**EFFECTIVENESS OF RANGE OF MOTION (ROM) *SPHERICAL GRIP* ON THE GRADE OF UPPER EXTREMITY MUSCLE STRENGTH IN POST STROKE**

**INFARK PATIENTS WITH HEMIPARESE**

**RSUD SOEKANDAR**

Lutfi Wahyuni1, Siti Kotijah2, Catur Prasastia Lukita Dewi3

1,2,3,4 Nursing DepartmentUniversitas Bina Sehat PPNI Mojokerto, Indonesia

email:[ltf.hidayat@gmail.com](mailto:ltf.hidayat@gmail.com) (081330044843)

**ABSTRACT**

Stroke is a medical emergency. Stroke is the third leading cause of death in developed countries, after heart disease and cancer. Post-stroke patients generally experience muscle weakness in the limbs, postural disturbances and muscle atrophy. The purpose of this study was to prove the effect of ROM Spherical Grip exercise on post-stroke patients. This type of research is pre-experimental with one group pre-test-post-test design. The independent variable used in this study is the Range Of Motion (ROM) Spherical Grip. The dependent variable in this study was the degree of upper extremity muscle strength in post-stroke infarct patients who had hemiparesi. The sampling technique used is consecutive sampling. Samples were taken as many as 33 respondents by measuring muscle strength before and after being given the intervention. The instrument uses an observation sheet for assessing muscle strength and manual muscle testing (MMT) physical examinations in post-stroke patients. The results of this study showed that most of the muscle strength before giving the Spherical Grip ROM exercise was Poor (there was movement but could not fight gravity) as many as 14 respondents (42.4%). After the intervention of the Spherical Grip ROM exercise, the muscle strength was mostly Fair (can move against gravity) as many as 19 respondents (57.6%). There is an increase in upper extremity muscle strength before and after being given ROM Spherical Grip exercise in post-stroke patients who experience hemiparesis. This shows that the Spherical Grip can improve the tone of those who experience weakness and if done continuously can increase muscle strength in post-stroke patients.

# Keyword : *Range Of Motion, Spherical Grip, Muscle Strength, Stroke*

**INTRODUCTION**

Stroke is a condition that occurs when the blood supply to the brain is reduced due to a blockage (ischemic stroke) or rupture of a blood vessel (hemorrhagic stroke). This makes the veins or blood flowing to all parts of the muscle not drained to all parts of the muscle not being drained. If the right side of the body cannot be moved, it means that the left muscle has a problem and vice versa (Anggraini, 2018). Post-stroke patients generally experience muscle weakness in the limbs, postural disturbances and muscle atrophy. Muscle atrophy causes decreased activity in the joints so that the joints lose synovial fluid and cause joint stiffness (Henny, 2018).

With the high prevalence of stroke in Indonesia, rehabilitation is seen as important in treatment interventions for stroke patients. In non-hemorrhagic stroke patients after an attack that results in sensory and motor disturbances, including balance disorders, muscle weakness, and motor control disorders resulting in loss of coordination in the body (Nurtanti & Ningrum, 2019). According to WHO 2016 in 2015, as many as 6, 24 million people died from stroke. 53% had hemorrhagic stroke and the remaining 46% had ischemic stroke. The prevalence of stroke in Indonesia in 2018 was 10.9% and has increased by 3.9% in the last five years (Trismarani, 2019).

Indonesia also has the second highest stroke burden after Mongolia, which is 3,382.2/100,000 people based on DALYs (disability-adjusted life-year). Approximately 15 million people suffer a first stroke each year, with a third of these cases or about 6.6 million resulting in death (3.5 million women and 3.1 million men). Stroke is a bigger problem in low-income countries than in high-income countries. More than 81% of deaths from stroke occur in low-income countries, the percentage of premature deaths due to stroke rises to 94% in people under the age of 70 years (World Health Organization, 2016).

Based on a preliminary study conducted in October 2021, it was found that 55 clients underwent exercise therapy in the Medical Rehab Poly Room at Prof dr. Soekandar Mojosari Mojokerto experienced the most paralysis in the upper extremities and underwent therapy for 3 months but had not yet recovered or had not shown an increase in muscle strength and a significant increase in range of motion, because the client was not regular or obedient to the prescribed therapy schedule. Based on an interview with the head of the Medical Rehab Polyclinic, it is known that every week there are 10 to 15 post-stroke patients visiting, each visit is 1x/week and 2x/week who undergo physiotherapy at the medical rehabilitation clinic. Factors that cause stroke include non-reversible factors such as gender and age, reversible factors such as hypertension, heart disease, high cholesterol, diabetes mellitus, polycythemia, emotional stress, and lifestyle factors, for example. smoking, drinking alcohol, illegal drugs, unhealthy activities (Nanda, 2013). Symptoms of a stroke that appear can be physical, psychological, or behavioral. The most typical physical symptoms are limb weakness to paralysis, loss of sensation in the face, asymmetrical lips, difficulty speaking or slurring (aphasia), difficulty swallowing, decreased consciousness, headache (vertigo), nausea and vomiting and loss of vision on one side or the other. blindness occurs (Sari, L. M., & Yuliano 2019)..

