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Effect of Constraint Induced Movement Therapy on Upper Extremity Function for Patients with Cerebro Vascular Accident

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ABSTRACT

AIM

To analyse the effect of Constraint Induced Movement Therapy for patients with Cerebro Vascular Accident

OBJECTIVES

- *To evaluate the upper limb functions for patients with Cerebro Vascular Accident and*
- *To train constraint induced movement therapy for patients with Cerebro Vascular Accident*

PROCEDURE

- *From PMR OPD, 14 diagnosed post stroke subjects satisfying the selection criteria were taken for this study. Informed consent was obtained from the subjects after detailed explanation about the study.*
- *The subjects were randomly assigned into two groups – Group A (Experimental group) and Group B (Control group) and assessed by using Wolf Motor Function Test.*

All the subjects were administered by conventional therapy along with that Group A were trained by constraint induced movement therapy combined with conventional rehabilitation of the affected limb. Post functional outcomes were evaluated using the same parameter.

RESULT

On comparing the mean values of Group A and B wolf motor function test 31.04 and 8.99 (in seconds) and, 18.71 and 4.58 (FAS), Group A shows statistically significant level of improvement in the score when compared with Group B. The result shows significant level of improvement in wolf motor function test (in seconds and functional ability score) through Constraint induced movement therapy for post stroke patients.

CONCLUSION

Through this study, it is concluded that Constraint induced movement therapy (CIMT) was more effective in the treatment of upper extremity function for patients with Cerebro Vascular Accident

KEYWORDS

Constraint Induced Movement Therapy (CIMT), Occupational Therapy (OT), Cerebrovascular Accident (CVA), Wolf Motor Function Test (CVA)

1. INTRODUCTION

Stroke is a complex dysfunction caused by lesion in the brain leads to long term disability, there are constant advances in the understanding of the condition, assessment and intervention techniques. Occupational therapy is a vital component in the rehabilitation of patients with this condition. It is vital to understand the condition and the theoretical basis for intervention.

Approximately 75% of stroke survivors are left with motor dysfunction. Although this motor dysfunction is improved to some extent after rehabilitation, large proportions (30-60%) of patients are left with persistent impairment of upper extremity movements. The recovery process of the upper extremity function is often slower than the lower extremity function mainly because, patients with stroke and unilateral upper extremity dysfunction may progressively avoid using the more affected arm in favour of the non-paretic upper extremity. Therefore functional recovery is affected and a learned non use phenomenon is formed. Even after recovery, about 20% of the stroke survivors are unable to perform independent purposeful movements including the motor behaviours necessary in activities of daily living such as placing, pulling, lifting, holding, feeding, dressing, reaching, writing and carrying. Those patients tend to rely on their unaffected arm to perform the ADL's leading to "non-use" of the affected upper extremity with progressive suppression of movements persistent reliance on one side of the body which may also result in certain consequences such as overuse syndrome, pain, frustration and embarrassment.

2. STROKE

The World Health Organization (WHO) defines stroke as "an acute neurological dysfunction of vascular origin with symptoms and signs corresponding to the involvement of focal areas of the brain." Stroke results in upper motor neuron dysfunction that produces hemiplegia or paralysis of one side of the body, including the limbs and trunk and sometimes the face and oral structures that are contralateral to the hemisphere of the brain with lesion. Acompanying the motor paralysis and maybe a variety of dysfunctions other than the motor paralysis, some of these dysfunctions include sensory disturbances, cognitive and perception dysfunctions, visual disturbances, personality and intellectual changes, and a complex range of speech and associated language disorders. The neurologic deficits must persist longer than 24 hours to be labelled CVA. (Pedritti 7th edition)

3. Constraint Induced Movement Therapy (CIMT)

Though various therapeutic approaches have been employed to improve hand function with varying outcomes, the upper extremity weakness gradually improves but the actual use of arm for function is often less than the potential use.

To overcome learned non use, Edward Taub proposed "Constraint Induced Movement therapy"(CIMT), which involves intense functional oriented practice with paretic upper extremity, along with restraint of the unaffected upper extremity. The original CIMT devotes six or more hours of therapy and constraining of the intact arm for 90% of waking hours per day and over a period of two weeks. Researchers observed that such a schedule of CIMT is exhausticant possibly resulting in non compliance. Hence a modified, shorter version of CIMT (CIMT) have been designed and tried to overcome such limitation.

