

# Effect of mirror therapy on upper extremity in hemiparetic stroke

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## Abstract

**Background:** STROKE is a global health problem. it is the second commonest cause of death and fourth leading cause of disability worldwide. In stroke hemiparetic limb muscles are impaired severely. Hand control is impotent for activities of daily living after stroke. Treatment focusing on each small aspect in stroke patients is needed. Since sufficient literatures are not available in comparing the effects of hand function in mirror therapy and conventional therapy. There is a need for incorporating it in this study. **Material and Methods:** Study was conducted as a Experimental Design – Pre-test and Post-test Designs with Two Comparison Treatments. A total of 30 hemiparetic stroke patients in the age group of 45 to 70 years participated in the study. The participants who satisfied the selection criteria were selected by convenience sampling and randomly assigned into two groups. Group A received conventional therapy and Group B received mirror therapy for 48days [4sessions per week for 12 weeks (45minutes/session)]. Outcomes were measured with Upper extremity function scale and Fugal Meyer assessment scale. **Results:** All participants in group A and group B showed significant improvement in UEFS and FMA scores with a mean difference of results shows that there were significant difference between group A and Group B mean value of post treatment Trunk impairment scale of group A and Group B are 22.13 and 19.33 respectively. The t-value were 15.88n p<0.0001 these values suggest there is significant difference in giving mirror therapy in improving hand function in hemiparetic stroke patients. In FMA scores group A and group B showed significant improvement with a mean difference results shows that there were significant differences between group A and Group B. mean value of post treatment Motor assessment scale of group A and Group B are 35.93 and 40.53 respectively. The t-value were 8.12 n p<0.0001. These values suggest there is significant difference in giving mirror therapy in improving hand function. **Conclusion:** the study concluded that there is significant improvement in giving mirror therapy in hemiparetic stroke patients in improving hand function.

**Key Words:** Mirror therapy, Hemi Paretic, hand function,, Functional Outcome, hand Impairment in stroke.

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## INTRODUCTION

Stroke is “rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than of vascular origin”. Stroke contributes to a major proportion of morbidity and mortality in developed and developing countries. Stroke produces a major economic burden to both family and the

country. It is the one of the most common causes for chronic disability. About one third of the survivors is functionally dependent and experience difficulties in most of the activities of daily living (parent article)<sup>1</sup>

At least 85% of stroke patients experience hemiplegia and upper-extremity function of at least 69% of patients is damaged. Stroke is estimated at \$140,000 per patient. Nationwide, costs related to stroke are expected to reach an estimated \$62.7 billion in 2007. In 2005, the median response rate among states, based on Council of American Survey and Research Organizations guidelines, was 51.1% (range: 34.6%-67.4%)<sup>2</sup> People who sustain a stroke have upper extremity impairment and most of them do not regain functional use of their paretic upper limb, which can make them dependant in their activities of daily living. It results in the reduction in quality of life. Hemiplegic damage to upper-extremity function has critical effects on the ability to perform independent activities of daily living<sup>3</sup>. The recovery of proximal joints functions are often faster than distal joints. Activities of

daily living are much limited due to failure of recovery of distal joints even though regaining of strength and coordination at proximal joints has occurred. Thus recovery of hand function is a critical component in stroke rehabilitation<sup>4</sup> Mirror Therapy can be recommended to improve upper extremity functions in stroke patients as it is simple and inexpensive and patient directed. Hemiparesis has been treated with mirror therapy for promoting cortical changes. This method is use to the concentration of brain on movement to stimulate the motor processes that is involved in that movement<sup>5</sup> Mirror therapy used in addition to conventional rehabilitation methods was found to be effective in the development of upper extremity motor functions in stroke patients. Mirror therapy was not superior to the conventional treatment group in increases in the FIM self-care scores that we used for the evaluation of daily living activities but longer follow-up of the patients may change these results. Larger randomized controlled trials are needed to evaluate mirror therapy on the body. Mirror therapy is a simple, easy to use, and low-cost rehabilitation method for patients and staff, and it can be integrated into the home environment. So the purpose of this study to determine the difference between Conventional therapy and mirror therapy in hemiparetic patients to improve upper extremity motor recovery and functions of hand in subacute stroke patient<sup>6</sup>

## MATERIAL AND METHODS

**Study Design:** The study design was a randomized, single-blinded clinical trial with a pre- and post-test groups design.

**Study Duration:** 12 weeks

**Study Setting:** MGM Hospital Physiotherapy Out-Patient Department, Aurangabad and other private hospitals and physiotherapy centers.

### Inclusion Criteria

1. Age- 50-70 Yrs.
2. First episode of unilateral stroke with hemiparesis.
3. Duration of 2 months-12months.
4. Diagnosis of stroke with involvement of middle cerebral artery on MRI or CT scan by Neurologist.
5. According to Brunnstorm Scale up to the grade 3

### Exclusion Criteria

1. Uncontrolled Systemic Hypertension
2. Perceptual or apraxic deficits.
3. Visual deficits such as homonymous hemianopia.
4. Reflex sympathetic dystrophy.

