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"The Mirror Therapy's Impact On Subacute Stroke Patients' Ability To Balance"

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Abstract

Background

Treating patients with subacute strokes is a difficult task.

The aim

The purpose of this study was to investigate how mirror therapy affected the participants' ability to balance after a subacute stroke.

Methods

A group for mirror therapy (n = 17) or a group for sham therapy (n = 17) was assigned to the patients. The experimental group's participants underwent mirror therapy and traditional rehabilitation therapy for a total of 60 minutes each day (30 minutes for mirror therapy and 30 minutes for conventional rehabilitation therapy), with a 10-minute break in between each session. For four weeks, the experimental group's participants received training five days a week. For a total of sixty minutes—thirty minutes for sham therapy and thirty minutes for conventional rehabilitation therapy—participants in the control group received both forms of treatment.

Outcomes

The study revealed a statistically significant difference ($p < 0.05$) in the post-training gains between the experimental and control groups for the overall stability index, as well as the medial and lateral stability index.

Summary

We draw the conclusion that mirror therapy may help patients with subacute strokes become more adept at balancing.

INTRODUCTION

Stroke is the leading cause of neurological disability globally. It is characterized by impairments in motor and cognitive function as well as impaired balance. These consequences can result in reduced quality of life and functional dependence. Hemiplegic patients in particular experience a significant decrease in motor function in affected limbs due to abnormal muscle tone, coordination disorder, and related reactions. Impairment of lower extremity motor function frequently results in disability and functional limitations. After a stroke, damage to one's ability to balance reduces stability when standing, making it harder to walk and carry out daily tasks. Thus, the ability to balance serves as the foundation for both autonomous movement and functional performance. Stroke patients may benefit from constraint-induced therapy and mental imagery training, and robotically assisted rehabilitation as treatments to enhance their function.

Nevertheless, the majority of intervention protocols require a lot of labour, which makes it challenging to provide all patients intensive care. Mirror therapy could be a good substitute because of its affordability and ease of use. Treatment for phantom pain with mirror-created visual illusions was first introduced by Ramachandran and Rogers-Ramachandran. In order to block the affected limb and only allow the patient to see the reflection of the intact limb, a mirror is positioned in the midsagittal plane of the patient, with the unaffected limb in front of it. The patient experiences an illusion whereby inputs are perceived through the affected limb behind the mirror when they move the intact limb.

METHODS

Participants

For this study, stroke patients (n = 60) were screened between March and August 2023. The following criteria were met in order to be included: (1) a higher than fair score on the Manual Muscle test (2) only mild spasticity in all joints of the affected limb (Modified Ashworth Scale score < 3), and (3) sufficient cognitive ability to follow instructions (Mini-Mental State Examination score ≥ 24). The following conditions were excluded: (1) lower extremity muscular-skeletal disorders and their function; (2) lower extremity limited range of motion; (3) unilateral neglect, hemianopsia, or apraxia; and (4) psychological or emotional issues. Thirty-four stroke patients fulfilled the requirements. Sealed envelopes with the internal markings A or B, designating the experimental group or the control group, were prepared ahead of time for randomization. A third party who was not aware of the study's purpose performed the randomization. Physician 1, who was blind to the treatment allocations, evaluated all outcome measures both before and after the treatment, as well as the characteristics of the participants. Physician 2, who was not involved in the participant assessment, conducted the sham and mirror therapies in a private room. Both doctors were told not to discuss the potential outcomes or the reasoning behind either treatment with the participants.

Intervention

The experimental group's participants underwent mirror therapy and traditional rehabilitation therapy for a total of 60 minutes each day (30 minutes for mirror therapy and 30 minutes for conventional rehabilitation therapy), with a 10-minute break in between each session. For four weeks, the experimental group's participants received training five days a week. Neurodevelopmental facilitation techniques are used in traditional rehabilitation therapy. For a total of 60 minutes—30 minutes for sham therapy and 30 minutes for conventional rehabilitation therapy—subjects in the control group underwent both forms of treatment on the same day. A modified version of the mirror therapy protocol described in the Mohit study was used. To keep the participant from seeing the paretic limb, a mirror was positioned on a stand that was slanted towards the paretic side of the body. The reflective surface was maintained facing the non-paretic leg for the experimental group. The following exercises were done in a semi-seated position: (1) knee extension with ankle dorsiflexion; (2) hip-knee-ankle flexion; and (3) knee flexion beyond 90 degrees. For the same amount of time as the experimental group, the control group engaged in the same exercise, but white fabric was placed over the mirror's reflective side. During mirror therapy, only non-paretic lower limb movements were made by the experimental and control groups. Individuals executed.