This emphasizes mass practise with the affected upper limb and training the limb by shaping movements. This compelled repetitive movements of the affected limb induce cortical reorganisation and therefore said to improve actual use of arm for hand function6. However the efficiency of modified constraint induced movement is not well established by clinical studies. Hence, this study intends to investigate the effectiveness of modified constraint induced movement therapy on hand function in post stroke patients.

4. NEED FOR THE STUDY

Many people suffer from cerebrovascular accident with lack of hand function, which lead to functional impairment. The main purpose of the study was to find out effectiveness of constraint induced movement therapy and to enhance the hand function

subconsciously through constraint induced movement therapy.

5. REVIEW OF LITERATURE

Sajid Ali et al., (2018) conducted a randomised clinical trial study to investigate that the constraint-induced movement therapy is a potential treatment for improving upper limb function in 40 stroke patients .Group A (n=20) patients received task oriented movement therapy and group B (n=20) received constraint induced movement therapy. The measurement was taken at baseline, after 1 and 2 months. The study concluded that the constrained-induced movement therapy is a potential treatment for upgrading motor limit of upper limb activities step by step in patients with stroke.

Nicola Samania et al., (2017) conducted a randomized control trial to investigate the reduced intensity modified constraint induced movement therapy versus conventional therapy for upper extremity rehabilitation patients after stroke. Group A (n=33) patients received conventional therapy and group B (n=33) received mCIMT along with conventional therapy. The patient was assessed with wolf motor function test, the motor activity log and the ash worth scale before and after treatment and 3 months later. The study concludes that constraint induced movement therapy may be more effective than conventional rehabilitation in improving motor function and use of the paretic arm in patients with chronic stroke.

Kamrul Hasan et al.,(2016) conducted a quasi-experimental study on efficacy of CIMT to improve upper limb function after stroke. A convenient sample of 30 stroke patients were taken into the study and assigned into group A (n=15) and group B (n=15). Then the clinical evaluation of upper extremity function was measured by voluntary control test of upper extremity and fugl-meyer functional test and berg balance scale respectively. It concluded that the constraint induced movement therapy can be effective to improve upper extremity function.

Ching- Yi Wu et al., (2007) conducted a randomised control trial of modified constraint induced movement therapy for elderly stroke survivors, to study the changes in motor improvement, daily functioning and quality of life. 26 patients received either modified constraint induced movement therapy and traditional rehabilitation for period of 3 weeks. Outcome measures included the fugl-meyer assessment, FIM instrument, motor activity log and stroke impact scale. This study suggest that modified constraint induced movement therapy is a programming aspects of HRQOL in elderly patient with stroke.

6. METHODOLOGY

STUDY SETTING

Upper limb rehabilitation, occupational therapy section, Division of physical medicine Rehabilitation, RMMC&H, Annamalai university, Annamalai Nagar

INCLUSION CRITERIA

- Post stroke subjects with hemiparesis irrespective of age/ gender/ side affected.
- History of single stroke.
- Subjects who are able to understand and follow commands.
- Subjects who are able to maintain sitting position for more than 45 minutes.
- Capability of extending the affected hand against gravity (wrist-20 degrees, fingers-10 degrees).
- Ability to move the affected arm 45 degrees of shoulder flexion and abduction, and 90 degrees of elbow flexion and extension.

EXCLUSION CRITERIA

- Patient with shoulder subluxation
- Chronic illness and co- morbidity
- Psychiatric illness
- History of other neurological deficits.

PROCEDURE

- From PMR OPD, 14 diagnosed post stroke subjects satisfying the selection criteria were taken for the study. Informed consent was obtained from the subjects after detailed explanation about the study.
- The subjects were randomly assigned into two groups – Group A (Experimental group) and Group B (Control group) and assessed by using Wolf Motor Function Test.
- All the subjects were administered by conventional therapy along with that Group A were trained by constraint induced movement therapy combined with conventional rehabilitation of the affected limb. Post

functional outcomes were evaluated using the same parameter.

SAMPLE AND STUDY DESIGN

Simple random sampling with Quasi experimental study design were selected for this study.

TREATMENT PROTOCOL

Conventional Occupational Therapy**:** Duration: 45 minutes per day, includes the following activities, Active and Passive range of motion activities, strengthening activities Balance and ADL training.

Constraint Induced Movement Therapy:

Duration: 45 minutes per day, 5 days per week for 12 weeks.

Activity encouraged with arm sling on unaffected upper extremity, includes, Peg board activities, Ball activities, Pincher exercise using clay, Exercise using towel, Exercise using cards..

