Journal Of Nursing Practice
https://thejnp.org/
ISSN: 2614-3488 (print); 2614-3496 (online) Vol.8 No.3. April 2025. Page.507-515

The Effect of *Mirror Therapy* on Exterm Muscle Strength in Non-Hemorrhagic Stroke Patients Based on *Self Care Theory*

Siti Robi'atus Sholiha[1*], R. Khairiyatul Afiyah[2], Hotimah Masdan Salim[3], Abdul Muhith[4], Siti Nur Hasina[5]
[1] *Student Master of Applied Nursing, Faculty of Nursing and Midwifery, Nahdlatul Ulama University Surabaya, Surabaya, Indonesia*
[3] *Department of Medicine, Faculty of Medicine, Nahdlatul Ulama University Surabaya, Surabaya, Indonesia*
[2,4,5] *Department of Nursing, Faculty of Nursing and Midwifery, Nahdlatul Ulama University Surabaya, Surabaya, Indonesia*
**Corresponding author: sitirobiatus97@gmail.com*

ABSTRACT

Background: Non-hemorrhagic strokes result in neuromuscular disorders with reduced activity and weakness in joint movement and even disability. This condition receives treatment at the hospital in the form of educational therapy, diet, medication and ROM (active and passive).

Purpose: The aim of the research was to determine the effect of *Mirror Therapy* on extremity muscle strength in non-hemorrhagic stroke patients based on self-care theory.

Methods: *Quasi experiment research* design with a *pretest posttest* approach with *control group design.* The population of all non-hemorrhagic stroke patients with a sample size of 40 people, divided into 2 groups, namely the control group and the intervention group, was selected using a *purposive sampling* technique. The instruments used in this research include respondent characteristics, MMT *(Manual Muscle Testing)* observation sheets and *Mirror Therapy* SOP. Data analysis used the *Mann Whitney U-test* with a significance value of P value < 0.05.

Results: The results of the study showed that the average muscle strength score in the *Mirror Therapy* intervention group was 1.55 before and after 2.65, while in the control group with standard hospital treatment before 1,40 and after 1.95. The Wilcoxon Test results show P value = 0.000 in the intervention group and P value = 0.000 in the control group, meaning there is an increase in extremity muscle strength in the intervention and control groups. Based on the Mann Whitney test, it shows P value = 0.013, meaning there is no differences in *Mirror Therapy* on extremity muscle strength in non-hemorrhagic stroke patients.

Conclusion: The application of *Mirror Therapy* affects the level of extremity muscle strength in non-haemorrhagic stroke patients. Nurses are expected to be able to apply *Mirror Therapy* to apply it in nursing practice.

Keywords: mirror therapy, self care, stroke

Received February 10, 2025; Revised March 12, 2025; Accepted April 6, 2025
DOI: https://doi.org/10.30994/jnp.v8i3.661

ISSN: 2614-3488 (print); 2614-3496 (online) Vol.8 No.3. April 2025. Page.507-515

BACKGROUND

Any sudden neurological disorder that occurs due to restriction or cessation of blood flow through the brain's arterial supply system is referred to as a stroke or cerebrovascular disease (Basyir *et al*., 2021). Stroke is a permanent neurological disorder due to disruption of blood circulation to the brain, which occurs for around 24 hours or more (Indiartinie *et al*., 2023). Stroke is the third cause of death in the world after coronary heart disease and cancer in developed and developing countries. One in 10 deaths is caused by stroke (World Health Organization, 2016). There were 17 stroke patients at RSI Jemursari Surabaya in December 2022. Three of the patients were patients who experienced extremity muscle weakness with a muscle strength value range of 1 – 4. The nurse at RSI Jemursari stated that the treatment provided by the hospital to non-hemorrhagic stroke patients with muscle weakness only took the form of educational therapy, diet, medication and ROM (active and passive).