According to the description above, researchers are interested in conducting research on "The Effect of Range Of Motion (Rom) Spherical Grip Exercise on Increasing Upper Extremity Muscle Strength in Stroke Patients at RSUD Prof Dr. Soekandar Mojosari".

**METHOD**

The research design used is Pre-Experimental with One Group Pretest and Posttest Design. The population in this study were all post-stroke patients who experienced paralysis of the left/right upper extremities at UPT Pukesmas Kec. Trawas Kab. Mojokerto in 2020 there are 33 people. In this study, the sampling technique used consecutive sampling with a sampling technique where data collection was limited by a certain period of time (Nursalam, 2013). The study was conducted for 4 weeks. The instrument in this study used an observation sheet about data collection procedures by measuring ROM / joint range of motion of stroke patients in the upper extremity joints. How to measure muscle strength manually means measuring the patient's muscle strength using a classic scale of 0, 1, 2,3, 4 and 5.

**RESULT**

**Table 1. Characteristics of respondents**

|  |  |  |
| --- | --- | --- |
| **general data** | **Frequency** | **(%)** |
| **Gender** |  |  |
| Female | 18 | 54.5 |
| Male | 15 | 45.5 |
| **Age** |  |  |
| 25 years | 0 | 0 |
| 26-30 years | 0 | 0 |
| 31-45 years | 10 | 30.3 |
| >45 years | 23 | 69.7 |
| **Total** | 33 | 100 |

Based on table 1 shows that the characteristics of respondents based on gender, most of the respondents were female as many as 18 respondents (54.5%) and male respondents as many as 15 respondents (45.5%). When viewed from the age characteristics of the respondents, namely 31-45 years as many as 10 respondents (30.3%). Age >45 years as many as 23 respondents (69.7%).

**Table 2 Characteristics of respondents based on the respondent's muscle strength before and after giving ROM exercises using Spherical Grib in stroke patients.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No** | **Criteria** | Muscle Strength | | | |
| **before** | | **after** | |
| **F** | **%** | **F** | **%** |
| **1** | **Zero** | 5 | 15.2 | 0 | 0 |
| **2** | **Trace** | 8 | 24.2 | 0 | 0 |
| **3** | **Poor** | 14 | 42.4 | 8 | 24.2 |
| **4** | **Fair** | 6 | 18.2 | 19 | 57.6 |
| **5** | **Good** | 0 | 0 | 6 | 18.2 |
| **Total** |  | 33 | 100 | 33 | 100 |

Based on table 2, the results obtained before giving the Spherical Grib ROM exercise as many as 5 respondents (15.2%) had zero muscle strength (no muscle movement at all), as many as 8 respondents (24.2%) had Trace muscle strength (there were contractions on palpation but no visible movement), as many as 14 respondents (42.4%) had poor muscle strength (there was movement but could not fight gravity), and 6 respondents (18.2%) had Fair muscle strength (can move against gravity) while after giving Spherical ROM exercises Grib as many as 8 respondents (24.2%) who have Poor muscle strength (can move and can fight light obstacles), 19 respondents (57.6%) have Fair muscle strength (can move against gravity), and 6 respondents (18.2%) ) who have good muscle strength (can move and can fight light obstacles). These data indicate that the intervention of giving Spherical Grib ROM exercise has been shown to have an effect on increasing muscle strength in post-stroke patients**.**

**DISCUSSION**

**1. The respondent's muscle strength before giving ROM exercises using Spherical Grib in post-stroke patients who experience hemiparesis**

Based on the results of the study, the results obtained before giving Spherical ROM exercises. In table 2, the results obtained before giving the Spherical Grib ROM exercise as many as 5 respondents (15.2%) had zero muscle strength (no muscle movement at all), as many as 8 respondents (24.2%) had Trace muscle strength (there were contractions on palpation but no visible movement), as many as 14 respondents (42.4%) have poor muscle strength (there is movement but cannot fight gravity), and 6 respondents (18.2%) have fair muscle strength (can move against gravity). Muscle strength is one of the most important elements as a foundation for preparations for heavier exercises, when viewed physiologically, muscle strength is the release of energy that originates in the neuromuscular system through muscle contraction. In stroke, weakness is a common symptom, muscle weakness is the biggest impact in stroke patients, weakness is found in the form of weakness on the right or left side (Febrina Angraini 2020). The lowest muscle strength in post-stroke patients before ROM Range of Mation is done is Zero which can be interpreted (no muscle movement at all). Factors that cause stroke include non-reversible factors such as gender and age, reversible factors such as hypertension, heart disease, high cholesterol, diabetes mellitus, polycythemia, emotional stress and lifestyle factors such as smoking. , drinking alcohol, illegal drugs, unhealthy activities. (Nanda, 2013).