Duration of this study, 3 months (60 sessions, 5 sessions / week)

7. DATA ANALYSIS

TABLE 1: AGE DISTRIBUTION, DURATION AND SIDE INVOLVEMENT

	MEAN	±S.D
AGE	56.71	12.74
Duration	8.43	6.92
Side involvement	No of Subjects	Percentage
Right	8	57.1
Left	6	42.9
Total	14	100

Table 1: It is inferred from table 1 that the mean age of study patients was 56.71±12.74 years. The mean duration of the condition was 8.43±6.92. Right side involvement was observed as 57.1% and left side involvement was observed as 42.9%.

TABLE 2(A):

WOLF MOTOR FUNCTION TEST in seconds – PRE AND POST COMPARISON (GROUP A)

WOLF MOTOR FUNCTION TEST	MEAN	± S.D	t-VALUE	p-VALUE
PRE THERAPY	87.84	4.71	15.73	0.001
POST THERAPY	56.79	3.94		
MEAN DIFFERENCE	31.04			

Above table shows pre and post comparison of wolf motor function test. The pre test wolf motor function test score mean was 87.84±4.71. The post test wolf motor function test score mean was 56.79±3.94. So the pre and post mean difference value was 31.05, the calculated t-value, 15.73 and p value 0.001 at level of 5% significance. The result shows that there is significant improvement inwolf motor function test score after treatment.

2 (B): GRAPHICALREPRESENTATION ON COMPARISON OF PRE AND POST SCORE OF WOLF MOTOR FUNCTION TEST in seconds (GROUP A)

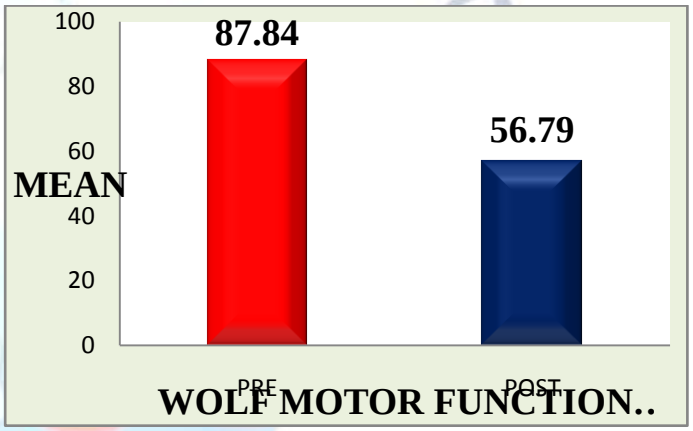


TABLE 3 (A):

COMPARISON OF FUNCTIONAL ABILITY SCORE-BEFORE AND AFTER TREATMENT (GROUP A)

FUNCTIONAL ABILITY SCORE	MEAN	±S.D	t-VALUE	p-VALUE
PRE THERAPY	28.86	7.38	9.00	0.001
POST THERAPY	47.57	8.85		
MEAN DIFFERENCE	18.71			

Above table shows pre and post test of functional ability score. The pre test functional ability score mean was 28.85±7.38. The post test function ability score mean was 47.57±8.85. So the pre and post mean difference value was 18.14, the calculated t-value 9.00 and p value 0.001 at level of 5% significance. The result shows that there is significant improvement in functional ability score after treatment.

3(B): GRAPHICAL REPRESENTATION ON COMPARISON OF PRE ANDPOST TEST OF FUNCTIONAL ABILITY SCORE (GROUP A)

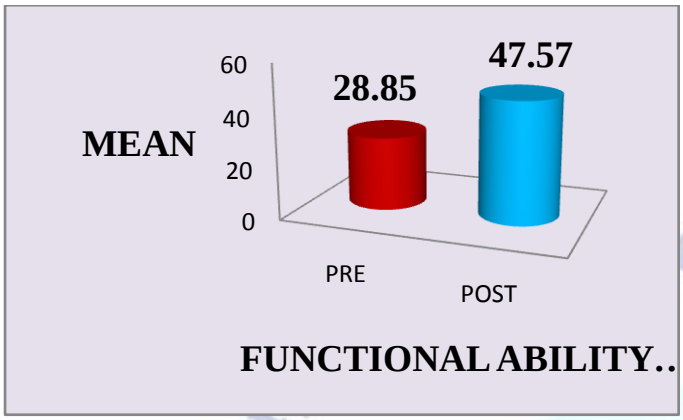


TABLE 4 (A):
WOLF MOTOR FUNCTION TEST in seconds –PRE AND POST COMPARISON (GROUP B)

WOLF MOTOR FUNCTION TEST	MEAN	± S.D	t-VALUE	p-VALUE
PRE THERAPY	71.77	10.35	6.79	0.001
POST THERAPY	62.77	7.20		
MEAN DIFFERENCE	8.99			

Above table shows pre and post comparison of wolf motor function test. The wolf motor function tests free score mean was 71.77±10.35. the wolf motor function test post score mean was 62.77±7.20. So the pre and post test mean difference value was 8.99, the calculated t-value, 6.79 and p-value 0.001 at level of 5% significance. The result shows that there is significant improvement in wolf motor function test score after treatment.

