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EFFECTS OF CONSTRAINT INDUCED MOVEMENT THERAPY VERSUS CONVENTIONAL REHABILITATION ON REACH TO GRASP MOVEMENT AND FUNCTIONAL PERFORMANCE OF UPPER EXTREMITY ON PATIENTS AFTER STROKE. RCT.

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ABSTRACT
Background and Purpose: The purpose of this study is to demonstrate the application of constraint-induced movement therapy with an individual with upper-extremity hemiparesis within 3 months after sustaining a cerebrovascular accident (stroke). Such patients often fail to develop full potential use of their affected upper extremity, perhaps due to a "learned nonuse phenomenon." On each weekday of the 15-day intervention period, the patient spent 6 hours being supervised while performing tasks using the paretic upper extremity. Pretreatment, post treatment, and 5-month follow-up outcome measures included the Wolf Motor Function Test. **Methodology:** Thirty-four patients who complete selection criteria were included to this study. Written informed consent were taken from every individual participating in this study before performing any physical examination. Patients were allocated into two equal groups. On 1st day pain was assessed by using Numeric pain scale and motor functioning by Wolf Motor Function Test. Group A treated with Constraint Induced Movement Therapy while Group B treated with Conventional Therapy Both groups also received conventional physical therapy that remained the same throughout the study. All conventional treatment exercises were given by researcher himself. Patients received heat pack for 10 minutes. Treatment frequency was 3 times a week. Duration of treatment was 3 weeks in both groups. Subjects were examined on 1st day, and by the end of 3th week. **Results:** The comparison of the pre- and post-treatment scores on the NPRS and WMFT for groups A and B demonstrated that CIMT was considerably effective in reducing pain and increasing functional activity in stroke patients. **Conclusion:** CIMT is more effective when combined with conventional treatment in management of stroke as compared to only use of conventional treatment.

KEYWORDS: Constraint induced movement therapy (CIMT), Stroke, Randomized Controlled Trial RCT.

1. INTRODUCTION
Stroke is a metabolic disease that significantly impairs people in their working years. The results of neurological impairments and the failure of the medical rehabilitation procedure lead to the development of disability. One of the reasons for this failure is post-stroke discomfort. Pain is an unpleasant mental and physical experience for a patient who has had a stroke. On the other hand, range of motion obstacles could make the medical rehabilitation process unsuccessful.[1]

A variety of pathogenic causes can induce a stroke, which is a diverse condition that disrupts cerebral blood flow (CBF). Reduces in blood flow to brain tissue (measured in milliliters of blood per 100 grams of tissue per minute) lead to subsequent cellular death and tissue loss because of insufficient oxygen1, which impairs motor, cognitive, and linguistic abilities in stroke survivors.[2]

One of the most prevalent and debilitating illnesses, stroke ranks second in the world in terms of causes of death, accounting for around 5.5 million deaths globally in 2015. It is also a major contributor to disability.[3] Comprehending the entire pathophysiology of ischemic stroke is crucial, as it pertains to both the acute and subacute phases as well as the chronic phase that occurs in the months and years after an ischemic event. The prolonged detrimental impact of stroke on After a stroke, the brain's vasculature also experiences severe injury and remodeling, which can lead to alterations that worsen the chronic pathology of stroke.[4]

To address these issues, stroke therapy employs two main intervention types: restorative and adaptive.The goal of restorative therapies is to restore normal body structures and functions in order to address stroke-related disability. Adaptive interventions seek to maximize capacity to perform significant tasks by modifying the task's environment or methodology.[5] Most stroke patients need rehabilitation after their initial hospital stay in order to maximize their functional capacities and avoid declining in their involvement in activities.[6]

Up to 77% of stroke survivors experience hemiparesis in their upper extremities. It increases the strain on caregivers and society as a whole and has a significant impact on functional independence2, 3.3–5 A lot of upper extremity rehabilitation techniques concentrate on motor functioning rather than how that limb is used on a regular basis for functional tasks outside of the lab. Nevertheless, spontaneous arm use during daily tasks has a greater impact on quality of life than motor ability, 7 making it a crucial factor to take into account for patient-centered therapy.[7]

Increasing the capacity of stroke survivors to engage in meaningful roles and everyday activities requires improving UL function. To enhance UL function, rehabilitation specialists must offer strategies that are supported by research. In order to support neuroplasticity and overcome learned non-use of the damaged UL, constraint-induced movement therapy is advised for stroke survivors who can demonstrate at least 10 degrees of active wrist and finger extension.[8]

