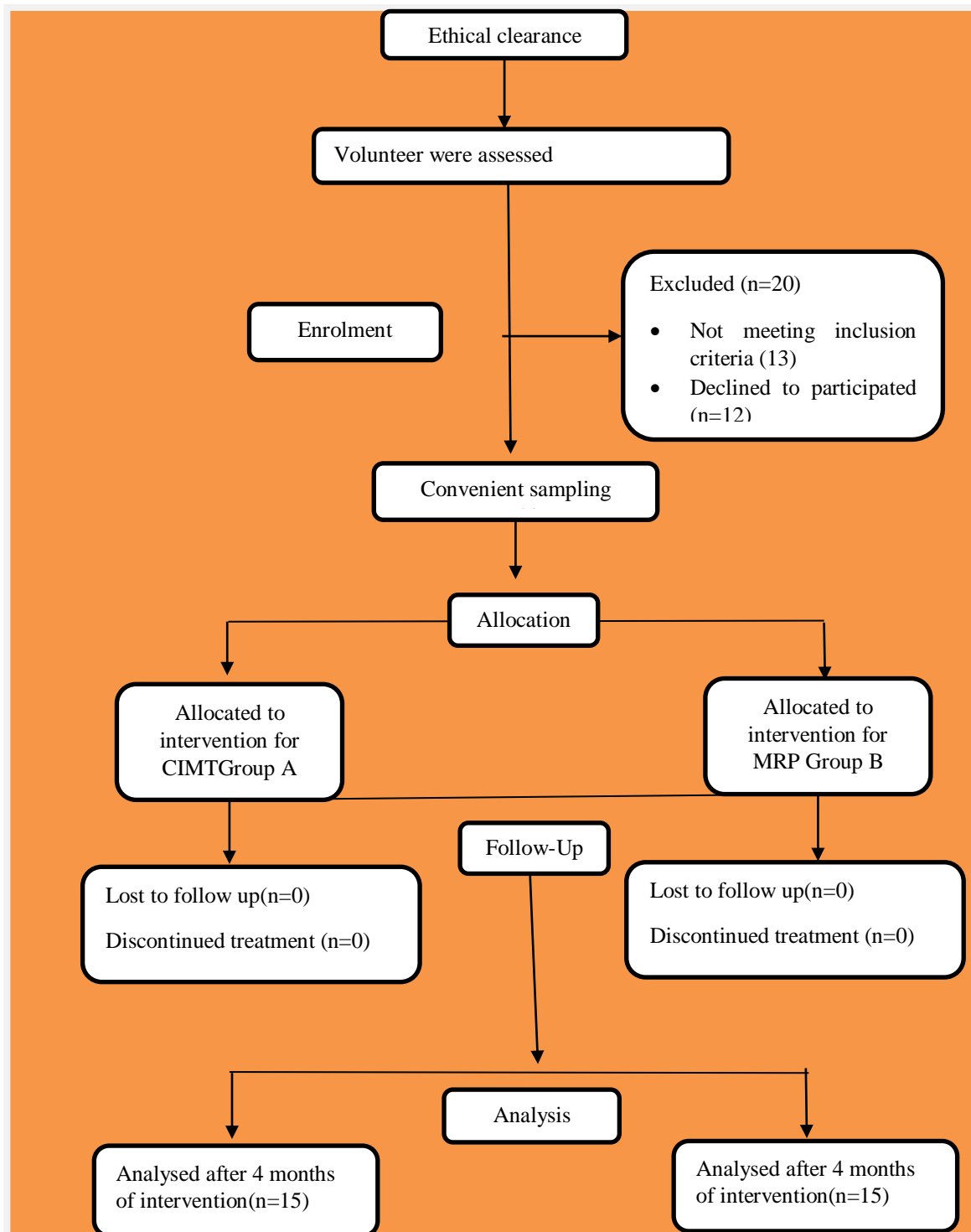


Fig. 1: Consort flow diagram

C. Intervention

➤ **Group A- Experimental Group**

• **CIMT [3]**

It received constraint induced movement therapy which included 40 sessions for 1-hr in eight weeks (5 days/week). Constraint Induced Movement Therapy includes the following treatment plan:

- ✓ Straight push-ups: Set a water bottle on a table, then use the affected arm to slide across the surface and strike the bottle with your fist.

- ✓ Pushing a button: Pushing practise using your affected hand to press buttons.
- ✓ One-sided stretches: Start by leaning forward and resting your injured arm on a cane.
- ✓ Avoid using your non-affected hand when turning the pages of a magazine and use your affected hand instead.
- ✓ To keep your unaffected hand from getting involved, you might find it useful to cover it with an oven mitt. Simply flipping your hand up and down while saying "palm up, palm down" is a good place to start.

