

ORIGINAL ARTICLE

The Combination of Mirror Therapy and Range of Motion (ROM) Therapy Increased the Muscle Strength

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ABSTRACT

Introduction: One of the effects of cerebrovascular disease is weakening the body's muscle strength. Muscle weakness in patients varies greatly depending on the location and severity of the disease. The regular intervention that is often done in patients who experience decreased muscle strength is to perform ROM. However, it is necessary to combine other therapies to increase the patient's muscle strength. The purpose of this study was to determine the effective combination of mirror therapy and ROM therapy to increase muscle strength in patients with impaired physical mobility. **Methods:** The type of this study is pre experimental. The purposive sampling was used with 19 respondents from a hospital setting according to the inclusion criteria, able to communicate well, compos mentis, and had not received ROM therapy. Meanwhile, the exclusion criteria were patients with strength 0 and had fractures. Intervention frequency is 2 times a day in the morning and evening, 10-15 minutes each time. The research variable measured was muscle strength using an instrument using a manual muscle test (MMT). The intervention is to provide movement in the joints in combination with a mirror. **Results:** The study showed that the mean pretest was 3.47 and the mean post-test was 4.3. The combination of mirror therapy and ROM therapy showed significant results in increased muscle strength (p -value <0.05). **Conclusion:** The combination of mirror therapy and ROM therapy is effective in increasing muscle strength. This combination can be an alternative nursing action in patients who experience decreased muscle strength.

Keywords: Muscle strength; Mirror therapy and ROM therapy; Impaired physical mobility

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INTRODUCTION

Stroke is a cerebra-vascular disease marked by brain dysfunctions due to damage or death in the brain tissues by reducing or disrupting bloodstreams in the brain and blocking them (1). Problems caused by stroke are too way complicated in human being lives. Significant brain dysfunctions, such as balance dysfunctions, postural control disorders, coordination disorders, sensory disorders, and reflex disorders interfere with daily functional personal activities (Konvensional & Motor, 2014). Physical mobility disorder is a symbol of physical movement to prevent disability in the motor complex or to prevent the effects that often occur in patients with paralysis due to being unable to maintain pressure in the paralysis area. Change your body posture and reduce it (2).

In the United States, around 795,000 stroke cases struck in a year, around 66,000 stroke cases for the first time, followed by other 185,000 cases. This number of cases has killed more than 140,000 people each year. The data showed that one person dies because of a stroke every quarter minute. The prevalence of hemorrhagic stroke in Central Java in 2018 was 0.07% higher (0.03%) compared to that in 2017. In 2018, the highest prevalence of Kudus was 1.84%. The prevalence of non-hemorrhagic stroke in 2018 was 0.07% lower than that in 2017 (0.09%). In 2018, there was a significant increase in stroke cases in Semarang (3).

Nursing Intervention Classification (NIC) is recommended to overcome physical mobility problems and to enhance training, such as sleeping treatment and strengthening power. Due to this, Range of Motion (ROM) can improve the quality of life compared to other treatments. ROM intervention is focus on increasing the join activity, but every patient that doing a ROM they still need also motivation in order to give support while exercise.

In addition to ROM, there is another therapy known as mirror therapy. Mirror therapy is generally used to reduce anxiety, fear of movement, and the risks associated with the movement of painful bodies. Those reduction of anxiety and fear of movement will increase the motivation of the patient to do the exercise of join and muscle activity among stroke patient (4,5). This creates a visual illusion of healthy organs lying equally in space with the sacred organs and hidden behind the mirror. The visual feedback of normal limbs breaks the connection between pain and unmovable (4). The goal of this therapy is to improve the speed of the lower leg. With ROM, it is measured only in Sagittarius, and further research should evaluate the reversal and immersion (6). The combination of ROM and mirror therapy will accomplish between the joint muscle exercise and the motivation of patient to do exercise.

According to a survey conducted at the Sultan Agung Semarang Islamic Hospital in May 2019, the average number of patients surveyed every month was 20 to 30, with the majority of stroke patients being treated. Decreased strength occurred. In the Darul Maqomah ward, the treatments for patients with physical mobility disorders were by providing ROM, bed rest, and ADL up to 30 degrees above the head. For this reason, this research was carried out to determine whether the combination of mirror therapy and ROM therapy is effective or not in increasing muscle strength in patients with physical mobility disorders.