Based on the results of Rikesdas in 2018, the prevalence of stroke in Indonesia increased compared to 2013, namely from (7%) to (10.9%). Nationally, the prevalence of stroke in Indonesia in 2018 based on doctor's diagnosis in people aged ≥ 15 years was (10.9%) or estimated at 2,120,362 people. Based on age groups, the incidence of stroke occurs more frequently in the 55 - 64 years age group (33.3%) and the lowest proportion of stroke sufferers is in the 15 - 24 years age group. Men and women have almost the same proportion of strokes. Most of the people who had a stroke had completed elementary school education (29.5%) (Kemenkes RI, 2018). The prevalence of stroke in urban areas is greater, namely (63.9%) compared to those living in rural areas (36.1%). One area with a high rate of stroke is the city of Surabaya. With a prevalence of stroke of 12,976 cases (Dinkes Surabaya, 2019).

Stroke is divided into 2, namely intracerebral hemorrhage stroke or what is commonly known as haemorrhagic stroke, which is caused by rupture. intracerebral vessels and non-haemorrhagic stroke (Setiawan, 2021). Non-haemorrhagic strokes are often found to involve decreased consciousness accompanied by a decrease in the patient's activity (Mardiana *et al*., 2021). There is an increase in intracranial pressure in sufferers due to decreased blood flow to the brain which can cause brain ischemia. Decreased consciousness results from a sudden decrease in oxygen supply to the brain and will gradually cause hypoxia in body tissues (Basyir *et al.*, 2021). If left untreated for a long time, sufferers will experience neuromuscular disorders with weakness in joint movement and disability may even occur (Sherina *et al*., 2022).

When damage occurs to one side of the sensory and motor part of the brain post stroke, it results in balance disorders including muscle weakness, decreased soft tissue flexibility, and impaired motor control in stroke patients resulting in loss of coordination, loss of body balance and posture (the ability to maintain a certain position) and also a stroke can cause permanent physical disabilities. Physical disabilities can make someone less productive. Therefore, stroke patients need rehabilitation to minimize physical disabilities so they can carry out normal activities. Rehabilitation must begin as early as possible, quickly and precisely so that it can help with faster and optimal physical recovery, as well as avoiding muscle weakness that can occur if range of motion exercises are not carried out after the patient has had a stroke (Appulembang & Sudarta, 2021).

Treatment that can be given to stroke sufferers with hemiparesis is pharmacological and non-pharmacological techniques. In this research, researchers used a non-pharmacological technique, namely *Mirror Therap*y. *Mirror Therapy* is a rehabilitation therapy in which a mirror is placed between the hands or feet so that the image of the non-painful limb gives the illusion of normal movement in the affected limb. Various brain

ISSN: 2614-3488 (print); 2614-3496 (online) Vol.8 No.3. April 2025. Page.507-515

regions for movement, sensation, and pain are stimulated. *Mirror Therapy* uses the optical illusion of a mirror which provides visual stimulation to the brain so that it can influence the improvement of motor function of the extremities (Maisyaroh *et al*, 2021).

This therapy relies on visual-motor perception interactions to improve the movement of body parts that suffer from muscle weakness on one side of the body or hemiparesis. Several studies conducted using brain mapping or scanning techniques found that while stroke patients were doing exercises using mirror media (*Mirror Therapy*), the areas that were active during this experiment were the prefrontal cortex, the premotor cortex, the parietal cortex and the cerebellum, which is the motor movement area. so that repeated stimulation causes an increase in muscle strength and prevents spread to other areas (Setiyawan *et al*., 2019).

Implementation for stroke patients given *Mirror Therapy* will be more focused, systematic and depict the role of nurses using the nursing model. The nursing model used is model by Dorothea Orem. The ability of individuals to initiate themselves in carrying out care independently with the aim of maintaining their health is called self-care. Every individual has the ability to care for themselves so that they can meet their living needs, maintain their health and well-being (Eko, 2015).

OBJECTIVE

This study aims to explain the effect of *Mirror Therapy* on extremity muscle strength in non-hemorrhagic stroke patients based on self-care theory.

