

Effects of Mirror Therapy for Improving the Motor Function of Upper and Lower Extremities in Patients with Stroke – A Quasi Experimental Study

QURBA KIRAN¹, ZUBAIR AHMAD², ABDUL RAB³, MOMIN MUKHTAR⁴, ATIF MALIK⁵, MAHANOOR SHAFIQ⁶, SANA ASHRAF⁷

¹Senior Lecturer, Shalamar School of Allied Health Sciences

²Lecturer, Qasim Hospital Sialkot

³Clinical Physical Therapist, Dr. Ali Therapy Clinic Islamabad

⁴House Officer Physiotherapy Department, Shalamar Institute of Health Sciences

⁵Lecturer, University of Sargodha

^{6,7}House Officer Physiotherapy Department, Shalamar Institute of Health Sciences

Corresponding author: Qurba Kiran, Email: Qurbabutt6@gmail.com

ABSTRACT

Background: Stroke is defined as the rapid onset of focused or generalized disturbance of cerebral functions that lasts more than 24 hours. Speech issues and weakness on one side of the body are typical stroke signs and symptoms. Patients with upper limb disability following a stroke were unable to carry out particular gripping and manipulating tasks.

Objective: Determine Effects of Mirror Therapy for Improving the Motor Function of Upper and Lower Extremities in Patients with Stroke

Material and Methods: A quasi-experimental study was carried out in which the subjects in between 45-60 years, ischemic and hemorrhagic stroke male and female were recruited. Subjects were divided into two groups. In Group A tasks given, were performed by patients in front of mirror and with the unaffected limb. The mirror therapy was given 5 days a week with 50 min session and Electrical stimulation for 10 minutes. In Group B the patients were given PNF techniques for 6 weeks. The outcome tool used for evaluation of upper and lower limb assessment was Modified Fugl Meyer functional tool. The data was analyzed using SPSS.

Results: The pretest and posttest observations for motor assessment of upper, within the mean score of Group A in pre assessment was 31.47±9.67 mid assessment was 34.73±10.47 and post assessment was 238.53±10.72 (0.001) showing significant improvement with intervention of Group A. Motor assessment score in Group B in pre assessment was 36.07±11.25 mid assessment was 43.27±9.83 and post assessment was 49.47±9.48 (0.001) showing significant improvement with intervention of Group A. Motor assessment score in Group B in pre assessment was 15.27±4.56 mid assessment was 21.73±5.23 and post assessment was 28.47±4.56 (0.001) showing significant improvement with intervention of Group A at P value <.05 showing effectiveness of both techniques.

Practical Implication: This study will also help peer group in practicing and rehabilitating the stroke patients with new techniques. There is a need to incorporate easy, simple, economic, patient directed and effective treatment techniques to enhance recovery following stroke. There is less data available on comparison between conventional physical therapy and mirror therapy in the up-per limb in the past.

Conclusion: We have concluded that both the PNF and MT were effective in improving score motor function but MT were found to have better effect as compared to PNF . Patient can gain muscle control, coordination and know the limitation of movement. It ultimately reduces the muscle atrophy and disability.

Keywords: Mirror therapy, Motor function, Patient, Lower Extremity.

INTRODUCTION

A clinical illness known as stroke is defined by the sudden onset of focused or generalised disruption symptoms that continue longer than 24 hours. Vascular origin is the major cause of stroke which leads to death. Speech issues and weakness on one side of the body are the most typical stroke signs and symptoms¹. Stroke is regarded as the second largest cause of mortality and disability worldwide. As stated by global burden of illness in 2013, men get ischemic strokes more frequently than women. Since no particular population-based study has been done yet, the real incidence of stroke in Pakistan is not known. The estimated number of stroke patients in Pakistan is 250/100,000. The arms and hands are used for many daily activities, such as manipulating objects, performing specific types of garbing, and controlling the proximal and distal joints to accomplish various tasks². These particular grabbing and manipulating skills were lost by patients who had upper limb disability as a result of a stroke. It is necessary to pinpoint the underlying causes of stroke related mobility deficits and do more thorough research into the best available treatments. Even after complete neurological recovery, many patients (41-45%) still experience long term motor impairments and limitations on daily activities³. To determine the most efficient stroke treatment, various studies have employed various approaches with varying treatment durations and methods. Brainstorm, Bo bath therapy, proprioceptive neuromuscular facilitation (PNF), motor relearning program me (MRP), mirror therapy, and constraint induced movement therapy (CIMT) are the main therapeutic approaches used with patients for stroke rehabilitation⁴. Constrained induced movement theory, robot arm training, virtual

reality (VR) training, mental practice, and mirror therapy are some of the most recently developed treatment modalities. Based on the theory of motor learning, new rehabilitation techniques for the upper extremities are being examined⁵. After a stroke, motor rehabilitation is typically closer to the lower end of the functional recovery continuum. 15 Prior to upper limb physical treatment, bilateral priming with active passive motions would help stroke patients' upper limbs recover faster at the sub-acute stage by rebalancing their corticomotor excitability⁶.