MATERIALS AND METHODS

Samples

This study used a pre-experimental research design. The sampling technique used is purposive sampling. According to the inclusion criteria, the sample size in this study was 19 respondents who could communicate well, was compos mentis, and did not receive ROM therapy. On the other hand, the exclusion criteria were patients with a thickness of 0 and a fracture.

Combination of Mirror Therapy and ROM methods

Data collection was carried out with the help of nurses who the researcher had determined. Before helping with the research, the room nurse was given apperception in the form of discussion and practicing how to do a combination of ROM and mirror therapy. The intervention was done in total of 14 days. The frequency of the intervention was done for 2 times per day, in the morning and evening, while the each session time was 10-15 minutes. The mirror used is 60 cm long and 30 cm wide. Before the intervention, the researcher placed a mirror in the patient’s direction at a distance

of 0.5-1 meters. At the time of ROM, the patient is asked to face a mirror and pay attention to movement in the joint muscle of upper and lower extremity from 30 until 360 degree.

Statistical analysis

The analysis used consisted of descriptive analysis and inferential analysis. The statistical analysis determines each variable by looking at the number and percentage, such as age, length of suffering, and muscle strength. The inferential analysis used was the Wilcoxon rank test because the muscle strength data before and after the intervention had an abnormal data distribution. For this reason, the analysis used in this study is the Wilcoxon rank test with Statistical significance defined by 0.05.

Instrument

The tool used for data collection was the muscle scale of the medical research committee. The muscle strength was tested by using a manual muscle test (MMT). In this way, the researcher determined the patients’ muscle strength through a muscle scale ranging from 0 to 5 on the Muscle Strength Scale (MSC).

ETHICAL CLEARANCE

The Respondents’ Characteristics

This study was approved by Research Ethics Committee, Faculty of Nursing Universitas Islam Sultan Agung No. 459/A.1-S1/FIK-SA/XI/2018

RESULTS

The result showed that the majority of respondents were male and the number of respondents in each category was 73.7% (table I). The average age of the respondents in the study was 58 years with standard deviation of 11.44 and the youngest age being 44 years old and the oldest being 99 years old. The average length of treatment was 2 days with the longest day of treatment being day 5. Muscle strength before the intervention was on average score of 3 and after the intervention, the average score of muscle strength was 4 (Table II).

Table I : The Distribution of Respondents Frequency Based on Gender Characteristics (n = 19)

Variable	Frequency (f)	Percentage (%)
Gender		
Male	15	78,9
Female	4	21,1
Total	19	100,0

Table II : The Distribution of the Respondents' Frequency Based on Age, length of treatment, muscle strength pre and muscle strength post Characteristics (n=19)

Variables	Mean \pm SD	Median	Minimum-Maximum	95% CI
Age	58,21 \pm 11,443	57,00	44-99	52,69-63,73
Length of Treatment	2,47 \pm 1,307	2,00	1-5	1,84-3,10
Muscle strength Pre	3,17 \pm 1,043	3,00	1-4	2,65-3,69
Muscle strength Post	4,11 \pm 1,049	4,00	1-5	3,60-4,61

Table III : The Result of Wilcoxon Test Analysis on the Pre and Post Mirror Therapy and ROM therapy Combination Treatment

Variable	n	Z	p-value (Asymp. Sig. (2-tailed))
Muscle Strength in the Pre and Post Mirror Therapy and ROM therapy Combination Treatment	19	-3.787 ^b	0,0001

Bivariate Analysis

The average muscle strength before the intervention was 3.17 ± 1.043 , with the lowest muscle strength being one and the highest being four. After the intervention, the average muscle strength was 4.11 ± 1.049 , with the most insufficient muscle strength being one and the highest being five. In determining the analysis test, a normality test was first performed. The results showed that the data distribution before and after the intervention was not normal, so the test used was Wilcoxon. Through the Wilcoxon statistical research, the value of the signed-rank test (Z) was -3.787 with a p-value of 0.0001 (p-value <0.05), and the muscle strength before intervention was more petite than after intervention. Therefore, it can be concluded that there is a significant difference between muscle strength pre and post-intervention (Table III).