- ✓ Get comfortable using your affected side to open doors. Depending on the design of your door knob, you may need to use some strength in the hand that is affected.
- ✓ Locate a ball that is no larger than a tennis ball. Next, set goals so you have something to shoot for. Practise throwing the ball at your targets by grabbing the ball with the affected hand.

➤ *Group B-Experimental Group*

- MRP [3]

It received Motor Relearning Programme which included 40 sessions for 1-hr in eight weeks (5 days/week)

Motor Relearning Programme includes the following steps as the treatment plan:

- ✓ Analysis of task
- ✓ Observation
- ✓ Comparison
- ✓ Analysis

- Practice of missing components
- ✓ Explanation-identification of goal
- ✓ Instruction
- ✓ Practice-verbal and visual feedback + manual guidance

- Practice of task
- ✓ Explanation-identification of goal
- ✓ Instruction
- ✓ Practice-verbal and visual feedback + manual guidance
- ✓ Re-evaluation
- ✓ Encourage flexibility

- Transference of training
- ✓ Opportunity to practice in context
- ✓ Consistency of practice
- ✓ Organization of self-monitored practice
- ✓ Structural learning environment
- ✓ Involvement of relatives and staff

- Training Programme (specific motor task) to improve upper limb function
- ✓ To elicit muscle activity and train motor control for reaching and pointing .
- ✓ To elicit muscle activity and train motor control for manipulation to train wrist extension.
- ✓ To train palmar abduction and rotation of the thumb (opposition).
- ✓ To train opposition of radial and ulnar sides of hand.
- ✓ To train manipulation of objects.
- ✓ To improve the use of holding objects for daily uses.

III. DATA ANALYSIS

The data analysis was done using SPSS (version 20). Paired t-test and unpaired t-test were used to compare the effects of constraint induced movement therapy and motor relearning programme to enhance upper limb motor function in stroke patients.

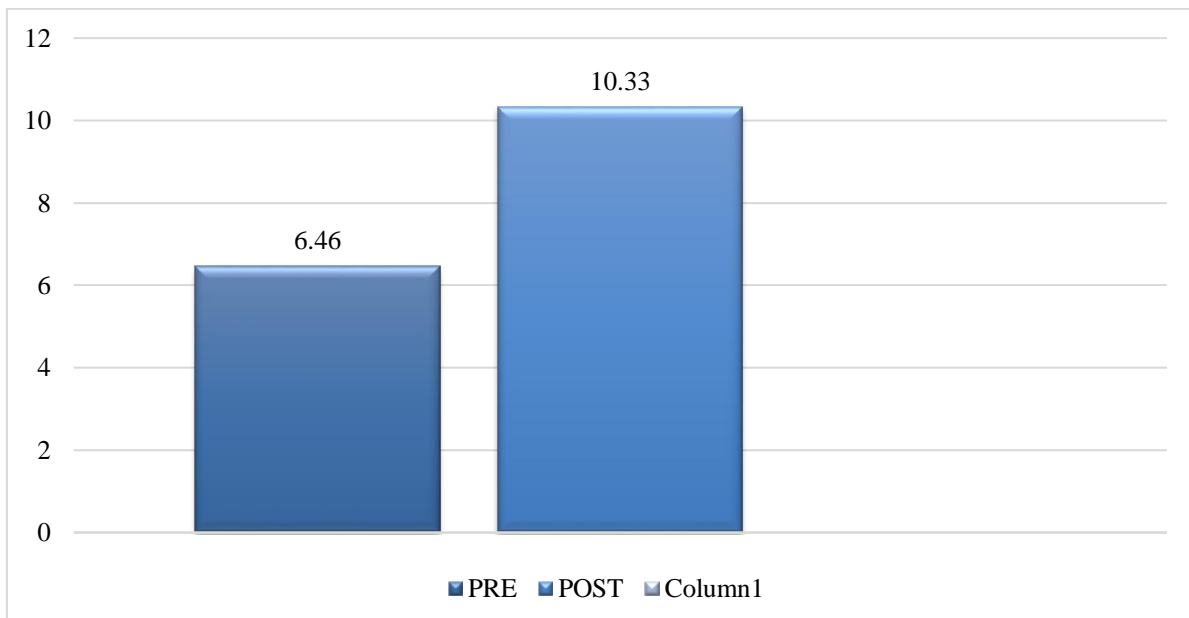


Fig. 2: Graphical representation of comparison of MAS of Group A at 0th month and after 4th month