METHODS

This research uses *a quasi-experimental research* design with *a pre-posttest* with *control group design*, namely measurements carried out by giving a pre-test before being given treatment and a post-test after being given treatment with a control group. The population in this study were all Non-Hemorrhagic Stroke patients with Hemiparase at RSI Jemursari Surabaya. The samples in this study were non-hemorrhagic stroke patients at RSI Jemursari Surabaya who met the following criteria:

a. Inclusion Criteria :
    1. Willing to be a respondent in research
    2. Have compositional awareness
    3. Patients are hospitalized for a minimum of 5 days
b. Exclusion Criteria :
    1. Hemorragic stroke patients
    2. The patients is uncooperative
c. Drop Out Criteria :
    1. Resign while the research is in progress
    2. Decreased consciousness or death during the research

Research samples were taken using the *purposive sampling method*. The minimum sample size in this study was calculated using the large formula for testing the hypothesis of an independent difference of 2 means. The results obtained were a sample of 18 respondents, so that the sample in the intervention group was 18 respondents and in the control group was 18 respondents. Researchers estimate that 10% of the sample will drop out, so the minimum sample size required is 20 respondents in each group. So, the required sample size is 40 respondents. This research was conducted at RSI Surabaya Jemursari. The intervention was carried out on patients for 3 weeks and was carried out in stages, covering 3 sessions. This research was conducted from May 14 to June 3, 2024.

a. Session 1 : Pre-intervention
   Began with obtaining permission from the ethics committee of RSI Jemursari Surabaya, explaining the work procedures to potential respondents and then requesting the availability of potential respondents (non-hemorrhagic stroke patients) to provide informed consent as approval to become a sample of respondents.
b. Session 2 : Intervention
   Began with conducting observations to assess muscle strength in the intervention group and control group, administering *Mirror Therapy* to the control group and treatment to non-hemorrhagic stroke patients 2 times a day in the morning and evening over a period of 5 days for 30 minutes and rest time 5 minutes.
c. Session 3 : Post Intervention
   The final session ended by observing post-intervention muscle strength research in the intervention group and control group, observing the results of muscle strength values after *Mirror Therapy*, and ensuring that the results of the observation sheet had been completely filled in.

The instruments used in this research include respondent characteristics, MMT *(Manual Muscle Testing)* observation sheets and *Mirror Therapy* SOP. Researchers used research instruments to measure muscle strength in the form of observation sheets. Observation sheets are used to find out directly about the results obtained when treatment is given to respondents. The *Manual Muscle Testing* observation sheet consists of 5 degrees. Degree 0 or total paralysis (unable to move extremities fully, Degree 1 (muscle contractions occur, but cannot move them), Degree 2 (muscle contractions exist, muscle contractions are able to move but cannot fight gravity), Degree 3 (can move and against gravity but not strong), Degree 4 (can move and resist resistance minimally) and Degree 5 (complete or normal muscle strength). Another instrument used in this research is SOP *Mirror Therapy* using 2-dimensional mirror media The reflective size of the mirror is approximately 160 x 50 cm or a full body mirror. Smooth edges and blunt corners make it easier for patients to use it comfortably in horizontal and vertical movements. Data analysis in this study uses the *Wilcoxon Mann Whitney U-Test*. Ethical requirements by the health ethics committee of RSI Jemursari Surabaya with No. JS.A.SKR.2285.05.24.