DISCUSSION

Gender is also defined as dynamic mental energy which works and moves in harmony with individual behavioral motives (7). Adult males generally have a higher risk of stroke than those that occur at a young age. In a male, stroke is suspiciously triggered by smoking, liquor, obesity, and psychological factors, where males are vulnerable to feeling depressed due to demands or needs of work, and earning money (8). Many as 15 respondents (47%) suffered from a stroke in most age groups of 60-65 years (1). Degenerative processes (such as reduced elasticity of blood vessels and endothelial dysfunction) increase the occurrence of stroke in the elderly, which leads to an increase in peripheral

resistance, followed by systolic blood pressure, which results in impaired blood flows and risks of stroke (9).

Based on treatment status, the stroke patients' highest complaint is on the weak left arm and leg (38.5%). The weakness on one side of the body is caused by the decrease in muscle tension, making it impossible to move the body (2). When the patient is in hospital for a long time, almost immobile, his/her muscle strength can decrease. The death of brain tissues in stroke patients can cause loss of functions controlled by these tissues. One of the symptoms that occurred is muscle weakness of the limbs. The mirror therapy and ROM therapy combination affect increasing leg muscle strength in stroke patients with a p-value of 0.001. The result of this study indicates that ROM exercises combined with mirror therapy help maintain posture and joint position (6).

Stroke patients must be mobilized as soon as possible (10,11). One of the early mobilizations which can immediately be done is the provision of various exercises to increase the patient independence after having a stroke. Muscle atrophy due to a lack of activities is likely to lead to stroke in a month (11,12). However, by providing regular and early ranges of motion to parts of the body that undergo joint weakness or stiffness, it will provide various movements and changes in the ability to relax joints carried out by muscle tissues, and the muscle tissues will make the muscle length back to normal (13). ROM therapy is an effective tool to increase leg muscle strength in stroke

patients. ROM also maintains muscle strength, keeps joint mobility, stimulates blood circulation, and prevents malformations (14).

Mirror therapy is a form of moving image which is useful for rehabilitation, where the mirror will provide visual stimulation. It will be imitated just like parts of the body that are disrupted by the mirror (15). This mirror therapy is categorized as a new therapeutic intervention that focuses on making undamaged parts of the body move, a form of image in which a mirror is used to convey the vision to the brain by looking at the human body which is not affected by a series of stimulating movements (5). According to the researcher's assumption, the stroke patient's motor skills undergo stiffness or limited movement due to nerve damage, if the patient does exercises it will increase motor function. Those assumption are related with the finding of another study that also find that mirror therapy will improve motor function of the upper extremity, activities of daily living and pain for patients that suffered a stroke (16). This study was conducted to train the impaired hand and leg to move in front of the normal hand or leg, to rely on the mirror, and to figure out that the affected hand gradually follows the normal hand or leg movement, and the respondents look at the mirror (4). There is a notification in the brain from the eyes that make the hands move like normal hands and legs. Doing the same daily exercises affects the movements of the impaired or stiffed hands and legs. It is intended to change the respondents' rigid movements (15).

The combination of mirror therapy and somatosensory stimulation positively affects the motor healing process during stroke phases, including muscle strength, manual agility (phage work), and the ability to move the body for three weeks (17). The result of this study indicates that the combination of ROM exercises and mirror therapy in medical treatment can help restore better exercise intensity in stroke patients by affecting both hemispheres' activation. Providing ROM therapy can increase muscle strength through systemizing afferent nerve fibers. The afferent nerves of the peripheral nervous system transmit sensory information about muscle levels to the brain and stretch them into the central nervous system, helping them maintain pustules and joints (18). Providing mirror therapy and ROM therapy to the body areas which undergo weak or stiff joints can change the ability to relax the joints as they used to be and as soon as possible, and muscle tissue begins to adapt; to restore muscle length to normal.

CONCLUSION

The combination of mirror therapy and ROM therapy affects increasing muscle strength in patients with impaired physical mobility. There are impacts and differences in the levels of the average strength in terms of pre and post-intervention.

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