

## EMIRFOMA (EDUCATION, MIRROR THERAPY) FOR INCREASE QUALITY OF LIFE FOR STROKE PATIENT

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### ABSTRACT

*Background: Education, mirror therapy and foot massage have been considered alternative treatments to improve muscle strength in post-stroke patients. However, little is known about the combination of these three methods. Objective: To identify the effectiveness of the combination of education, mirror therapy, and foot massage on changes in muscle strength in post-stroke patients. Methods: This study used pre-experimental design one group pretest-posttest design. Twenty seven samples were selected using purposive sampling. Muscle strength was measured using a muscle strength scale. Data analysis was performed using Wilcoxon test. Results: Based on the Wilcoxon Signed-Rank Test, a statistically significant effect was observed in muscle strength between the pre-test and post-test measurements ( $p < 0.001$ ) Conclusion Education, mirror therapy, and foot massage are effective in increasing muscle strength in post-stroke patients.*

*Keywords: education, foot massage, mirror therapy, muscle strength, stroke*

### INTRODUCTION

Stroke is one of the leading causes of disability and death worldwide, with more than 15 million people experiencing a stroke each year ((Donkor, 2018; Hou et al., 2024)). According to the World Health Organization (WHO), stroke causes nearly 6 million deaths globally, and more than 50 million people live with disabilities caused by this disease ((Donkor, 2018; Hou et al., 2024; Kernan et al., 2021)). Disabilities that arise after a stroke can include paralysis (hemiparesis), speech disorders (aphasia), balance disorders, and difficulty performing daily activities ((Carmo et al., 2015; Whitiana et al., 2017)). One aspect that is greatly affected by stroke is the body's motor

function, which can significantly reduce the patient's quality of life ((Ismail et al., 2022; Pratiwi & Fatmawati, 2024)).

The quality of life of stroke patients can be influenced by various factors, including physical, psychological, social, and cognitive function (Heiberg et al., 2020; Pratiwi & Fatmawati, 2024; Zukhri et al., 2024). Among these factors, motor status is one of the main indicators in determining the extent to which patients can return to an independent life (Arlies Zenitha Victoria et al., 2024; Heiberg et al., 2020; Lincoln, 2018). Motor impairment in stroke patients, especially in the upper and lower extremities, often prevents patients from performing daily activities, such as walking, dressing, or eating, which in turn reduces their quality of life (Pratiwi & Fatmawati, 2024). Therefore, appropriate treatment and effective rehabilitation are essential to help restore the patient's motor status (Lee et al., 2022a).

Various rehabilitation approaches have been developed to aid motor recovery in stroke patients (Knecht et al., 2011). One of these is Mirror Therapy and Foot Massage (Fernández-Solana et al., 2024; Gandhi et al., 2020). Mirror Therapy is a technique that uses mirrors to create a visual illusion so that patients can see the movements of their paralyzed limbs as if they were moving normally, which can stimulate motor recovery

(Implikasi et al., n.d.; Waghavkar & Ganvir, 2015). On the other hand, Foot Massage, as a physical therapy, focuses on stimulating reflexology points on the feet, which is believed to increase blood flow, reduce spasticity, and improve mobility in the extremities affected by stroke (Lee et al., 2022a).

In addition, education related to stroke disease management, healthy lifestyles, and rehabilitation techniques that can be done at home are important components that support the long-term recovery of stroke patients (Sukmawati et al., 2024). Proper education can increase patient and family awareness of the importance of therapy and physical exercise to improve motor function and avoid further complications. However, despite the widespread application of various therapies, research combining Education, Mirror Therapy, and Foot Massage (known as EMIRFOMA) in a single approach to improve the quality of life of stroke patients, particularly in terms of motor status, remains limited.

Based on information from the profile of RSUD KISA Depok from 2022-2024, stroke is among the top 10 causes of death in hospitals. Additionally, since 2024, RSUD KISA Depok has been designated as a referral hospital for stroke (Raya, n.d.).

Therefore, this study aims to explore the combined effectiveness of these three components in improving the quality of life of stroke patients, with a focus on enhancing motor status.



