



## COMPARATIVE STUDY BETWEEN THE EFFECT OF TRADITIONAL UPPER LIMB REHABILITATION AND MODIFIED CONSTRAINT INDUCED MOVEMENT THERAPY IN STROKE

Mohan Raj Manjalavil<sup>1\*</sup>, Sooraj Rajagopal<sup>2</sup> and Sreedevi Menon Parappil<sup>3</sup>

Department of Physical Medicine & Rehabilitation, Govt. Medical College, Kozhikode

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### ABSTRACT

**Background:** Upper limb impairment is the major challenge faced by stroke survivors. Modified constraint induced movement therapy (mCIMT) is a new intervention which enhances motor recovery better than the traditional rehabilitation treatment.

**Objective:** To compare between the effects of traditional upper limb rehabilitation and its combination with modified constraint induced movement therapy in patients with stroke.

**Methods:** Thirty stroke patients having involvement in the middle cerebral artery territory were included in this study. The patients are divided into two groups of 15 each. Group A patients were given traditional upper limb rehabilitation, while Group B patients traditional rehabilitation and mCIMT. Patients are assessed by Fugl Meyer and Action Research Arm tests of the affected hand, initially and at the end of rehabilitation.

**Results:** Significant improvements in functional activities are noticed in both the clinical scales used, mainly in Group B.

**Conclusion:** In post stroke patients, the combination of traditional upper limb rehabilitation along with mCIMT is significantly better than the traditional upper limb rehabilitation alone.

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### INTRODUCTION

Stroke also called “apoplexy” is previously thought to be delivered by Gods. A stroke, or cerebrovascular accident, is defined by this abrupt onset of a neurologic deficit that is attributable to a focal vascular cause<sup>1</sup>. It is noted that the long-term survival of the post-stroke patients are improving even though incidence rate is reducing. So the prevalence of stroke in the population has stayed the same or has increased. Stroke units provide both acute management and subsequent rehabilitation<sup>2</sup>.

The functional demands of upper limbs and lower limbs are different. Lower limb will be relatively functional if patient can maintain extended position, whereas the upper limb relies mainly on the fine motor control of the hand for activities of daily living<sup>3</sup>.

Earlier upper limb rehabilitation was focussed on strategies where the intact upper limb was used to compensate for the activities of the affected upper limb.

But now there are studies which suggest that the injured brain has the potential for extensive reorganization<sup>4</sup>. So rehabilitation intervention can enhance motor recovery in the impaired upper limb. One such intervention is constraint induced movement therapy (CIMT).

The Constraint Induced Movement Therapy” was proposed by a behavioural neuroscientist, Dr. Edward Taub. He showed that use of affected limb can be augmented by forced use of impaired limb by constraining the intact upper limb. Randolph Nudo has corroborated these findings by showing that the normal and injured primate brain is capable of cortical reorganization in response to behavioural interventions<sup>5</sup>. These are the basic principles in the CIMT. Constraining normal limb for 90% of the waking hours for 2 weeks is impractical. So modified CIMT (mCIMT) which provides less intensive therapy was introduced. Here, there is constraining of normal limb is for 5hrs/day for 5 days/week.

Hence, we decided to conduct this study in order to compare between the effects of traditional upper limb rehabilitation and its with combination with modified constraint induced movement therapy in patients with stroke.

\*Corresponding author: Mohan Raj Manjalavil

Department of Physical Medicine & Rehabilitation, Govt. Medical College, Kozhikode

## AIMS AND OBJECTIVES

To compare between the effects of traditional upper limb rehabilitation and its combination with modified constraint induced movement therapy in patients with stroke.

## MATERIALS AND METHODS

### Settings

Tertiary care multi speciality hospital.

### Study Design

A single blinded comparative study

### Subjects

Out of 30 post stroke patients attending a tertiary care multi speciality hospital in Kozhikode, Kerala selected, 15 patients were given traditional upper limb rehabilitation and the rest a combination of traditional rehabilitation along with modified constraint induced movement therapy.