Although it has been demonstrated that constraint-induced movement therapy (CIMT) is practical and promising, the long-term results are yet unknown.[9] The three main elements are (i) rigorous graded practice with the affected hand and arm, (ii) hand constraint to promote the use of the affected arm, and (iii) a behavior change transfer package to promote the generalization of arm usage in daily life.[10]

Based on neurological principles and brain plasticity theory, it is envisaged that repeated functional ability training will be able to recover disrupted functional abilities.[11]

The usage of the affected side is encouraged in CIMT, a representative behavioral rehabilitation strategy, in order to maximize the likelihood of neurological recovery.4 Nevertheless, issues with its practical application have surfaced, including the temporary difficulty with independent living, the increased risk of falls, and the strain on patients due to the rigorous training and restricted use of the unaffected side.[12]

Stroke is a very familiar problem after 30 years. Stroke leads to multiple dysfunctions depending upon severity of lesion. It may decrease the range of motion and leads to functional dependency or disability. Physical therapy is important in the management of stroke including Strengthening, Stretching, ROMs and Manipulation and Constraint Induced Movement Therapy. This study provided an opportunity to share my personal experience with community. This study was conducted purely in clinical setting of Physiotherapy Department Mayo Hospital, Lahore. The outcome of this study is of great value in treating stroke patients, which is a great contribution to the health care system of Pakistan.

2. METHODOLOGY

Study Design was Randomized Control trial. Study Setting was Single Centered and data was collected from Physiotherapy Department Mayo Hospital Lahore. It was Purposive non-probability sampling. Study duration was 5 months.Sample Size was 34 patients.

Inclusion Criteria •Age from 30 to 50 years •Enrollment of patient to experience ischemic stroke prior to 3 months(sub-acute) •Paretic upper limb passively have: 90 degree shoulder flexion and abduction 45 degree external rotation 30 degree at elbow extension •Paretic upper limb actively have: 45 degree of shoulder extension 30 degree elbow extension	**Exclusion Criteria** •Sensory impairments •Aphasia, cognitive impairments •Musculoskeletal problem •Excessive pain

10 degree wrist extension 10 degree finger extension 10 degree thumb abduction adduction	

The number of patients required for this study is calculated prior to ensure sufficient statistical power. Power estimates are based on a prior study investigating the effect of improvements in WMFT Tool. This reveals that a sample size of minimally 34 patients will be necessary.

Subjects were randomly assigned to 2 groups.
The experimental group, receiving constraint induced movement therapy. n=17.
The control group, receiving only the conventional rehabilitation program. n=17.

To allocate patients to one of these groups, occupational therapists who were blinded to the research perform allocation based on a computer generated random number. There was 5 sessions per week for 20 mints…. And patients received 25 sessions each.

Tasks of Experimental group
1. Wrist flexion and extension
2. Forearm supination and pronation
3. Wrist flexion and extension
4. Counting, opposition, tapping, squeezing
5. Pick up coin or bean
6. Flip a card
a. Put block into bucket

Complex Tasks
- Placing peg on a board
- Coping shapes
- Toys picking
- Pick spoons
- Eating

Conventional Treatment
- ROMs
- Active assisted ROM
- Passive ROM
- Postural correction exercises
- Stretching
- Strengthening
- Resistance training
- Mobilization

RESULTS
Table 1 depicts the demographic data of study. Group A having 6(41.2%) males and 11(58.8%) females while 11 (58.8%) male and 6 (41.2%) females enrolled in group B.Age distribution of individuals in Group "A, B" with mean ageof Group A were 53.345±9.360, Group B were 57.453±8.536. In group A, 12 patients were right sided, 5 was left side while group B were 5 right sided and 12 were left sided.

Comparison of Numeric pain rating scale and WMFT score of group A has shown that there was significant difference between pre and post treatment score, pretreatment mean NPRS and WMFT score were 9.500±0.870 , 17.90±2.68 and post treatment were 3.96 ±0.49, 68.90±5.39 with the P value of 0.00, showing that CIMT was significant in reducing pain and increasing functional activity while group B has shown that NPRS, WMFT score were 9.60 ±0.870, 17.87±2.76 and post treatment were 7.67± 0.86, 38.90±3.10 with the P value of 0.00, showing that conventional treatment was also increase functional activity in patients of stroke but not more than group A.

Table 1: Descriptive statistical analysis (N=17) experimental & control group.

	Experimental group Mean (SD)	**Control group Mean (SD)**
Gender	6/11	11 /6
Age	53.345±9.36043	57.453±8.53625
Side Involved	12(R)/5(L)	5(R)/12(L)

Table 2: Mean values of Experimental group and the control group.