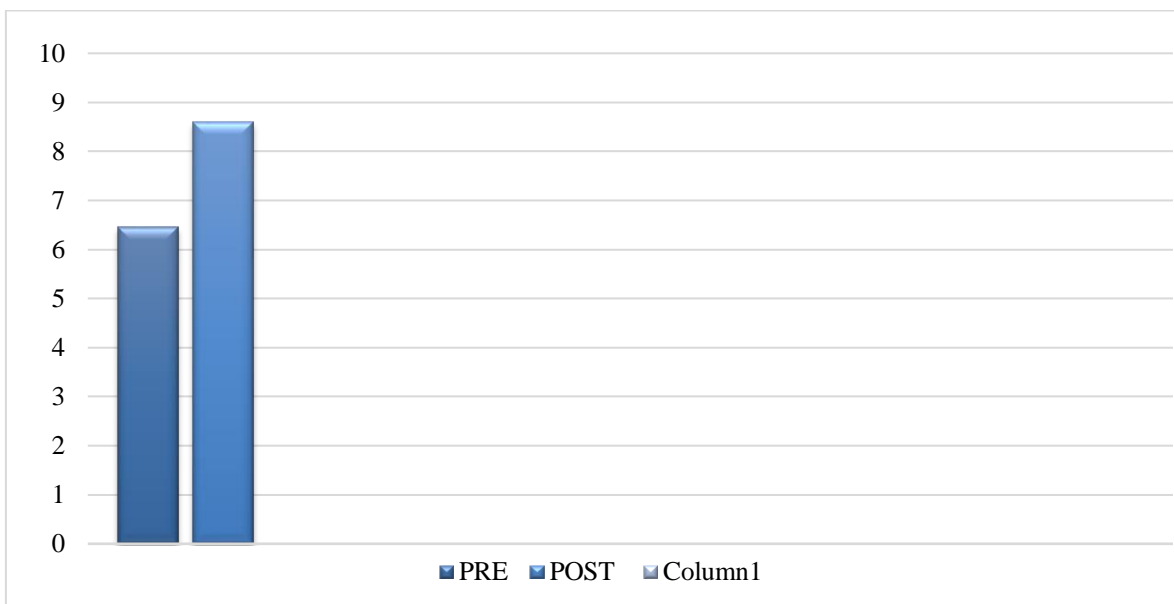


Fig. 3: Graphical representation of comparison of MAS of Group B at 0th month and after 4th month

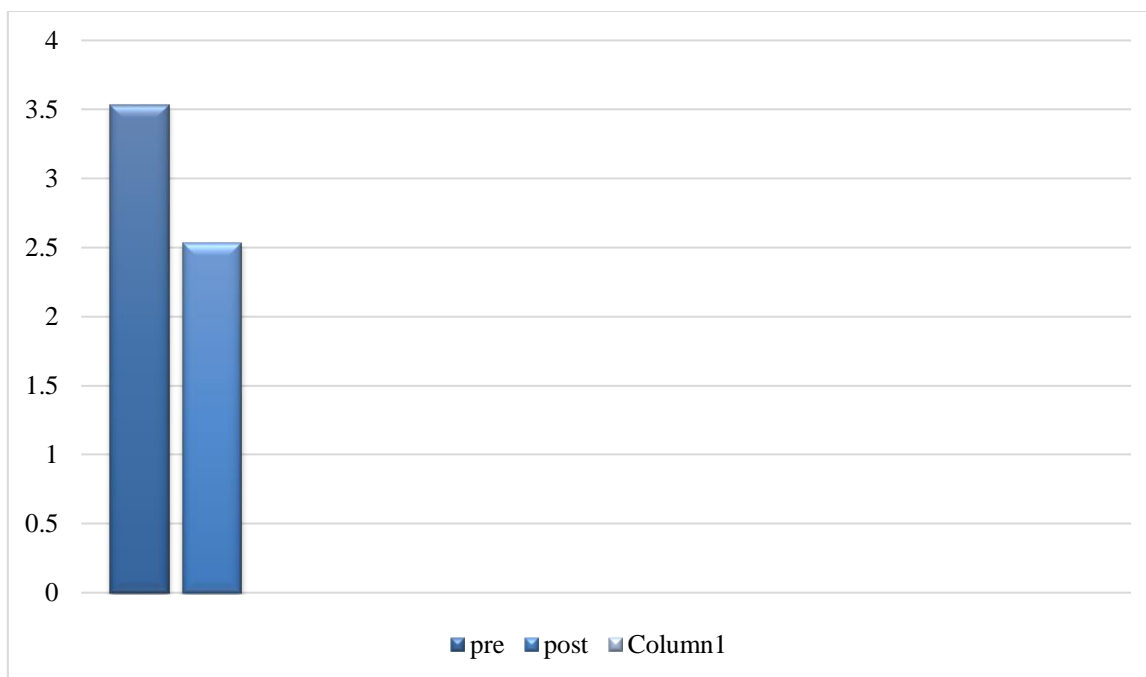


Fig. 4: Graphical representation of comparison of MAS of Group A at 0th month and after 4th month