### Inclusion criteria

1. Patients having post stroke in the middle cerebral artery region between 1-2 months.
2. Patients with preserved cognition
3. Patients having minimum of 10 degrees of active finger extension and 20 degrees of active wrist extension
4. Patients who give valid consent

### Exclusion Criteria

1. Patients with intracerebral haemorrhage and multi infarcts.
2. Patients with contractures of upper limb.
3. Patients with recurrent stroke.
4. Patients with neglect and global aphasia.
5. Patients with upper limb pain.

## METHODS

30 post stroke patients who gave valid written consent and satisfying the inclusion criteria were included in this study. After clinical examination the diagnosis is confirmed by CT brain. The patients are then divided into 2 groups A and B with equal number of patients. Group A patients are given traditional upper limb rehabilitation which includes mobilisation exercises for the involved joints and muscles, strengthening of recovering muscle groups, activities to improve hand function and sensory facilitation training to involved upper extremity. Group B patients are given first traditional upper limb rehabilitation and mCIMT program. This mCIMT program consists constraining of normal limb for 5 hours daily for 5 days/week over a period of 4 weeks. The constraining is done by wearing a mitten. The patients in the both groups are assessed before starting and after completion of treatment. The results are analysed.

### Study Tools

1. Fugl - Meyer Assessment scale
2. The Action Research Arm Test

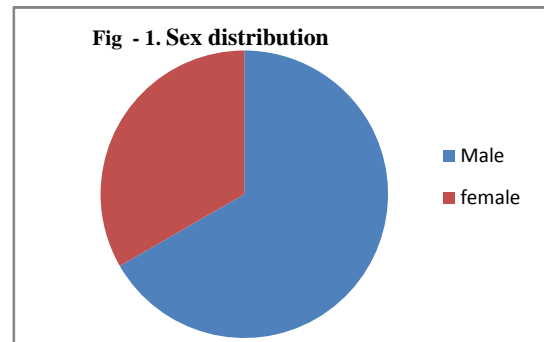
### Analysis of Data

Analysis and interpretation of the data was carried out using SPSS statistical software. Arithmetic mean and paired T test was used for comparing the effects before and after treatment in both the groups.

## RESULTS

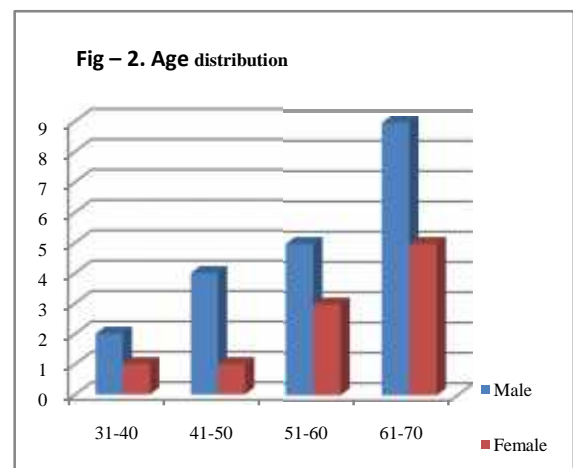
### Sex distribution

As shown in Fig - 1, out of 30 patients, 20 patients were male and 10 female.

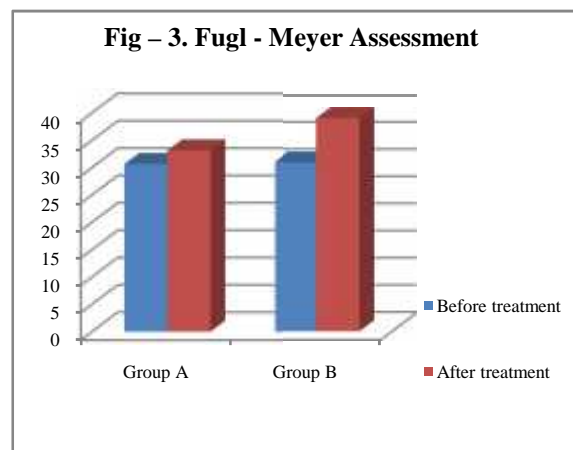


### Age distribution

As shown in the Fig - 2, the main age group affected are between 60 -70 yrs.

