



## The Effect of Active Range of Motion (ROM) on Muscle Strength in Non-Hemorrhic Stroke Patients in The Physioteraphy Room of Imelda Pekerja Indonesia General Hospital, Medan City North Sumatera

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### ABSTRACT

Non hemorrhagic stroke is experiencing delays in movement due to muscle weakness. The purpose of this study was to analyze the effect of active Range of Motion (ROM) on muscle strength in non-hemorrhagic stroke patients in the PHYSIOTRAPI ward of IMELDA MEDAN RSU. This type of pre-experimental analytic research using the one group pre-test post-test design method. The population in this study were 120 respondents and a total sample of 21 respondents were taken using simple random sampling. The independent variable was active Range of Motion (ROM) and the dependent variable was muscle strength in patients with non-hemorrhagic stroke. Collecting data using checklists, processing data through editing, coding, scoring, tabulating, and Wilcoxon statistical tests. The results showed that of the 21 respondents with poor muscle strength, 13 (61.9%) respondents, after active ROM were performed, most of the respondents had strong muscle strength. good muscle category 11 (52.4%) respondents. The value of  $p=0.000$  is smaller than  $=0.05$ , so  $H_1$  is accepted. The conclusion of this study is that there is an effect of giving active Range of Motion (ROM) on muscle strength in non-hemorrhagic stroke patients.

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#### Kata kunci:

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### ABSTRAK

Penyakit stroke non hemoragik adalah mengalami keterlambatan dalam melakukan pergerakan karena terjadi kelemahan otot. Tujuan penelitian ini adalah menganalisis pengaruh pemberian *Range Of Motion* (ROM) aktif terhadap kekuatan otot pada pasien stroke non hemoragik di Ruang FISIOTRAPI RSU IMELDA MEDAN. Jenis penelitian analitik pra experimental dengan menggunakan metode *one group pra-test post-test design*. Populasi dalam penelitian ini sebanyak 120 responden dan jumlah sampel 21 responden yang diambil menggunakan *simple random sampling*. Variabel independen adalah *Range of Motion* (ROM) aktif dan variabel dependen adalah kekuatan otot pada penderita stroke non hemoragik. Pengumpulan data menggunakan *ceklist*, pengolahan data melalui *editing, coding, scoring, tabulating*, dan uji statistik *wilcoxon*. Hasil penelitian menunjukkan bahwa dari 21 responden kekuatan otot dengan kategori kurang 13 (61,9%) responden, setelah dilakukan ROM aktif sebagian besar responden memiliki kekuatan otot kategori baik 11 (52,4%) responden. Nilai  $p=0,000$  lebih kecil dari  $\alpha=0,05$ , sehingga  $H_1$  diterima. Kesimpulan penelitian ini adalah ada pengaruh pemberian *Range of Motion* (ROM) aktif terhadap kekuatan otot pada pasien stroke non hemoragik.

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## INTRODUCTION

Daily activities require muscle work and require maintenance of muscle tone or muscle strength. In a sick condition, a person is unable to perform activities due to limited motion, muscle strength can be maintained by performing range of motion (ROM) exercises (Otre and Ferry, 2010). Loss of function due to impaired motor control in non-hemorrhagic stroke patients results in loss of coordination, body balance and ability to maintain certain positions. Non-hemorrhagic stroke patients will experience muscle weakness, making it difficult for patients to move (Muttaqin, 2013).

ROM exercise is one form of exercise in the rehabilitation process which is considered quite effective to prevent disability in stroke patients. This exercise is a form of fundamental nurse intervention that can be carried out for the success of the therapeutic regimen for patients and in an effort to prevent the occurrence of permanent disability conditions in stroke patients after hospitalization, so as to reduce the patient's level of dependence on the family, increase self-esteem and coping mechanisms. sufferer.

Stroke is the first cause of disability and the third cause of death after coronary heart disease and cancer. Stroke sufferers are the majority of the elderly. Data shows that two-thirds of strokes currently occur in developing countries. Globally, about 80 million people suffer from stroke. There are about 10 million new stroke sufferers each year, of which about 5 million die within 12 months after a stroke, another third have permanent disability. The risk of stroke death is about 20% for ischemic stroke, 40-70% for hemorrhagic stroke (Hinkle & Cheever, 2014).

According to Bakara & Warsito, 2016 stroke is a blood circulation disorder in the brain that causes impaired brain function which results in various disorders in other body parts (Dinanti, et al, 2015). In brain tissue, lack of blood flow causes a series of biochemical reactions that can damage or kill brain cells (Bakara & Warsito, 2016).

