
Effectiveness of Hydrotherapy with Mirror Therapy to Increase Muscle Strength of Ischemic Stroke Patients

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Abstract:

Stroke is a central nervous breakdown disease that causes due to loss and dysfunction of brain parts Disability in the blood supply to the brain blood vessels. Among these three classifications, ischemic stroke is among the most common types of stroke, which is about 70 % of the whole case. As a top-down rehabilitation hegemon, mirror therapy improves lower limb motor function, balance, transferability and activities of daily living for stroke patients by increasing functional connectivity and activity in areas of the brain that promote motor function. It is indicated that hydrotherapy soaks warm feet with mirror therapy in the intervention group and mirror therapy in the control group are equally effective in improving the muscle strength of the upper and lower extremities. Methodological quality of studies using the scholar, pubmed.

Keywords: Hydrotherapy, Mirror Therapy, Stroke, Ischemic, Musculoskeletal

INTRODUCTION

Stroke is a central nervous breakdown disease that causes due to loss and dysfunction of brain parts Disability in the blood supply to the brain blood vessels. Most stroke patients experience impaired motor function and show abnormal performances and bigoes, usually asymmetrical harmony and posture, abnormal balance, lack of ability to move weight to a bump area, and difficulty with certain functional movements. Restoration of days of movement of the linked lot is the most common goal of therapeutic rehabilitation days (Kim, W.I., et al. 2014) Stric-type stroke, transient ischemic attack (TIA) blockage of blood vessels in the brain, which is temporary, ischemic stroke of brain chest blood clogging, and hemorrhagic stroke of blood vessel rupture. Among these three classifications, ischemic stroke is among the most common types of stroke, which is about 70 % of the whole case. There are two therapeutic methods used to increase muscle strength in elderly patients with ischemic stroke, namely mirror therapy and water therapy. Mirror therapy is a form of rehabilitation or exercise relying on and practicing the patient's image or motor image, where the mirror will provide visual stimulation of the brain (motor nerves, such as ipsilateral leg movements) or contralateral hemiplegia) by observing body movements tend to body parts such as mirrors of sick people (Fariyanti, C., et al. 2020).

Mirror therapy has useful benefits for the rehabilitation of limb functions such as movement, balance, transfer, and activities of daily living (Cui, W. et al. 2022) Hydrotherapy is a series of health treatments that are very effective through heating, mechanical and chemical actions of water. The mechanism of action provides heat transfer from warm water to the body through the soles of the feet. The effect of warm water basically increases circulation (cells) by directing energy through convection (irrigation



through liquid media), thereby widening blood vessels throughout the body, which affects increased muscle strength (Setiawan, L., et al. 2021).

METHODS

The method of this study using literature review journals systematic review. These study determined whether there were differences in muscle strength before and after mirror therapy and hydrotherapy in patients with ischemic stroke. A comprehensive study was conducted on 3 topics: (1) stroke pathophysiology and the factors that cause stroke (2) hydrotherapy and glass therapy (3) the role of sensorimotor stimulation in geriatrics with ischemic stroke. The treatment criteria used were (1) the sample consisted only of geriatrics (over 50 years of age) (2) reported cases of ischemic stroke and (3) outcome measures relevant to stimulation of mirror therapy and water therapy. The search for effective was deliberately limited to English, with interesting studies in geriatric patients published in the last 5 years. Literature research was conducted in the PubMed electronic database, Physical Therapy Science and Scholar, for the period between January 2017 and November 2022.