## METHODS

### Study Design

This study employed used *pre-experimental design one group pretest-posttest design*

### Sample/Participants

The target population in this study was all patients with post stroke in the type C in General Hospital of Jakarta. Twenty seven samples were selected using purposive sampling. The inclusion criteria of the sample were 1) stroke patients with impaired motor function, with a minimum Medical Research Council (MRC) score of 2 (Muscle Weakness), 2) patients aged ranging from 45 to 65 years, 3) patients with full awareness (GCS 13-15), and 4) patient's family approved the patient to be the respondent by signing the informed consent. The exclusion criteria included: 1) patients who used ventilator, 2) patients with hearing loss, and 3) patients with wound in leg.

### Instrument

Muscle strength were measured using the Medical Research Council (MRC) scale (Usker Naqvi et al., n.d.). This scale is often used to measure motor weakness and evaluate the progress over time on the weakened muscle strength. Muscle strength can be described as the ability of the muscles to withstand both external and internal forces. Muscle strength is closely related to the neuromuscular system, which is how much the ability of the nervous system to activate the muscles to perform contractions. Muscle strength assessment has a measurement scale commonly used to check patients who experience paralysis, and also to see the progress during treatment (Usker Naqvi et al., n.d.).

This scale consists of 6 grades, ranging from a score of 0 to 5, where a score of 0 = no contraction, 1 = having muscle twitch and slight contraction, 2 = active motion limited to gravity, 3 = active motion that can defy gravity, 4 = active movement, which can resist gravity and hold the examiner slightly, 5 = normal muscle strength (Lumbantobing, 2000).

### Intervention

The intervention was conducted by the researcher themselves and assisted by a nurse who had approximately 5 years of experience in the hospital. For education, leaflets from the Ministry of Health on post-stroke patient care were used. The intervention for mirror therapy used SOP (Genius et al., 2013) from patients positioned in a sitting position on the bed with both legs in a straight and comfortable position. The mirror was placed parallel to the patient's midline and perpendicular to the floor, so that the healthy limb was in front of the mirror, while the weakened limb was behind the mirror and not visible to the patient.

Once the position of the patient and the mirror was confirmed, the researcher instructed the patient to focus their gaze on the reflection of their healthy limb in the mirror. The therapy begins with slow and controlled active movements of the healthy lower extremities, such as dorsiflexion and plantar flexion of the ankle, flexion and extension of the knee, and opening and closing of the toes. While performing the movements, the patient is instructed to imagine that the weak limb is moving normally

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in accordance with the reflection seen in the mirror, thereby creating a visual illusion of movement in the affected extremity.

During the mirror therapy session, the researcher continuously observes the patient's responses, including their ability to maintain visual focus, movement coordination, and any complaints such as pain, fatigue, or discomfort. The researcher provides continuous verbal instructions and motivation to keep the patient focused and performing the movements at the recommended rhythm. The therapy is conducted for 30 minutes per session.

Foot massage: The foot massage begins by warming the hands and applying a sufficient amount of massage oil or lotion to the soles of the patient's feet. The nurse performs a slow and rhythmic massage, starting from the soles of the feet with a light stroking technique (effleurage) to increase blood flow and prepare the tissue. Next, the nurse performs pressing and gentle kneading (petrissage) movements on the arch of the foot, heel, and ball of the foot with pressure adjusted to the patient's tolerance. Each toe is massaged one by one with slow twisting and pulling movements to stimulate the sensory nerves and increase joint flexibility.

After completing the foot massage, the nurse continues massaging the back of the foot and ankle with circular and proximal strokes to help improve venous circulation. For stroke patients with mild to moderate spasticity, the nurse may perform light passive stretching of the ankle and toes, while remaining mindful of the patient's comfort and safety limits. During the procedure, the nurse continuously observes the patient's response to the massage, including expressions of pain, discomfort, or fatigue.

Education is provided once on the first day, and mirror therapy and foot massage are performed twice a day for three days. Muscle strength is assessed before the first day of intervention and reassessed after intervention on the fourth day.

### **Data Analysis**

Data processing and analysis used SPSS. Univariate data analysis was described with frequency distribution table, The collected data was analyzed by Wilcoxon signed rank test to determine the difference before and after treatment (different pre-test and post-test).



## RESULTS

**Table 1.** Differences in Muscle Strength Before and After Emirfoma

| Muscle strength | n  | Mean $\pm$ SD   | Median (Min-Max) |
|-----------------|----|-----------------|------------------|
| Pre Test        | 27 | 2,93 $\pm$ 0,87 | 3 (1–4)          |
| Post Test       | 27 | 3,85 $\pm$ 0,88 | 4 (1–5)          |
| $p < 0.001$     |    |                 |                  |

The analysis showed an improvement in muscle strength following the intervention. At the pre-test assessment, the respondents' mean muscle strength score was  $2.93 \pm 0.87$ , with a median of 3 (range 1–4). Following the intervention, the mean muscle strength score increased to  $3.85 \pm 0.88$ , with a median of 4 (range 1–5). Thus, descriptively, there was a 0.92-point increase in the mean muscle strength score after the intervention.