RESULTS

Respondent Characteristics Based on Demographic Data

Demographics	Control n=20	Intervention n=20	p value equality	Explanation
Gender				
Male	12 (60,0%)	12 (60,0%)	1,000	Equivalent
Female	8 (40,0%)	8 (40,0%)		
Age				
Mean ± Sd	59,55 ± 3,48	59,25 ± 2,57		
Pre-elderly	10 (50,0%)	7 (35,0%)	0,522	Equivalent
Young Elderly	10 (50,0%)	13 (65,0%)		
Work				
Doesn't Work	12 (60,0%)	13 (65,0%)	1,000	Equivalent
Work	8 (40,0%)	7 (35,0%)		

Based on the table above, it shows that in the intervention group the majority (65.0%) were in the young elderly age range, while in the control group 10 respondents (50.0%) were in the young elderly age range. The gender in the intervention group was mostly (60%) male, and in the control group the majority (60%) was male. The majority of the intervention group (65.0%) did not work, while the majority (65.05) of the control group did not work. Based on the *Pearson chi-square test of* equality, p > 0.05 was obtained, namely there was no difference between the intervention group and the control group (equivalent).

Comparative Test of Extremity Muscle Strength in Non-Haemorrhagic Stroke Patients Before and After Intervention

Muscle Strength Score	Control	Intervention
Pre		
Min - Max (Median)	1 - 3 (1)	1 - 3 (1)
Mean ± SD	1,40 ± 0,58	1,55 ± 0,68
Post		
Min - Max (Median)	1 - 3 (2)	1 - 4 (3)
Mean ± SD	1,95 ± 0,51	2,65 ± 0,93
Delta		
Min - Max (Median)	0 - 1 (1)	0 - 2 (1)
Mean ± SD	0,55 ± 0,51	1,10 ± 0,71

Based on the table above, it can be explained that the average muscle strength score in the intervention group before giving *Mirror Therapy* was 1.55 and after being given the intervention an increase of 2.65 was obtained, while in the control group with intervention given according to hospital standards it was 1, 40 and experienced an increase of 1.95. The intervention group had a Min-Max (Median) value of 1-3 (1) in the pretest. After the intervention (Post-test), the Min-Max (Median) value increased by 1-4 (3), while the control group had a Min-Max value of 1-4 (3) in the pretest group. Max (Median) 1-3 (2) after the intervention was carried out according to hospital standards, the Min-Max value was 1-3 (2). In the delta value, the intervention group obtained a Min-Max value of 0-2 (1), indicating that there was an increase in muscle strength scores by 1 to 2 levels after being given the *Mirror Therapy* intervention, while the control group obtained a Min-Max (Median) value of 0-1 (1) shows that there is an increase in muscle strength scores by 1 level after being given intervention according to hospital standards.

Comparative Test Analysis of Extremity Muscle Strength Scores in Non-Haemorrhagic Stroke Patients

Muscle Strength Score	Pre		Post		p value Wilcoxon	Delta	
	Range (Median)	Mean ± SD	Range (Median)	Mean ± SD		Range (Median)	Mean ± SD
Control	1-3 (1)	1,40±0,58	1-3 (2)	1,95±0,51	0,001	0-1 (1)	0,55±0,51
Intervention	1-3 (1)	1,55±0,68	1-4 (3)	2,65±0,93	0,000	0-2 (1)	1,10±0,71

Based on the table above, it shows that for the Wilcoxon Test analysis to show that there is a difference in extremity muscle strength before and after being given *Mirror Therapy*, namely in the intervention group before and after giving *Mirror Therapy*, the p

value = 0.000 < 0.05, so it can be concluded that there is a difference in the level of Extremity Muscle Strength in non-haemorrhagic stroke patients before and after being given the *Mirror Therapy* intervention, while the control group before and after obtained a p value = 0.001 < 0.05, so it was concluded that there was a difference between before and after administration according to hospital standards.

Test analysis of the effect of providing intervention with extremity muscle strength in non-haemorrhagic stroke patients

Muscle Strength Score	Pre		Post		Delta	
	Range (Median)	Mean ± SD	Range (Median)	Mean ± SD	Range (Median)	Mean ± SD
Control	1-3 (1)	1,40±0,58	1-3 (2)	1,95±0,51	0-1 (1)	0,55±0,51
Intervention	1-3 (1)	1,55±0,68	1-4 (3)	2,65±0,93	0-2 (1)	1,10±0,71
p value Mann Whitney	0,482		0,007		0,013	

Based on table 5.5, to see the effect of providing *Mirror Therapy* intervention and Hospital Standards looking at the results of the delta test, the value obtained is 0.013 < 0.05, meaning that there is an influence of *Mirror Therapy* and Hospital Standards on the extremity muscle strength of non-haemorrhagic stroke patients Based on *Self Care Theory*.