The purpose of the study was to evaluate the efficacy of mirror therapy vs traditional physical therapy in stroke patients. To improve recovery after a stroke, it is necessary to include quick, accessible, affordable, patient directed, and efficient treatment strategies. Less research has been done in the past to compare mirror treatment to traditional physical therapy in the upper limb. This particular type of research will therefore aid in the rehabilitation of stroke patients.

The study was aimed to compare the effectiveness of conventional physical therapy and mirror therapy in stroke patients. There is a need to incorporate easy, simple, economic, patient directed and effective treatment techniques to enhance recovery following stroke. There is less data available on comparison between conventional physical therapy and mirror therapy in the up-per limb in the past. That is why this particular kind of research will contribute in stroke rehabilitation.

METHODOLOGY

The study design was quasi-experimental. The data was collected from Ayesha sadiqa hospital Lahore after ethical approval from

IRB. The sample size was 56 participants. The subjects in between 45-60 years, ischemic and hemorrhagic stroke male and females were recruited in the study. But dementia, impaired cognitive and other co-morbidity were excluded. All subjects were informed about the study before enrollment. They signed a consent form, showing that they are agree to participants. They were informed about purpose, nature and benefits as well including the procedure. Intervention of this group was the mirror therapy, used for same time period⁷. Patients in Group A completed the tasks in front of a mirror while using their non-paretic leg. The mirror was 25 x 30 in dimension. Instructions for the maneuver were given either verbally or visually. The mirror was placed in the midline. The unaffected limb was in a similar position to the damaged limb. Patients were then instructed to look at their reflection in a mirror for one to two minutes while attempting to picture the mirror image as the injured limb. The first exercises were started when the patient indicated that he / she perceived the mirror image as the affected limb. After the first exercises on establishing a vivid mirror illusion the subsequent treatment approach were chosen according to the individual treatment aim. The mirror therapy was given 5 days a week with 50 min session and Electrical stimulation for 10 minutes⁸. In Group B the patients were given PNF techniques. All the patients received a total 6 weeks sessions with 5 sessions/week and assessments were taken at baseline, after 04 weeks and 8 weeks. The outcome tool used for evaluation of upper and lower limb assessment was Modified Fugal Meyer functional tool. The Fugal-Meyer scale is a well-designed, feasible and efficient clinical examination method used in stroke population. It has 100 points for evaluation of motor limbs. It has strong concept validity and intra- and inter-rater reliability.⁽⁹⁾ The results given here in the form of frequency tables, percentages and mean ± score time period was 6 weeks for each patients. The data was collected at baseline, at 3rd week and at 6th week. The data was analyzed using SPSS.V21. The normality tests were applied to check the data distribution and Repeated Measurement ANOVA was used for within and Independent t test was used for between group analyses at P<.05 (CI195%)

RESULTS

The pretest and posttest observations for motor assessment of upper, within the mean score of Group A in pre assessment was 31.47±9.67 mid assessment was 34.73±10.47 and post assessment was 238.53±10.72 (0.001) showing significant improvement with intervention of Group A. Motor assessment score in Group B in pre assessment was 36.07±11.25 mid assessment was 43.27±9.83 and post assessment was 49.47±9.48 (0.001) showing significant improvement with intervention of Group A. Motor assessment score in Group B in pre assessment was 15.27±4.56 mid assessment was 21.73±5.23 and post assessment was 28.47±4.56 (0.001) showing significant improvement with intervention of Group A at P value <.05 showing effectiveness of both techniques. (Table No 2)

Table 1: Demographics of Participants

Demographics	Group A	Group B
Male	23(41%)	17(30.3%)
Female	10(17.8%)	6(10.7%)
Left Hemiplegia	20(35.7%)	21(37.5%)
Right Hemiplegia	9(16%)	6(10.7%)
Hemorrhage	8(14.2%)	7(12.5%)
Infarction	22(39.2%)	19(33.9%)