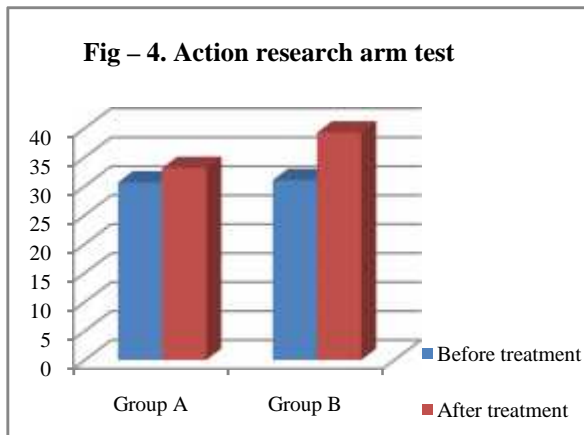


### Fugl-Meyer Assessment Scale



As depicted in the Fig - 3, there is improvement in scores seen in both groups after treatment, with significant improvement in the Group B. Arithmetic mean of Group A before treatment is 35.2 and after treatment are 37.06. The paired t test shows p value of .036433 which is significant. Arithmetic mean of Group B before treatment is 35.86 and after treatment are 43.13. The paired t test shows p value < .00001 which is highly significant.

### Action Research Arm Test



As depicted in the Fig - 4, Arithmetic mean of Group A before treatment is 30.66 and after treatment are 33.13. Here the paired t test shows p value of .021974 which is significant. Arithmetic mean of Group B before treatment is 31.06 and after treatment are 39.26. Here the paired t test shows p value < .00001 which is highly significant.

### DISCUSSION

Stroke is the third leading cause of death in the United States; it is exceeded only by cardiovascular disease and cancer<sup>6</sup>. Stroke is mainly a disease of old age relatively uncommon before age 50 but doubling each decade after age 55. Stroke is more common among men than among women, but after the age of 85, it is more common among women<sup>7</sup>. In our study, the main age group affected is between 61-70 years (43%) and males (67%) are more commonly affected than females (33%).

In the past 20 years there is a transformation in the therapeutic approach to the rehabilitation in patients with stroke. Upper limb function improvement is a major challenge faced by stroke survivors and the rehabilitation team. In patients with upper motor neuron lesion, the muscle strength does not correlate with performances on functional tasks<sup>8</sup>. Motor recovery is mainly training dependent, responding mainly to repetitive practice along with continuous modification of the program<sup>9</sup>.

The CIMT protocol combines the constraining of the normal upper limb and training of the affected arm and hand. In the original CIMT, the intact limb is constrained for 90% of waking hours and there is a therapy of 6 hours or more per day. In the modified CIMT, intact limb is constraint for 5h/day for 5 days/week and 3 hr therapy three times per week over 10 weeks. It has been noted in the article by Wu CY *et.al* that modified CIMT is a promising intervention for improving motor function, daily function, and physical aspects of quality of life in elderly patients with stroke<sup>10</sup>. Stephen J *et.al* stated that the addition of CIMT to traditional rehabilitation program in stroke patients delivers maximum improvement of upper extremity function in post stroke patients<sup>11</sup>.

In this study, we used the modified CIMT for a period of 4 weeks for Group B patients, along with the traditional upper limb rehabilitation.

Fugl-Meyer AR *et.al* has designed a motor scale for the assessment of upper extremity which includes motor, sensory and passive joint motion<sup>12</sup>. In this study, we used the motor component of Fugl Meyer Assessment (FMA). The other test used in this study is the Action Research Arm Test (ARAT) which has four subsets: Grasp, Grip, Pinch and Gross movement<sup>13</sup>. We found that at the end of treatment, there is improvement in both groups especially significant in the CIMT group.

### CONCLUSION

In post stroke patients, the combination of traditional upper limb rehabilitation along with mCIMT is significantly better than the traditional upper limb rehabilitation alone.

### Implications

CIMT along with traditional upper limb rehabilitation can be started in the acute and sub acute post stroke patients.

### Ethics & Human Subject Issues

There has been no procedure which directly or indirectly causes injury to the patients. Valid written consent is taken before the enrolment in the study.

### Budget

Financial burdens were not met by the patients.

### Limitations of The Study

1. Small sample size.
2. Study is conducted in a tertiary hospital.
3. Follow up after treatment is necessary.

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