DISCUSSION

Based on the research results in the control group, it was found that the average score before and after giving the intervention in accordance with hospital standards was 1.40 and experienced an increase of 1.95. Wilcoxon Test analysis to show that there is a difference in extremity muscle strength before and after being given intervention according to hospital standards, namely in the control group before and after giving intervention according to hospital standards, the p value = 0.001, so it can be concluded that there is a difference between before and after Administration is carried out in accordance with hospital standards.

The results of research conducted by (Kasma *et al*., 2022) with the research title The Effectiveness of Rehabilitation Programs in Increasing Extremity Muscle Strength in Non-Hemorrhagic Stroke Patients, obtained Pre-intervention results with an average score of extremity muscle strength = 30 and Post-intervention with an average score of extremity muscle strength = 50 with a Delta value (Δ) = 20 (significant increase) which means that this research shows that a rehabilitation program according to hospital standards is effective in increasing limb muscle strength in non-hemorrhagic stroke patients.

Providing interventions according to hospital standards can increase extremity muscle strength scores in non-hemorrhagic patients for several reasons. These reasons include, firstly, the Protocol has been Proven to be Effective, secondly there is a Structured Approach with a structured rehabilitation program, thirdly Trained Experts with interventions carried out by trained health professionals, there is monitoring and evaluation and there is a combination of therapy. Interventions that comply with hospital standards are able to increase limb muscle strength scores in non-hemorrhagic patients because they are based on proven methods, implemented by experts, and equipped with comprehensive monitoring and support.

According to the researchers' analysis, the increase in extremity muscle strength scores in non-hemorrhagic stroke patients with intervention in accordance with the standards of the Jemursari Islamic Hospital, Surabaya City was due to the combination of care provided

by the Az-zahra Care Room nurses where after interviews were conducted, the care provided by the Hospital to non-hemorrhagic stroke patients with muscle weakness in the form of educational therapy, diet, medication and ROM (active and passive).

Based on the results of research in the intervention group, it was found that the average muscle strength score in the intervention group before giving *Mirror Therapy* was 1.55 and after being given the intervention an increase of 2.65 was obtained. For the Wilcoxon Test analysis to show that there is a difference in limb muscle strength before and after being given the *Mirror Therapy* intervention, namely in the intervention group before and after giving *Mirror Therapy*, the p value = 0.000 < 0.05, so it can be concluded that there is a difference between before and after giving *Mirror Therapy*.

The results of research conducted by Robinson *et al* (2023) with the research title The Effect of *Mirror Therapy* on Muscle Strength Tests in Non-Hemorrhagic Stroke Patients at Curup Hospital in 2022. The results obtained after applying *Mirror Therapy* for 4 days experienced an increase in muscle strength from previously 4 on the right hand and 5 on the left hand to 5 on the right hand and 5 in the left hand.

Mirror Therapy exercises are a form of rehabilitation or exercise that relies on and trains the patient's motor imagination or imagination, where the mirror will provide visual stimulation to the brain (cerebral motor nerves, i.e. ipsilateral or contralateral for the movement of the hemiparetic limb) through observation of body movements which will tend to be imitated. like a mirror by the affected part of the body (Lestari, 2021).

This is in accordance with the theory that when carrying out *Mirror Therapy* intervention, the mirror is placed in the patient's midsagittal position and reflects healthy hand movements. A person with a stroke may see a shadow of the healthy hand as if it were the paretic hand (Arif *et al*, 2024). *Mirror Therapy* is an appropriate method to improve sensory and reduce motor deficits and can improve recovery of extremities experiencing hemiparesis. In stroke patients who experience hemiparesis which causes disability and needs rehabilitation, *Mirror Therapy* is also an appropriate intervention as a home rehabilitation program for post-stroke patients who require long-term care and this intervention has been proven to be effective in improving the motor functional status of stroke patients. (Setiyawan *et al*., 2019).