Post-stroke sensory and motor disturbances result in balance disorders including muscle weakness, 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 stroke can cause permanent physical disability. . Physical disabilities can make a person less productive. Therefore, stroke patients require rehabilitation to minimize physical disabilities in order to carry out normal activities. Rehabilitation must be started as early as possible quickly and accurately so that it can help a faster and optimal physical recovery. The respondent's muscle strength after giving ROM exercises using Spherical Grib in stroke patients.

Based on table 2 the results of the study after giving Spherical ROM exercises. as many as 8 respondents (24.2%) who have Poor muscle strength (can move and can fight light obstacles), 19 respondents (57.6%) have Fair muscle strength (can move against gravity), and 6 respondents (18.2%) who have good muscle strength (can move and can fight light obstacles). These data indicate that the intervention of giving Spherical Grib ROM exercise has been shown to have an effect on increasing muscle strength in post-stroke patients.The results of this study indicate that ROM (Range Of Mation) exercises using the Spherical Grip really help balance the use of muscles that still have normal function, help maintain, establish strength and help maintain ROM in influencing the limbs in preventing muscle contractures and the occurrence of disability. Doing exercise (Range Of Mation) Spherical Grip regularly 2 times a day morning and evening with a time of 10 minutes given for 3 days, can increase independence in stroke patients. This is because almost all of the fingers move in a flexion position so they can grip an object. When grasping the metacarpophalangeal and interphalangeal joints they move freely. So that with the number of joints and muscles that also work can increase muscle strength.

This exercise is carried out in 3 stages, namely opening the hand, closing the fingers to grip the object and adjusting the grip strength. The duration of the exercise can affect the results obtained. The duration of the exercise depends on the patient's stamina. Good exercise therapy is an exercise that is not tiring, not too long in duration but with as many repetitions as possible. In an effort to reduce the number of patients with recurrent stroke, it is important for patients not only to understand the importance of the rehabilitation process but also to understand the importance of controlling risk factors. Efforts to treat stroke patients start from acute phase management to rehabilitation. Rehabilitation in stroke patients consists of physical therapy, occupational therapy, speech therapy, counseling and spiritual guidance. One of the rehabilitation used is physical therapy (physiotherapy). Physiotherapy in principle is carried out as soon as possible and adapted to the patient's condition (Pinzon, 2010).

2. **Analysis of the Effect of Muscle Strength Before and After Spherical Grip ROM (Range Of Mation) Exercises in Stroke Patients**

Based on table 2, the results obtained before giving the Spherical Grib ROM exercise as many as 5 respondents (15.2%) had zero muscle strength (no muscle movement at all), as many as 8 respondents (24.2%) had Trace muscle strength (there were contractions on palpation but no visible movement), as many as 14 respondents (42.4%) had poor muscle strength (there was movement but could not fight gravity), and 6 respondents (18.2%) had Fair muscle strength (can move against gravity) while after giving Spherical ROM exercises Grib as many as 8 respondents (24.2%) who have Poor muscle strength (can move and can fight light obstacles), 19 respondents (57.6%) have Fair muscle strength (can move against gravity), and 6 respondents (18.2%) ) who have good muscle strength (can move and can fight light obstacles). The results of the Wilcoxon test showed data that = 0.000 and = 0.05 so that < then H0 was rejected and H1 was accepted, so that there was an effect of Spherical Grib ROM exercise on increasing muscle strength in post-stroke infarct patients who experienced Hemiparesis at the Rehabilitation Poly Hospital Prof. Dr. Soekandar The data shows that the intervention of giving Spherical Grib ROM exercises has been shown to have an effect on increasing muscle strength in post-stroke patients.

