

## The synergistic effects of mirror therapy and functional electrical stimulation on hand function in severe stroke patients

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**Background and Objectives:** Mirror therapy and functional electrical stimulation (FES) are simple and less costly, and patients can perform these by themselves. Studies reported that mirror therapy made significant improvements in the Brunnstrom stage as well as functional independence measure scores of subacute stroke patients. FES makes improvements in the motor function of patients with hemiparesis such as reduced spasticity, strengthened muscles. Our study was performed to investigate the synergic effects of mirror therapy and functional electrical stimulation on hand function in severe stroke patients

**Methods:** Thirty patients with severe hemiplegia after stroke were included (13 males and 17 females). Ten patients had FES applied and simultaneously underwent mirror therapy. Ten patients had FES applied only, and ten patients underwent mirror therapy only. Each treatment was done five days per week, 30 minutes per day, for four weeks. FES was applied on the surface of the extensor digitorum communis, flexor carpi radialis, biceps brachii, and triceps brachii for hand and arm motion. Muscle tone, Fugl-Meyer assessment were evaluated before and after treatment.

**Results:** There were significant improvements in the Fugl-Meyer assessment score, as well as power of wrist and hand in all groups after treatment. The mirror combined with FES group showed significant improvements in the Fugl-Meyer scores of hand, wrist, arm, coordination and power of wrist flexion compared to the other groups. However, the power of hand flexion, extension, wrist extension showed no significant differences among the three groups. Muscle tone also showed no significant differences in the three groups.

**Conclusion:** This study showed that there is a synergic effect of mirror therapy and FES on hand function. Therefore, a hand rehabilitation strategy combined with FES and mirror therapy may be more helpful for improving hand function in stroke patients than FES or mirror therapy only.

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