In the intervention group, based on the results of the data obtained using the Mann Whitney test, the P value obtained during the pre test was 0.482 > 0.05, meaning that in the pre test there was no difference in treatment from the intervention group, while in the post test the P value was 0.007 < 0.05, meaning that post test there were differences in treatment from the intervention group. To see the effect of providing the *Mirror Therapy* intervention, look at the results of the delta test, a value of 0.013 < 0.05 was obtained, meaning there is no differences in *Mirror Therapy* on extremity muscle strength in non-hemorrhagic stroke patients based on *Self Care Theory*.

This is in line with research conducted by Zuliawati *et al* (2023) the results obtained using the Mann Whitney test showed that there was an effect of *Mirror Therapy* on muscle strength in non-hemorrhagic stroke patients (P-value 0.000). This is in line with the theory that *Mirror Therapy* imagines movement will activate the areas of the brain used to control movement, namely the premotor cortex, primary motor cortex and parietal lobe. Imagining a movement causes activation in ±30% of neurons in area M1 that will execute the imagined movement. *Mirror Therapy* not only activates the motor cortex, but also changes the somatosensory cortex. Looking at stimulation in a mirror can cause the sensation to spread to the other hand (Hasanah *et al*., 2019). By seeing a healthy limb performing functional motor movements in front of a mirror as if it were a paretic limb, it will maintain sensory feedback

through visual input to the brain, thereby not facilitating the phenomenon of learned nonuse. *Mirror Therapy* has the potential to trigger motor improvements in stroke patients (Zuliawati *et al*.,2023).

Researchers analyzed that providing *Mirror Therapy* as a therapy option for stroke sufferers is an effective choice. Where *Mirror Therapy* functions to improve the motor function of stroke sufferers. The results of the study showed that there was an effect of *Mirror Therapy* on muscle strength in non-hemorrhagic stroke patients at Jemursari Islamic Hospital. This is because in the *Mirror Therapy* intervention group there was an increase in the measuring scale because *Mirror Therapy* will provide visual stimulation to the brain through observation of body movements which will tend to be imitated like a mirror by the part of the body that is experiencing the disorder. Therefore, it is recommended for the hospital to be able to apply *Mirror Therapy* in nursing practice by doing it twice a day, thereby providing maximum results and it is hoped that *Mirror Therapy* can be used as a Standard Operating Procedure (SOP) in treating non-hemorrhagic stroke patients at the Jemursari Islamic hospital, Surabaya City.

CONCLUSION

The application of *Mirror Therapy* affects the level of extremity muscle strength in non-hemorrhagic stroke patients. However, in this study there was no significant difference between the two groups. Nurses are expected to be able to apply *Mirror Therapy* to apply it in nursing practice.

ACKNOWLEDGMENTS

This research is the result of a thesis. The author would like to thank all the supervisors and thesis examiners. would like to thank all the inpatient nurses at RSI Jemursari Surabaya as well as all respondents and families who have helped carry out this research to completion.

CONFLICT OF INTEREST

The research results have been mutually agreed upon so that there is no conflict of interest in this research.

REFERENCES

Ahmad Zaini Arif, Atika Jatimi, Adimah, F. I. (2024). *Mirror Therapy Meningkatkan Kekuatan Otot Paisen Pasca Stroke Non Hemoragik dengan Hemiparase*.

Appulembang, I., & Sudarta, I. M. (2021). Pengaruh Latihan Range of Motion Pada Ekstremitas Atas Dengan Bola Karet Terhadap Kekuatan Otot Pasien Stroke RSUD Dr. H. Soewondo Kendal (Studi Literature). *Jurnal Berita Kesehatan*, *XV*(1), 143–152.