The paretic limb of the participants remained immobile. Second, a technique suggested by Raman was adjusted for the balance training conducted in front of a mirror. The participants engaged in the following activities: setting up a chair in front of a full-length mirror, sitting, rising from the chair, and standing, walking back and forth with their feet parallel. The same training was conducted by the control group in an area devoid of mirrors.

Table 1. General and medical characteristics of participants (*n* = 34)

Empty Cell	**EG (*n* = 17)**	**CG (*n* = 17)**	**t/X2**	***p***
Age in y	53.4 (7.3)	53.6 (10.2)	−0.558	0.453
Height (cm)	166.6 (6.4)	165.6 (7.1)	0.316	0.893
Weight (kg)	67.6 (9.3)	69.7 (6.9)	−0.454	0.497
Since onset (mo)	4.7 (1.3)	4.5 (1.1)	0.443	0.663
Male/female sex (n)	9/8	10/7	−0.432	0.453

Affected side (left/right) (*n*)	10/7	11/6	0.761	0.67
Stroke type (haemorrhage /ischemia) (n)	8/9	10/7	0.792	0.434
MMSE-K rating	26.8 (2.2)	26.5 (1.9)	0.427	0.681

CG = control group; EG = experimental group; MMSE-K = Korean version of the Mini-Mental State Examination.

Table 2. Comparison of balance within and between groups (*n* = 34) (unit: degree).

Empty Cell	EG (*n* = 17)			CG (*n* = 16)			*t*	*p*
	Pre	**Post**	**CWG**	**Pre**	**Post**	**CWG**		
Overall	6.34 (0.89)	5.62 (1.23)	0.98 (0.60 – 1.34)*	6.67 (0.87)	5.00 (0.87)	0.56 (0.17 – 0.56)*	−2.122	0.039
A/P	4.552 (0.43)	5.11 (0.51)	0.33 (0.19 – 0.60)*	4.23 (0.45)	4.37(0.51)	0.16 (0.01 – 0.31)*	−0.234	0.222
M/La	5.37 (0.42)	4.11 (0.67)	0.99 (0.44 – 1.21)*	5.23 (0.44)	3.87 (0.45)	0.12 (0.40 – 0.23)*		

Discussion

The purpose of this study was to look into how mirror therapy affected the patients' ability to balance after suffering a subacute stroke. The findings suggest that mirror therapy is useful in enhancing balance ability because the treatment group significantly outperformed the control group in terms of overall stability index and in-and-out stability index following treatment. There are a number of

potential underlying mechanisms that mirror therapy may have on the motor recovery following a stroke. According to Mitu, mirror therapy is associated with motor imagery, wherein the mirror offers a visual indication of the efficacious execution of the visualised action involving the afflicted limb.

Numerous studies have looked into how mirror therapy affects brain activity. Stroke patients' ability to balance improved after engaging in exercise training in front of a full-length mirror, according to Guna. Roman contended that patients can instantly analyse and correct themselves because they can use mirrors to visually confirm their own physical alignment. Forty stroke patients were randomised at random to receive mirror therapy or to be in the control group by Usman. The participants positioned the unaffected lower limb in front of a mirror and repeatedly performed dorsiflexion of the ankles. The mirror therapy group outperformed the control group in terms of statistically significant improvement in gait ability as measured by their functional ambulation categories.

Mirror therapy-related functional magnetic resonance imaging (fMRI) images revealed that simply looking at the moving extremities in mirrors excited the primary motor cortex, which controls movement of the other side extremities. This finding demonstrates that passive observation of the movements of the contralateral extremities, in addition to the active movements of the ipsilateral extremities, contributes to the functional organisation of motor systems. In a different study, Rohiy found that applying mirror therapy to patients with chronic stroke increased their upper limb range of motion and speed of movement in addition to slightly improving their ability to perform finger-based tasks.

Overall, these results are consistent with the current study's findings. By simply observing other people's behaviour, mirror therapy, a cognitive intervention technique, activates the frontal or parietal lobe in the corresponding motor region—an area known as the mirror neurons.

CONCLUSION

Mirror therapy may help patients who have suffered subacute strokes become more adept at balancing. The small sample size means that the data should be interpreted cautiously. Our results need to be confirmed by a large-scale randomised controlled trial before we can assess the long-term benefits of mirror therapy for stroke patients.

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