According to WHO, stroke is the number 3 killer after heart disease and cancer. In Europe found about 650,000 new cases of stroke every year. In America alone, stroke kills more than 160,000 people and 75% of stroke patients suffer from paralysis (Dinanti, et al, 2015)

According to Riskesdas (2013), stroke in Indonesia is ranked 3rd. Stroke can cause a variety of neurologic deficits, depending on the location of the lesion (which blood vessel is blocked), its size, the area of inadequate perfusion, and the amount of collateral blood flow (secondary or accessory). There are 2 types of stroke, namely ischemic and hemorrhagic.

Patients with CVA infarction in North Sumatra Province were 190,449 people (6.6%) (Kemenkes RI, 2014). One of the private hospitals in Medan City is the Indonesian Workers Hospital Melde, it is known that the number of stroke sufferers in the last 3 months (April-June) 2020 is 90 people.

Muscle weakness in non-hemorrhagic stroke patients will affect muscle contraction, so that it can inhibit the main nerves of the muscles and spinal cord. The inhibition of oxygen and nutrients to the brain causes serious health problems because it can cause hemiparase to cause death. The occurrence of disturbances in the level of physical mobilization of clients is often caused by a movement in the form of bed rest. The effects of a weakened muscle tone associated with lack of physical activity usually appear within a few days. Control of the brain to regulate muscle movement has decreased function resulting in reduced muscle mass.

Non-hemorrhagic stroke patients require good treatment to prevent physical and mental disability if the patient does not receive optimal treatment, disability and physical weakness will occur. The therapy needed to reduce advanced muscle weakness, one of the rehabilitation programs that can be given to non-hemorrhagic stroke patients is joint mobilization by giving active ROM. Active ranger of motion is an exercise performed to maintain or improve the level of normal joint movement ability to increase muscle mass and muscle tone. Giving active ROM early can increase muscle strength, hemiperase deficiency patients if not treated immediately experience permanent muscle weakness (Potter and Perry, 2010).

Based on the above background, the researcher is interested in conducting research on the effect of giving active range of mounts or (ROM) on muscle strength in non-hemorrhagic stroke patients in the Physiotherapy clinic room at Imelda Workers' Hospital in Indonesia.

## METHOD

### Types of research

According to Nursalam (2013), research design is something that is very important in research, allowing maximum control of several factors that can affect the accuracy of a result. Design can be used by researchers as a guide in planning and implementing research to achieve a goal or answer a research question.

This research is a type of analytical research. This study uses a pre-experimental design (trial) with a pre-post test design in one group (one group pre-post design). The characteristic of this study is to reveal a causal relationship by involving one group of subjects. The subject group was observed before the intervention was carried out and then observed again after the intervention (Nursalam, 2013). In this study, researchers wanted to determine the effect of active ROM exercise on muscle strength in patients with non-hemorrhagic stroke in the Physiotherapy room at Imelda General Hospital, Medan.

### Research design

The research design is a research strategy in identifying problems before the final planning of data collection (Nursalam, 2011). The design used in this study was pre-experimental with one group pre-test post-test design method.

### Research Place and Populations

This research was carried out in the Physiotherapy room at Imelda General Hospital, Medan. Research time This research was conducted on 30 May – 20 July 2020. The population is a generalization area consisting of objects that have certain qualities and characteristics determined by the researcher to be studied and then conclusions are drawn (Sugiyono, 2013). The population of this study were all 120 non-hemorrhagic stroke patients in the Physiotherapy room at Imelda General Hospital Medan.

### Sample

The sample is part or the number and characteristics possessed by the population, if the population is large and it

is impossible for the researcher to study everything in the population, the researcher will take a sample from that population, what is learned from the population, the conclusions will be applied to the population, to the sample taken from the population must be truly representative (Sugiyono, 2013) the sample used in this study is an accidental sample.

### Data processing

After the data is collected, then data processing is carried out through the stages of Editing, Coding, Scoring and Tabulating.

#### 1. Editing

Editing is a very important part to achieve the main goal before further data processing is carried out. Where the researcher must re-check the completeness of a data.

#### 2. Coding

Coding is an activity of assigning a numeric code (number) to data which consists of several categories respectively. Giving this code is very important to facilitate the processing and analysis of data using a computer.

## RESULT AND DISCUSSION

In this chapter, the researcher will present the results of data collection through observation and discussion. Data collection was carried out in the Physiotherapy Room at Imelda Medan Hospital for non-hemorrhagic stroke patients, it was found that there were 21 respondents who were carried out from May to June 20 20. The results of the study are a description of the condition of the characteristics of the variables studied, namely: the effect of giving active Range Of Motion (ROM) on muscle strength in non-hemorrhagic stroke patients in the Physiotherapy Room of Imelda General Hospital Medan.

