

## Effect of Mirror Therapy in Improving Hand Function in Subacute Stroke Patients

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### Abstract

*Aims and Objective:* The purpose of the study was to find out the effect of mirror box therapy in improving hand function in stroke patients. *Method:* Fifteen stroke patients were recruited in the study, all within 12 months after the stroke. The patients underwent thirty minutes of mirror therapy program a day in addition to 50 minutes of conventional stroke rehabilitation program, 5 days a week, for 4 weeks. The assessment was done pre intervention and post-intervention using Upper limb score of Fugl Meyer Test. *Results:* Fugl Meyer Assessment mean score of the Group (pre intervention: 21.53, post intervention 40.26). *Conclusion:* Mirror therapy is effective in improving hand function in stroke patients.

**Keywords:** Mirror Therapy; Hand Function; Stroke.

### Introduction

Stroke is the leading cause of serious long-term disability in adults [1,2]. The high incidence and high prevalence of stroke have a major impact on society [3]. Treatment of upper extremity of people with hemiplegia continues to be a challenge [4]. Several methods of exercise therapy for the rehabilitation of stroke patient are in common use today [5]. Mirror therapy have been used in therapy for stroke and hemiparesis [1,6-9], complex regional pain syndrome [10,11], following fractures [10,11], and brain tumour [10,13], and experimentally for the control of pain from a real stimulus [10]. This study focuses on mirror therapy for improving hand function in stroke patients.

### Methodology

A sample of convenience of 15 patients (males- 8 and females- 7) with first episode of unilateral stroke confined to territory of middle cerebral artery with hemiparesis during the previous 12 months [1,6,7],

with no severe cognitive disorders [1,6,13], Brunnstorm score between stages I and IV for the upper extremity [6] having age between 50 - 65 years [15] were included in the study. Patients with previous strokes, major hemorrhagic changes, increased intracranial pressure, hemicraniectomy or orthopedic, rheumatologic, or other diseases interfering with their ability to sit or to move upper limb [7], Patients with unilateral neglect, apraxia [7] and severe psychiatric disorders such as major depression [16] were excluded from the study.

### Procedure

An informed consent was taken from the subjects and detailed explanation of the procedure was given. The patients underwent 30 minutes of mirror therapy program [6,13] a day in addition to 50 minutes of conventional stroke rehabilitation program, 5 days a week, for 4 weeks [6,13,14,17]. The study was conducted at Banarsidas Chandiwala Institute of Physiotherapy. The assessment was done pre intervention and post-intervention using Upper limb score of Fugl Meyer Test [7,13]. The FMA uses a 3-point ordinal scale to assess the level of sensorimotor function in the affected UE. We used only the UE motor function items. The maximum total motor score is 66, with higher scores indicating better motor recovery.

### Results

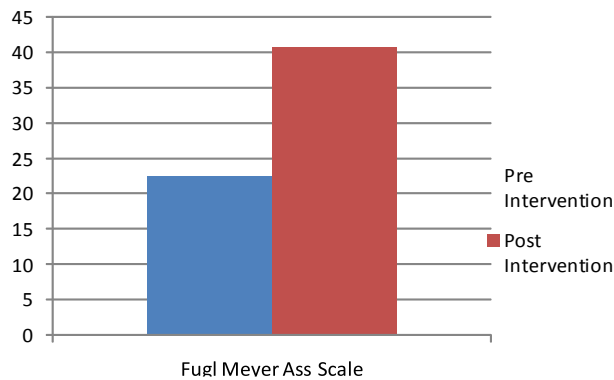
On comparing Fugl Meyer Assessment mean scores pre and post intervention of the group (pre

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intervention: 21.53, post intervention 40.26) it was found that there was post intervention improvement in Group.



## Discussion

The results show that all the patients performed better on Fugl Meyer scale post intervention.

Several underlying mechanisms for the effect of mirror therapy on motor recovery after stroke have been proposed. It is thought that Mirror therapy uses mirror visual feedback which increases neural activity in areas involved with allocation of attention and cognitive control (dorsolateral prefrontal cortex, post cingulated cortex, S1 & S2 precuneus).

There is also little evidence that mirror visual feedback activates the mirror neuron system. Mirror visual feedback increases the excitability of the ipsilateral primary motor cortex that projects to the untrained hand/ arm. There is also evidence for ipsilateral projections from the contra lateral M1 to the untrained/ affected hand as a consequence of training with mirror visual feedback. It has been shown that functional organization of the motor system, including the primary motor cortex, can be modulated by both ipsilateral limb movement and passive observation of movement of movement of the contra lateral limb.

Altschuler et al which suggested that the mirror illusion of a normal movement of the affected hand help to recruit the premotor cortex and assisting rehabilitation through an intimate connection between visual input and premotor areas; mirror neuron system, bilateral arm training [11].

Ching-Yi Wu et al support the results of this study by showing that mirror therapy can be effective in stroke patients since it is believed that these positive results post intervention could have been because of cortical reorganization. MT could provide "proper visual input" and, perhaps, "substitutes" for absent

or reduced proprioceptive input from the affected body side. MT might also facilitate self-awareness and spatial attention by activating the superior temporal gyrus, precuneus, and the posterior cingulate cortex. Consequently, the experience during MT might help recruit the premotor cortex or balance the neural activation within the primary motor cortex toward the affected hemisphere to facilitate motor improvements. The visual illusion input of the mirror reflection in MT might especially activate the damaged hemisphere. All the possible explanation points out towards the effectiveness of mirror therapy in improving hand function in subacute stroke patients.

In country like India, where the follow up of the patient and treatment cost bearing capacity of the patient is quite difficult, a therapy like Mirror Therapy is recommended since it is cost effective and easy to carry.

## Conclusion

The results revealed that mirror therapy helps in improving hand function in stroke patients.

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