Table 2: within Group Compassion of Upper and Lower Limb Functions

Outcomes	Groups	Baseline	3 rd week	6 th week	P-value
		Mean ±SD	Mean ±SD	Mean ±SD	
Upper Limb Motor Assessment	Group A	31.47±9.67	34.73±10.47	38.53±10.72	0.00
	Group B	36.07±11.25	43.27±9.83	49.47±9.48	0.00
Lower Limb Motor Assessment	Group A	17.8±4.66	20.93±4.56	24.67±4.81	0.00
	Group B	15.27±4.56	21.73±5.23	28.47±4.56	0.00

*p- valve significant <0.05

Table 3 compares the mean difference of pre test and posttest observations between groups. The mean difference between the pretest and posttest scores for the upper limb in Groups A and B was 0.72.4 and 13.42.95 respectively (P=0.00), indicating a significant difference between the mean scores of the two groups. In the lower limb, the mean difference between the pretest and posttest scores for Group A was 6.871.41 and for Group B was 13.21.42 (P=0.00); this indicates that there is a significant difference between the mean scores of the two groups.

Table 3: Between Group Comparison of Upper and Lower Limb Function

Outcomes	GROUP A	Group B	P-Value
	Mean ±SD	Mean ±SD	
Upper Limb Motor Assessment	7.07±2.4	13.4±2.95	0.00
Upper Limb Motor Assessment	6.87±1.41	13.2±1.42	0.00

* P-value significant <0.005

DISCUSSION

The activity-based MT helps chronic post-stroke hemiparesis people walk more normally and speeds up the recovery of lower limb motor function¹⁰. The findings of the current study imply that by integrating various types of feedback and by combining MT exercises improves the environment for lower leg and upper extremity rehabilitation in chronic stroke patients. The outcomes of our study are encouraging when compared to regular physiotherapy, and more research is needed to determine the most effective ways to lessen impairment and the burden placed on a person's family, society, and healthcare systems¹¹. There is a significant difference between the mean scores of the two groups, as evidenced by the mean difference of the pretest posttest score in Group A being 6.871.41 and in Group B being (P=0.00). The combination of cross-education and mirror therapy may be able to enhance motor function following a stroke. This study illustrates the viability of the combination therapy and the requirement for further research examining the efficacy of the therapy with larger sample sizes¹². The results of another EMG-Triggered functional electrical stimulation and mirror therapy demonstrated a positive impact on balance and walk of the chronic stroke patients. The findings of this study suggest that by combining EMG Triggered functional electrical stimulation with mirror therapy, brain plasticity stimulation can be more simply and steadily administered to stroke patients. This is important as an intervention strategy for stroke patients who need ongoing care¹³. The results of the study show that, compared to a placebo intervention, mirror therapy and treadmill training significantly reduced ankle muscle tone in our group of chronic stroke patients (p 0.05)¹⁴. This study demonstrates that mirror therapy may be a useful treatment for subacute stroke patients to increase their walking speed. On the other hand, there was no distinction in the effects of therapeutic exercise and mirror treatment on balance, gait, or motor function¹⁵. The study's statistical analysis reveals that both Techniques Group A (Proprioceptive Neuromuscular Facilitation) and Group B (Mirror Therapy), when used separately, were successful in enhancing balance and gait. There is a sizable difference between the groups when comparing the two strategies. In order to improve gait and balance in paretic lower limb after acute stroke, Group A Proprioceptive Neuromuscular Facilitation is therefore more effective¹⁶. The findings imply that MT, in addition to traditional rehabilitation methods, produces higher gains in ambulation and lower extremity motor function that last only briefly after therapy¹⁷. The impact of mirror therapy on stroke patients' upper extremity motor function was discussed by Nigar Gurbuz. Both the Brunnstrom phases and the FIM self score improved for the conventional treatment group and the mirror therapy group, however the post-treatment FMA score was found to be greater in the mirror therapy group¹⁸. According to JoongSan wang, PNF treatment was successful in reducing the abnormally increased muscle tone and stiffness in the lower extremity muscles of chronic stroke patients¹⁹. There was a significant improvement in CIMT group's motor function and self care performance of hemiplegic

upper extremity as compared to MRP group, which includes patients with subacute stroke assessed with MAS and FIM scales²⁰.

CONCLUSION

We have concluded that both the PNF and MT were effective in improving score motor function but MT were found to have better effect as compared to PNF .

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