**Table 3.**  
**Tabulation Cross Influence Giving Active ROM to Strength Muscle on Non - Hemorrhagic Stroke Patients in the Room Physiotherapy**

Before	Muscle Strength						Total	
	Well		Enough		Not enough		f	%
	F	%	F	%	F	%		
Well	2	9.5	0	0.0	0	0.0	2	9.5
Enough	6	28.6	0	0.0	0	0.0	6	28.6
Not enough	3	14.3	5	23.8	5	23.8	13	61.9
<b>number</b>	<b>11</b>	<b>52.4</b>	<b>5</b>	<b>23.8</b>	<b>5</b>	<b>23.8</b>	<b>21</b>	<b>100.0</b>

Wilcoxon test result  $p = 0.000$   $\alpha = 0.05$

Based on Table 3 of the cross tabulation of the effect of giving active ROM on muscle strength in patients with non-hemorrhagic stroke in the Physiotherapy Room of Imelda Workers' Hospital in Indonesia, it was found that from 21 respondents, most of them had muscle strength in a good category as many as 11 or 52.4% of respondents. This shows that the more frequent active ROM affects muscle strength in non-hemorrhagic stroke patients

From the Wilcoxon test results, it was found that the significance of 0.000 is less than 0.05 so it can be stated that H1 is accepted or there is an effect of giving active *Range of Motion* (ROM) on muscle strength in patients with non-

**Table 1 Distribution of Respondents Frequency by Gender and age (N=21)**

Characteristics of Respondents	Frequency	Percentage (%)
<b>Gender</b>		
Female	12	57.19
Male	9	42.9
<b>Age</b>		
35-49 Years	5	23.8
50-64 Years	8	38.1
65Years	8	38.1

Based on the table 1, it shows that most of them consist of 12 respondents or 57% are male. Some respondents aged 50-64 years were 8 or 38.1% respondents and some respondents aged 65 years were 8 or 38.1% respondents.

The results of measuring the respondent's muscle strength before active ROM intervention was carried out in the Physiotherapy Room of Imelda Workers' Hospital of Indonesia are shown in the table below.

**Table 2 Distribution Frequency Strength Muscle Respondent Before and after Active ROM in Space Physiotherapy (N=21)**

Muscle Strength	Frequency	Percentage (%)
Before Intervention		
Well	2	9.5
Enough	6	28.6
Not enough	13	61.9
After Intervention		
Well	11	52.4
Enough	5	28.6
Not enough	5	28.6

Based on the table 2, it shows that almost half of the respondents who lack muscle strength are 13 or 61.9% of respondents. Almost after the intervention, the muscle strength was either 11 or 52.4% of the respondents.

Based on the results of cross tabulation, the effect of giving Active ROM on muscle strength in patients with non-hemorrhagic stroke is presented in the table below.

hemorrhagic stroke in the Physiotherapy Room of Imelda Indonesian Workers Hospital Medan.

## DISCUSSION

### Muscle Strength Before Active *Range Of Motion* (ROM)

The results of the study in table 4.1 it is known that most of the respondents who experienced non-hemorrhagic stroke were male as many as 12 or 57.1% of respondents, male

gender. Physically, men are stronger than women, but women have stronger endurance than men, both in terms of pain resistance and disease resistance. Men are more susceptible to various types of diseases than women because of the unhealthy lifestyle of men, so they are more likely to suffer from non-hemorrhagic strokes and require active *Range of Motion* (ROM) exercises.

The results of this study are in accordance with the theory that non-hemorrhagic stroke patients are more common in men than women (Lewis, 2014). According to Chefez (2011) who says that the risk of male sex affects the incidence of non-hemorrhagic stroke. This can be seen from the lifestyle of men who smoke a lot, drink alcohol, so that it can interfere with motor function in non-hemorrhagic stroke patients.

Based on table 4.2 shows that almost all respondents who experience muscle strength in non-hemorrhagic stroke patients over the age of 50 years. The results of the study in table 4.2 of respondents aged 50-64 years as many as 8 or 38.1% of respondents and respondents aged 65 years showed that muscle weakness in patients with non-hemorrhagic stroke was experienced at the age of over 50 years with an incidence rate of almost all respondents.

According to researchers, non-hemorrhagic stroke patients are more common at the age above 50 years because in the elderly there is weakness of muscle strength in both the upper and lower extremities, where all organs of the body experience a decline in function, especially in motor function at that age. Not many at that age have reduced muscle strength so that it is necessary to give active ROM optimally.

According to Suiraka (2012) states that the incidence of non-hemorrhagic stroke increases with increasing age, after the age enters 50 years and above. so the older he gets, the more mature he is, mature age is the age he can always be positive and do positive things also for his own health. Because with a mature age it will form a better personality and a better role also to be positive, and can distinguish which is positive and which is negative or which is good and which is bad for his own health. With a mature age is expected to always be more positive.