4 (B): GRAPHICAL REPRESENTATION ON COMPARISONOF PRE AND POST SCORE OF WOLF MOTOR FUNCTION TEST in seconds (GROUP B)

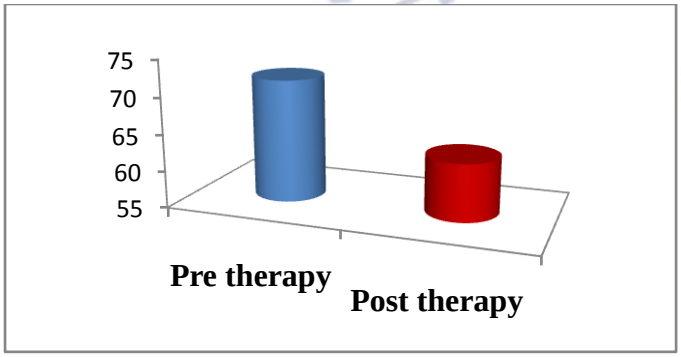
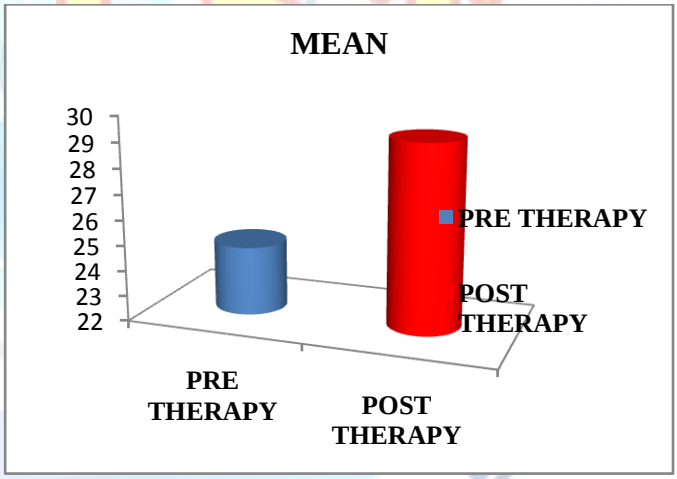


TABLE 5 (A): COMPARISON OF FUNCTIONAL ABILITY SCORE – BEFORE AND AFTER TREATMENT (GROUP B)

FUNCTIONAL ABILITY SCORE	MEAN	±S.D	t-VALUE	p-VALUE
PRE THERAPY	24.71	1.80	12.39	0.001
POST THERAPY	29.29	0.95		
MEAN DIFFERENCE	4.58			

Above table shows pre and post comparison of wolf motor function test. The wolf motor function tests free score mean was 24.71±1.8. The wolf motor function test post score mean was 29.29±0.95. So the pre and post test mean difference value was 4.58, the calculated t-value, 12.39 and p-value 0.001 at level of 5% significance. The result shows that there is significant improvement in wolf motor function test score after treatment.

5 (B): GRAPHICAL REPRESENTATION ON COMPARISON OF PRE AND POST TEST OF FUNCTIONAL ABILITY SCORE



8. RESULT

On comparing the mean values of Group A and B's wolf motor function test 31.04 and 8.99 (in seconds) and, 18.71 and 4.58 (FAS), Group A shows statistically significant level of improvement in the score when compared with Group B. Thus, the result shows significant level of improvement in wolf motor function test (in seconds and functional ability score) through Constraint induced movement therapy for post stroke patients.

LIMITATION AND SUGGESTION

- Sample size was too small to generalize the stroke population.
- The study could not examine the long term efficacy of CIMT due to limited time and resources. Therefore, future studies can be conducted on long duration and sustainability can also be studied.

9. CONCLUSION

Through this study, it is concluded that Constraint induced movement therapy (CIMT) was more effective in the treatment of upper extremity function for post stroke patients.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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