Variables	**Experimental Group**		**Control Group**		
	Pre value	**Post value**	**Pre value**	**Post value**	**P-value**
NPRS	9.500±0.870	3.96 ±0.49	9.60 ±0.870	7.67± 0.86	0.00
WMFT	17.90±2.68	68.90±5.39	17.87±2.76	38.90±3.10	0.00

4. DISCUSSION
In my study, total 34 patients were included. There were two groups of patients each having 17 patients. One group was treated with Constraint Induced Movement Therapy along with conventional therapy and Second group was treated with Conventional treatment only. The patients were treated for three weeks and progression was assessed at the end of treatment. The pain and

functional status were assessed by WMFT scale and NPRS scale. The aim is to enhance and restore functional ability of patients with stroke. The patients were assessed for change in pain intensity on the basis of visual analogue scale (0 representing no pain and 10 the most severe pain imaginable by the patient), and ability to do task present in WMFT scale.

I have seen maximum functional ability in patients after the application of CIMT with treatment rather than conventional treatment alone. Functional improvement was above 80% in patients after complete follow up of 3 weeks with combination of CIMT plus conventional treatment.

The aim of the present study was to elucidate a comparison between the impact of CIMT and conventional treatment in patients with stroke. Results showed that both CIMT and conventional treatment are efficacious in treatment. However, CIMT and conventional physical therapy has proven to be more efficacious than conventional physical therapy. While Conventional physical therapy program solely found less efficacious than CIMT. CIMT was invaluable when performed well. It used to increase the arm movements and decrease the pain associated with it. A supposition has been made about conventional treatment stated that its impact may be increased by increasing local circulation, facilitating the muscles, providing a positional stimulus to the skin, muscle, or joints providing proper afferent input to the central nervous system.

These results concurred with the results reached by Steven L. Wolf, in his study compare the effects of a 2-week multisite program of CIMT vs usual and customary care on improvement inupper extremity function among patients who had a first stroke within the previous 3 to 9 months. Main Outcome Measures The Wolf Motor Function Test (WMFT), a measure of laboratory time and strength-based ability and quality of movement (functional ability),and the Motor Activity Log(MAL), a measure of how well and how often 30common daily activities are performed. Results From baseline to 12 months, the CIMT group showed greater improvements than the control group in both the WMFT Performance Time (decrease in mean time from 19.3 seconds to 9.3 seconds [52% reduction] vs from 24.0 seconds to 17.7 seconds.[13]

Stock et al aimed to compare the long-term effects of CIMT applied 6 months after stroke with the results of CIMT applied within 28 days post stroke. Both groups received standard rehabilitation and were tested at 5 time points. The results revealed that both groups showed significant improvements after 12 months. No significant differences between the 2 treatment groups were found before and after the delayed intervention group received CIMT at 6 months and during the 12-month follow-up. Both groups showed only minor impairment after 6 months. The first group showed an initially faster recovery curve of Wolf Motor Function Test (WMFT), Nine-Hole Peg Test (NHPT), and Modified Rankin Scale (MRS) scores. The authors concluded that commencing CIMT early is as good as delayed intervention in the long term, specifically in this group of patients who might have reached a ceiling effect during the first 6 months after stroke.[14]

Gyrd Thrane (2015) in his study show the Efficacy of Constraint-Induced Movement Therapy in Early Stroke Rehabilitation. Objective. To evaluate the effect of a modified CIMT within 4 weeks post stroke. Methods. This single blinded randomized multisite trial investigated the effects of CIMT in 47 individuals who had experienced a stroke in the preceding 26 days. WMFT score was significantly better in the CIMT group compared with the control group. Moreover, posttreatment dexterity, as tested with the NHPT, was significantly better in the CIMT group, whereas the other test results were similar in both the groups. At the 6-month follow-up, the 2 groups showed no significant difference in arm impairment, function, or use in daily activities. Conclusions. Despite a favorable effect of CIMT on timed movement measures immediately after treatment, significant effects were not found after 6 months.[15]

5. CONCLUSION

When CIMT is used in conjunction with traditional treatment, rather than solely using conventional treatment, stroke patients respond better to treatment.

6. Recommendations: Constraint Induced Movement Therapy technique greatly affect the functional activity and modulate pain. This method is non-invasive, effective and require fewer hospital/ clinic visits for a sufficient early response. Further research on a larger scale is recommended.

8. Competing Interests: There are no competing ideas declared by the authors. The study's findings are given simply and honestly, with no exaggeration, manipulation, or improper deletion of information.

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