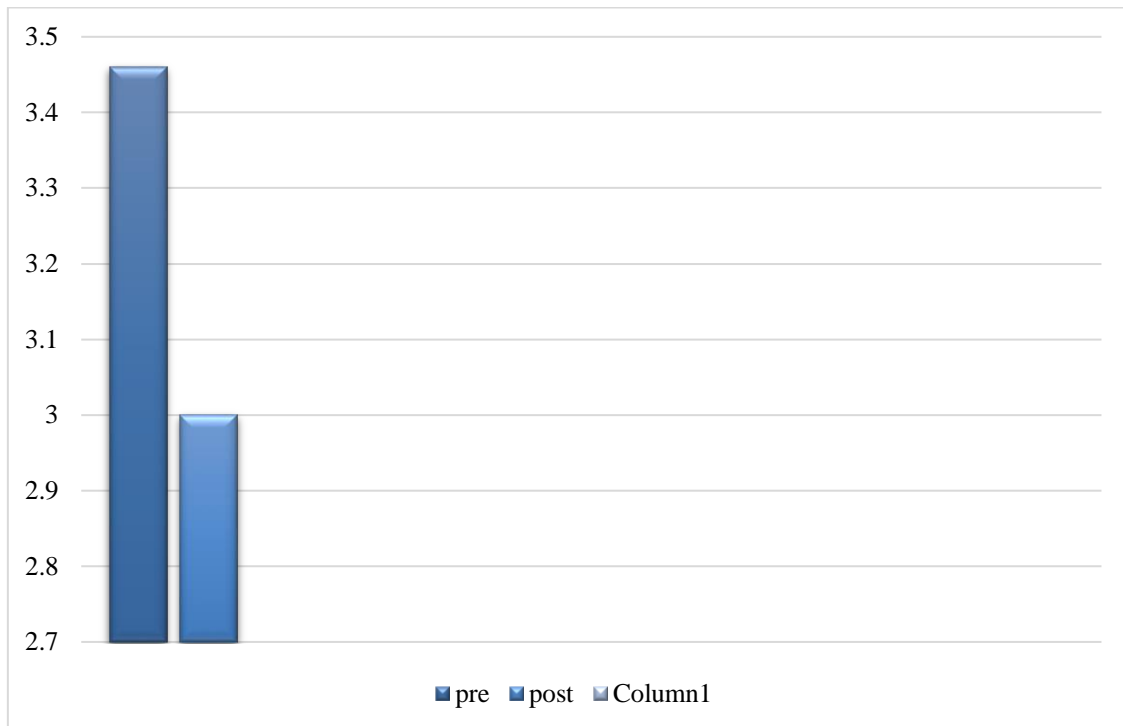


Fig. 5: Graphical representation of comparison of MRS of Group B at 0th month and after 4th month

IV. RESULT

In both the groups, there were significant differences between pre-treatment and post-treatment mean scores of MAS and MRS (as shown in fig.1.2 and 1.3), however the mean scores of Group A (CIMT) improved significantly more as compared to Group B (MRP) (as shown in figure 1.4 and 1.5)

After 4 months of treatment, individuals who received Constraint Induced Movement Therapy performed better than the patients who received MRP.

V. DISCUSSION

In order to improve motor function of the hemiplegic upper extremity in patients with stroke, this study demonstrated the superiority of constraint-induced movement therapy (CIMT) over the motor relearning programme (MRP). Upper extremity rehabilitation is more successful when CIMT is started within two weeks of the stroke's onset. The findings of the current study provide more credence to the idea that functional recovery following a stroke may happen between three and six months later.

The findings of this investigation are consistent with a study by Myint et al. (2008) that demonstrated significant improvements in the motor function of the hemiplegic arm after 2 weeks of intervention and 12 weeks of follow-up in the CIMT group. However, no follow-up was done in the current investigation after 4 months.[8]

The results of the Taub et al. (2006) study revealed that the CIMT group improved significantly more when compared to the placebo group.[9]

The results of the study by Sana Batool et al. revealed that the CIMT group significantly improved when compared to the MRP group. The current study's findings indicated improvements in both groups, although the CIMT group showed a considerable improvement.[4]

VI. CONCLUSION

The finding of this study showed that Group A which was treated with CIMT shows significantly more improvement as compared to group B which was treated with MRP in terms of motor function and degree of disability.

A. Limitations of Study:

- Sample size is small
- Duration of treatment is short

B. Future scope of study:

- To assess the impact of CIMT in the acute and chronic post-stroke population, more research is required.
- Studies including patients from both rural and urban background should be included.
- The limitations of study provide scope for further research and opportunities to expand knowledge.
- The age of stroke patients in inclusion criteria can be less than 40 years.
- Further, there is scope for randomized control trials with large sample size and longer duration of interventions to improve the quality of evidence.

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