Basyir, I. F., Nurkhalifah, N., & Linggabudi, I. G. B. W. (2021). Gambaran Radiologis pada Bidang Neurologis Stroke. *Syntax Fusion: Jurnal Nasional Indonesia*, *1*(10), 588–603.

Hasanah, M., Gofir, A., Setyopranoto, I., UIN Sunan Kalijaga, K., Neurologi, D., Kedokteran, F., & Gadjah Mada, U. (2019). Neurorehabilitasi motorik pasca stroke. *Berkala NeuroSains*, *18*(2), 51–56. https://journal.ugm.ac.id/bns/article/view/54998.

Herman, A., Thalib, S., & Dimara, H. (2023). Efektivitas *Mirror Therapy* Terhadap Peningkatan Kekuatan Otot Pada Pasien Post Stroke: Literatur Review. *Jurnal Ilmu Keperawatan Medikal Bedah*, *4*(1), 11–15. https://doi.org/10.32584/jikmb.v4i1.713.

Indiartinie, A. T., Setiyowati, E., Septianingrum, Y., & Muhith, A. (2023). The Importance of

Discharge Planning in Stroke Patients : Literature Review. *Journal Of Nursing Practice*, *6*(2), 130–136.

Kasma, Safei, I., Zulfahmidah, Rachman, M. E., & Nasrudin Andi Mappaware. (2022). Pengaruh Kepatuhan Menjalani Rehabilitasi terhadap Peningkatan Kekuatan Otot Pada Pasien Pasca Stroke. *Fakumi Medical Journal: Jurnal Mahasiswa Kedokteran*, *1*(3), 216–223. https://doi.org/10.33096/fmj.v1i3.68.

Kemenkes RI. (2018). Hasil Riset Kesehatan Dasar Tahun 2018. *Kementrian Kesehatan RI*, *53*(9), 1689–1699.

Lestari, E. N. I. (2021). *Program studi s1 keperawatan universitas muhammadiyah pringsewu lampung 2021*.

Mardiana, S. S., Yulisetyaningrum, & Wijayanti, A. (2021). Efektifitas ROM Cylindrical grip terhadap Peningkatan Kekuatan Otot Tangan pada Pasien Stroke Non Hemoragik. *Jurnal Ilmu Keperawatan Dan Kebidanan Vol.12*, *12*(1), 81–90.

Robinson, D. P., Pansori, H. M., & Hermiati, D. (2023). *287-295++maret+koloni+23+(Autosaved) (1)*. *2*(1), 287–295.

Setiawan, P. A. (2021). Diagnosis dan Tatalaksana Stroke Hemoragik. *JMH: Jurnal Medika Hutama*, *03*(01), 1660–1665.

Setiyawan, S., Nurlely, P. S., & Harti, A. S. (2019). Pengaruh *Mirror Therapy* Terhadap Kekuatan Otot Ekstremitas Pada Pasien Stroke Di RSUD dr. MOEWARDI. *JKM (Jurnal Kesehatan Masyarakat) Cendekia Utama*, *6*(2), 49. https://doi.org/10.31596/jkm.v6i2.296.

Sherina, N., Ramdan, D., & Hidayat, N. (2022). Assistancy of Medical Surgical Nursing for Patients with Nervous System Disorders (Hemorrhagic Stroke) in Flamboyant Room, General Hospital of Banjar. *Kolaborasi Jurnal Pengabdian Masyarakat*, *2*(2), 175–197.

World Health Organization. (2016). *Tabacco & Stroke*. *6*, 33–36.

Zuliawati, Rosaulina, M., & Tane, R. (2023). The Effect of *Mirror Therapy* on Muscle Strength in Non Hemorrhagic Stroke Patients in Sembiring General Hospital. *Jurnal Keperawatan Dan Fisioterapi (Jkf)*, *5*(2), 381–388. https://doi.org/10.35451/jkf.v5i2.1402.