Based on the Wilcoxon Signed-Rank Test, a statistically significant difference was observed in muscle strength between the pre-test and post-test measurements ( $p < 0.001$ ). These findings indicate that there was a significant improvement in muscle strength following the intervention. Therefore, the intervention was associated with an improvement in muscle strength among the respondents.

## DISCUSSION

Findings of this study showed that there was a significant change in muscle strength in the experiment group between before and after given the combination of education, mirror therapy and foot massage.

Muscle strength is one of the important aspects in the recovery of stroke patients because it is directly related to the patient's functional ability and mobility. Stroke patients often experience significant muscle weakness as a consequence of motor nerve disorders, so an effective rehabilitation program is indispensable to improve the patient's quality of life and independence. The results of this study are in line with various previous studies that stated that structured exercise or rehabilitative therapy is able to increase muscle strength in stroke patients. (stated that the mirror therapy exercise program provided a significant improvement in the muscle strength of the lower extremities of stroke patients compared to the control group that did not undergo a similar program (Herawati et al., 2023; Nadatien et al., 2024; Fernández-Solana et al., 2024; Lee et al., 2022b; Waghavkar & Ganvir, 2015).

Based on the results of the study, mirror therapy was shown to be able to significantly increase corticomotor excitability and last for at least 30 minutes after the intervention, compared to asymmetrical bilateral motion patterns. This increase mainly occurs through modulation of cortical inhibition mechanisms, specifically decreased

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interhemispheric inhibition and changes in long-interval intracortical inhibition, without interfering with the selectivity of muscle activation. In addition to neurophysiological effects, mirror therapy also accelerates the process of motor learning, which is demonstrated by the increased speed and efficiency of fine motor task performance. These findings show that mirror therapy acts as an effective priming method to create a more plastic and responsive brain condition to motor exercise, so it has great potential to be applied in the rehabilitation of poststroke patients to improve the optimal recovery of motor function (Byblow et al., 2012).

The findings are supported by previous study results that three days FM given regularly can improve local blood circulation and stimulate the somatosensory system, including several receptors, and can also cause smooth muscle contractions (Chatchawan et al., 2015). On the other hand, foot massage (FM) stimulates larger muscles and offers the benefit of more localized muscle relaxation (Samarehfekri et al., 2020).

## CONCLUSION

The combination of education, mirror therapy and foot massage intervention was effective on muscle strength on stroke patient. It is suggested that the combination of education, mirror therapy and foot massage can be used as an alternative to improve muscle strength for stroke patient in the hospital and at home.

## IMPLICATIONS FOR NURSING PRACTICE

The findings of this study have important implications for nursing practice, particularly in the rehabilitation of stroke patients with motor impairment. The EMIRFOMA intervention, which combines education, mirror therapy, and foot massage, can be considered a complementary nursing intervention to support improvements in motor status and muscle strength. Nurses can integrate EMIRFOMA into individualized nursing care by providing structured education, guiding patients in performing mirror therapy, and applying foot massage to promote comfort and readiness for rehabilitation. This intervention also emphasizes the role of nurses in encouraging patient participation and self-management throughout the recovery process. EMIRFOMA is a relatively simple, non-pharmacological, and potentially cost-effective intervention that may be implemented alongside conventional rehabilitation programs, with appropriate assessment of patients' motor function, clinical condition, and tolerance. Collaboration with physiotherapists and other rehabilitation professionals is recommended to ensure safe and comprehensive implementation. Further research with larger samples and longer follow-up periods is needed to strengthen evidence regarding the effectiveness and sustainability of EMIRFOMA in improving motor status and functional recovery among stroke patients..



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## ETHICAL STATEMENT AND CONFLICT OF INTEREST [

The study has been approved by Health Research Ethics Commite Universitas Bakti Tunas Husada Tasikmalaya (Approval number : 139-01/E.01/KEPK- BTH/VI/2025). Prior to data collection, each respondent was asked to sign informed consent and explained about the purpose, benefits and research procedures.

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