### Study Tool:

Upper Extremity Functional Scale.

Fugal-Meyer Assessment upper Extremity

**Study Procedure:** Total 30 hemiparetic patients between age group 45 to 70 are selected for the study and they are screened through inclusion and exclusion criteria. Patients were divided into 2 groups by simple random sampling method. Whole procedure was first explained to the patients. Written consent was obtained from the patients before starting the treatment. The study passed through ethical committee. The patients were assessed with upper extremity functional scale and fugal Meyer assessment scale. In group A-patients treated with conventional therapy. Treatment given was passive range of motion exercises, stretching, strengthening, coordination, gripping, resistance training. In group B-patients treated with mirror therapy. Treatment given was passive range of motion exercises, strengthening, coordination, gripping, resistance training, Duration of the treatment was one session per day- five days in a week- for twelve weeks.

### Statistical Analysis:

**Table 1:** Comparison Of Group A And Group B-Uefs

| Test    | Mean  | Sd   | T-Test | P-Value |
|---------|-------|------|--------|---------|
| Group A | 22.13 | 3.31 | 15.88  | <0.0001 |
| Group B | 19.33 | 4.41 |        |         |

The table shows that there is comparison between group A and Group B mean value of post treatment UEFS of group A and Group B 22.13 and 19.33 respectively. The t-value were 15.88 n p<0.0001 These values suggest there is significant difference in giving mirror therapy on upper extremity in stroke patients.

**Table 2:** Comparison of group a and group b-fma

| TEST      | MEAN  | SD   | t-TEST | p-VALUE | INFERENCE   |
|-----------|-------|------|--------|---------|-------------|
| PRE -TEST | 35.93 | 3.15 | 8.12   | <0.0001 | SIGNIFICANT |
| POST TEST | 40.43 | 4.14 |        |         |             |

The table shows that there is comparison between group A and Group B mean value of post treatment FMA of group A and Group B 35.93 and 40.53 respectively. The t-value were 8.12 n p<0.0001. These values suggest there is significant difference in giving mirror therapy on upper extremity in stroke patients.

## DISSCUSSION

Rehabilitation is the most important factor after stroke. The first steps involve promoting independent movement because many individuals are paralyzed or seriously weakened. Patients are prompted to change positions frequently while lying in bed and to engage in passive or active range-of-motion exercises to strengthen their stroke-impaired limbs. ("Passive" range-of-motion exercises are those in which the therapist actively helps the patient move a limb repeatedly, whereas "active" exercises are performed by the patient with no physical assistance from the therapist.) Depending on many factors

including the extent of the initial injury patients may progress hand function. Therapists help patients who are able to perform progressively more complex and demanding tasks, such as bathing, dressing, and using a toilet, and they encourage patients to begin using their stroke-impaired limbs while engaging in those tasks. Hand motor dysfunction is a common impairment in stroke patients, as the cortical projection area of our fingers is large. Once it is damaged, it will be very difficult to restore the function, and has long been the focus and difficulty of stroke rehabilitation. Upper limb dysfunction if not immediately treated, that is within the sub-acute phase (less than 6 months) following stroke, and the following problems can develop: contractures and other soft tissue changes; chronic pain; and ingrained, abnormal, non-functional movement patterns. The more long-standing these symptoms are, the more resistant to treatment they become. Therefore, it is important to provide promising interventions prior to the onset of chronic symptoms and dysfunction<sup>12</sup>. Mirror therapy has been seen to provide encouraging results in treatment of hemiparesis. Mirror therapy can be recommended to improve upper-extremity functions in stroke patients as it is simple, inexpensive and patient-directed. The human brain is capable of significant recovery after a vascular insult. Among its sequel, hemiparesis has been treated with mirror-therapy for promoting cortical changes. This method is thought to use the concentration of brain on movement to stimulate the motor processes that is involved in that movement. It seems likely that this illusion enhances activation of the premotor and motor cortex in a similar way to action observation or motor imagery. This effect can be explained by the activation of so-called mirror-neuron system. Mirror neurons are neurons that fire when the subject performs a movement, but also during observation of the same movement by someone else, and they seem to play a central role in the process of motor re-learning by action observation. Mirror neurons constitute a part of the nervous system. Execution or observation of motor action has produced changes over the adjacent cortical penumbra area in post-stroke patients with sensorimotor disorders. When using the mirror box, these mirror neurons get stimulated and help in recovery of the affected limb<sup>13</sup>. This study shows considerable improvement of function of upper limb by mirror therapy.

## CONCLUSION

30 hemiparetic patients undergone treatment with mirror therapy and conventional therapy in improving hand function. The statistical analysis suggests that there is significant improvement in giving mirror therapy than conventional exercises in hemiparetic stroke patients. So

this study concluded that there is significant improvement in giving mirror therapy than conventional therapy on upper extremity function in stroke patients.

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