The results of this study are in accordance with research conducted by Prok, Gessal & Angliadi (2016) which concluded that there was an increase in muscle strength in stroke patients after giving Spherical Grip ROM (Range Of Mation) exercise. These results can be seen in table 2 that the results of the study of 33 respondents, all respondents' muscle strength increased with muscle strength. Before the ROM Spherical Grip was carried out, there were zero muscle strength results (no muscle movement at all) as many as 5 respondents after the Spherical Grip ROM exercise turned out to be an increase in muscle strength to poor (there was movement but could not fight gravity). ROM Spherical Grip there are results of Trace muscle strength (there are contractions during palpation but no visible movement) as many as 8 respondents after the ROM Spherical Grip exercise, it turns out that 8 respondents experienced an increase in muscle strength to Fair (can move against gravity), Prior to ROM Spherical Grip has poor muscle strength results (there is movement but can't fight gravity) as many as 14 respondents after the Spherical Grip ROM exercise, it turns out that 14 respondents have increased muscle strength to Fair (can move against gravity), Before the Spherical Grip ROM was carried out there were results fair muscle strength (no movement) but can't fight gravity) that is as many as 6 respondents after the Spherical Grip ROM exercise turned out to be 6 respondents an increase in muscle strength to good (can move and can fight light obstacles).

ROM therapy has been found to be effective in increasing the muscle strength of the extremities of stroke patients. The increase in the occurrence of muscle strength is influenced by several factors, while the factors that affect muscle strength are gender and age (Pujiastuti, 2003) cited in (Yuliastiti, 2011). On the gender factor, the results showed that most of the respondents were female as many as 18 respondents (54.5%). Gender is one of the factors that affect muscle strength. Women have a strong relationship with increasing muscle strength than men. According to Laubach (1976) in (Utomo, 2010). The results of the comparison study of male and female muscle strength in female extremities averaged 71.9% of male muscle strength. Male muscle strength after puberty is influenced by the hormone testosterone which has an anabolic effect, one of which is important in maintaining muscle mass.

Based on the above research, the increase in muscle strength in women also greatly affects joint flexibility. Women's joints are more flexible than men's because they have smaller bones and less muscle than men. In the next factor, namely age, the results showed that most of the respondents were >45 years old as many as 23 respondents (69.7%). With age, muscle strength will decrease gradually. After the age of 30, humans will lose approximately 3-5% of total muscle tissue per decade. Decreased muscle function and strength will result, namely a decrease in the ability to maintain body balance, obstacles in moving and changes in body posture (Utomo, 2010).

Based on the results of the study, 8 out of 33 respondents had experienced a decrease in muscle strength so it was difficult to do ROM exercises. This happened because the stroke he had suffered for years had not even done any ROM exercises so that he experienced stiffness. Actually natural when there is a decrease in muscle strength. This happens because with increasing age a person will also be followed by a decrease in body tissues which causes a decrease in the ability of muscles and other organ functions. Decreased ability to perform activities is caused by gradual shrinkage of body tissues. At the age of >45 years with increasing age, scientifically occurring degeneration can also cause a decrease in muscle strength. The duration of the exercise can affect the results obtained. The duration of the exercise depends on the patient's condition. Good exercise therapy is an exercise that does not melt, the duration is not too long but with repetition as often as possible. Exercise repetitive motion with as much quality as possible. Repeated and focused movements can establish new connections between the motor system and activate spinal motor neurons that are the basis of recovery in stroke patients. If this movement is done regularly, there will be an increase in muscle strength (Andarwati, 2013).

**CONCLUSION**

The results showed that there was an effect of Spherical Grip ROM (Range Of Mation) exercise on increasing muscle strength in post-stroke infarct patients who experienced hemiparesis at the Rehabilitation Poly Hospital Prof. Dr. Soekandar Mojosari. Movement exercises, especially range of motion using the Spherical Grip for post-stroke patients can increase the patient's independence. Increasing muscle strength by using Spherical grip exercises is very influential, this is because almost all of them move the fingers in a flexed position so they can grip an object. When grasping the metacarphalangeal and interphalangeal joints move freely. The number of joints and muscles that work is one factor in increasing muscle strength.

**SUGGESTION**

**1. For Respondents**

It is hoped that after being given the Spherical grip ROM exercise, the respondent is asked to continue it himself at home to add information that will later affect the increase in muscle strength in stroke patients.

**2. For Health Workers**

It is hoped that this research can be used as additional knowledge of muscle strength training in stroke patients who experience decreased muscle strength, especially in the upper extremities, especially in the gripping exercise section, especially using the spherical grip. During treatment there must be collaboration to be given physiotherapy and also assisted by taking medication according to the doctor's advice.

**3. For Further Researchers**

It is hoped that future researchers will further refine this research. To be even more effective in this Spherical grip exercise, it can be developed further due to time constraints and it is only carried out in the hospital during control and at the respondent's home and the equipment is also not in accordance with operational standards.

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**CONFLICT OF INTEREST**

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