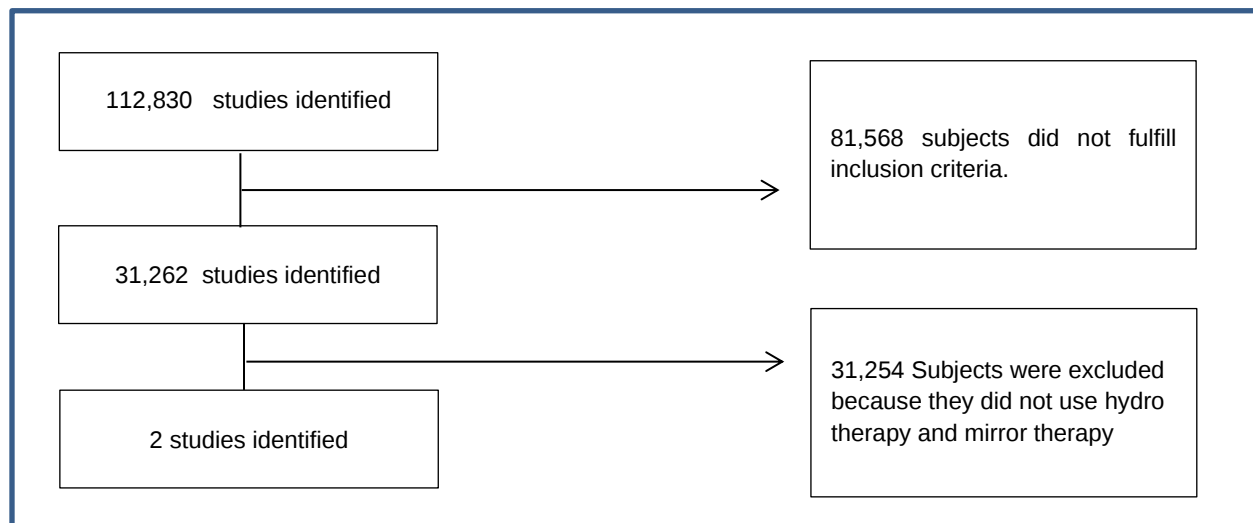


Figure 1. Flowchart of the search and selection of articles during the literature review process.

RESULT

Table 1. study summary about simulation using hydro therapy and mirror therapy in ischemic Stroke patients

First author/ year	Type of study	Sample	Assessment and intervention	Clinical outcome	Significance
Cui, W. et. al (2021)	A single-blind and randomized controlled design	32 patient	Assessment : Mirror therapy was added to the MT group 5 times a week for 30 minutes each time over a period of 3 weeks.	Patients' motor functions showed significant improvement in both groups compared to those before treatment. Moreover, the MT group showed	P < 0.01 P < 0.05



				significantly better improvement than the CT group after the treatment.	
Setiawan, R. L. et. al (2020)	Randomized control trial, pre-test, and post-test with control group was applied in this study	30 patient	Assessment : Then hydrotherapy with warm foot soaks for 20 minutes 3 times a day for four days	The results showed a significant difference in muscle strength and range of motion of the upper extremities between the intervention group and the control group.	P >0.05

DISCUSSION

It is indicated that hydrotherapy soaks warm feet with mirror therapy in the intervention group and mirror therapy in the control group are equally effective in improving the muscle strength of the upper and lower extremities. Stimulation given by hydrotherapy soaking feet in warm water will make cells experience Vasodilation, smooth blood flow, brings more nutrients and oxygen to brain cells. Muscles get enough nutrients, including calcium and potassium. Increased calcium ions in the body the appearance of cytosols is caused by the release of more ions from the sarcoplasmic reticulum, potassium ions in muscle uncton execute muscle action potential so that muscle mass can be maintained and can improve muscle work. Increased oxygen supply to the body due to smooth blood flow Muscle cells.

During mirror therapy, the themirror's neurons are stimulated by an illusion in themirror and directly participate in simulating and understanding action, which can enhance the efficiency of presentation and processing information. Within the realm of the linked brain, enhancing the synchronization of neuronal activity, promoting reorganization. And repair motor pathways, speeding up the restoration of motor nerves in the corticospinal region, and thus improving the restoration of motor functions in the limbs. Mirror therapy is a specific form of motor imaging with visual guidance. As the patient receives reflective therapy, motor imaging is enhanced, which simulates internal movements without distinct movements and activates the neural circuits involved in motion control. In other words, mirror therapy promotes motor function in the limbs by improving the neural pathways in motor control. Fc analysis is widely used to evaluate the nerve activation correlation between different spatial areas of the brain. Mirror therapy creates an illusion that enables visual feedback and virtual reality. When combined with movement observation, imitation learning, motor imagery and other rehabilitation training techniques, mirror therapy leads to desired clinical outcomes . Mirror therapy has been widely applied to the treatment of upper limb motor dysfunction after stroke and has achieved good therapeutic effects. In recently years, more and more studies have been exploring the curative effect of mirror therapy for lower limb rehabilitation.



CONCLUSION

In conclusion, The benefits of mirror therapy and hydrotherapy maximize movement and balance in the upper and lower extremities in stroke patients, especially in ischemic stroke patients. As a top-down rehabilitation hegemon, mirror therapy improves lower limb motor function, balance, transferability and activities of daily living for stroke patients by increasing functional connectivity and activity in areas of the brain that promote motor function. This is a conducive and effective method of rehabilitation treatment. This study has several limitations. First, the main limitation of this study was the lack of control over treatment time between the two groups. The MT group received an additional 30 minutes of mirror treatment per session compared to the CT group and a total of 7.5 hours of treatment compared to the CT group received. In fact, in our pilot study, CT sham treatment was administered, and the patient controlled hemiplegic lower limbs to mimic normal limb movements while wooden panels were placed between the lower limbs. I was asked to do so. However, many patients have low adherence and refuse to complete treatment. As a result, the therapy of sham therapy was not carried out in the current study. And the average increase in upper and lower extremity muscle strength between the intervention and control groups has the same effectiveness with a $P > 0.05$.

AUTHOR CONTRIBUTIONS

Virginia Eka Putri A. Baharudin and Nurhalisah Are the main researcher who selected the topic, searched and collected the data. Ragil Aidil Fitriyani analyzed data and reviewed study documents.

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