The results of the research on the respondent's muscle strength based on table 5.3 on special data prior to active *Range of Motion* (ROM) it is known that the category of lacking muscle strength is 13 or 61.9% of respondents with non-hemorrhagic stroke. Consisting of 6 or 28.6% of respondents with sufficient muscle strength, 2 or 9.5% of respondents with good muscle strength category.

Researchers argue that during the study many respondents experienced less muscle strength in the upper and lower extremities when carrying out daily activities, so that being given an active *Range of Motion* (ROM) in patients with non-hemorrhagic stroke will increase muscle strength to be good so that they are easy to move. the extremities in general.

According to Kwakkkel, et al (2013), said that 30-60% of non-hemorrhagic stroke respondents who experienced less muscle strength would experience loss of upper and lower extremity function within 6 months. Based on tabulation before *Range Of Motion* (ROM) was performed. active muscle strength was greater in the lower extremities with a total of 39 or an average of 1.86 respondents, and the upper extremity muscle strength of 37 or an average of 1.76 respondents.

The researcher argues that the conditions from the data above can cause a decrease in muscle strength in the extremities in general, a decrease in flexibility and joint stiffness which can lead to contractures so that in the end respondents will experience limitations, especially in carrying out activities. During the study, the level of activity in the

upper extremities was lacking in moving the limbs so that it could increase the decline in functions such as muscle atrophy, reduced joint lubrication, and joint stiffness. However, the increase in range of motion of muscle strength and muscle tone of the lower extremities before active ROM of non-hemorrhagic stroke respondents was quite good from the upper extremities. Most respondents' muscle strength before giving active ROM to the lower extremities tended to be better than the upper extremities.

Muscle strength is closely related to the neuromuscular system, namely how much the ability of the nervous system to activate muscles to contract. So that the more muscle fibers are activated, the greater the force generated by the muscle. The muscle strength of the legs, knees and hips must be adequate to maintain body balance in the presence of external forces. The muscle strength is directly related to the ability of the muscles to resist the force of gravity and other external loads that continuously affect body position (Risangdiptya, 2016).

### **Muscle Strength after Active *Range of Motion* (ROM)**

Based on table 4.4 it is explained that most of the good muscle strength after active ROM is 11 or 52.4% of respondents in non-hemorrhagic stroke patients. Consists of 5 or 23.8% of respondents who have sufficient muscle strength, 5 or 23.8% of respondents who have less muscle strength.

Based on the facts above, the research found that after active ROM the muscle strength of non-hemorrhagic strokes was mostly good and respondents were able to move their limbs compared to before active ROM was performed. This shows that the provision of an active *Range of Motion* (ROM) can have a positive impact on increasing muscle strength in non-hemorrhagic stroke patients.

According to Puspawati (2010), intervention with active *Range of Motion* (ROM) on strength twice a day is more effective than using active ROM once a day because it can increase strength more effectively and achieve good muscle strength.

Based on the tabulation after active *Range of Motion* (ROM) muscle strength was greater in the lower extremities of 70 or an average of 3.33 respondents, and in the upper extremities of 59 or an average of 2.81 respondents. non-hemorrhagic stroke respondents on lower extremity muscle strength recover faster because the severity of patients who attack the part of the brain that controls the lower limbs is lighter, as well as the enthusiasm of the respondents themselves. Rehabilitation of non-hemorrhagic stroke patients takes a relatively long time. significantly lower extremity than before and after active ROM, because the range of motion and muscle tone of the lower extremity is more frequently used, the majority of people move their legs more often during rehabilitation. Respondents experienced an increase in muscle strength so that they experienced an increase in strength and muscle contraction was much better than the range of motion of the joints of the upper extremities in non-hemorrhagic stroke patients.

*Range of Motion* (ROM) exercises that are programmed and carried out continuously and regularly can provide optimal results, because the more often the joints are moved regularly with the right technique and slowly, it can increase muscle strength and nerve response in patients with non-hemorrhagic stroke in the lower extremities. who initially lacked good muscle strength (Suratun, 2013).

## Effect of Active *Range of Motion* (ROM) on Muscle Strength in Non-Hemorrhagic Stroke Patients

Based on data analysis using a computerized program with the *Wilcoxon test* in table 5.5, the value of  $p = 0.000$  is smaller than  $\alpha = (0.05)$ , then  $H_1$  is accepted. This means that there is an effect of giving active ROM on muscle strength in non-hemorrhagic stroke patients in the Physiotherapy Room of Imelda Indonesian Workers Hospital, Medan. The results of the study in table 4.4 show that after active ROM treatment, it is known that almost all of the respondents with good muscle strength were 11 or 52.4% of the respondents.

According to researchers, several active ROM exercises that are often done are efforts that can help non-hemorrhagic stroke patients increase muscle strength to prevent disability and complications. The theory and results are continuous so that there is an effect of giving active ROM on muscle strength in non-hemorrhagic stroke patients, especially in the lower extremities.

Patients whose muscle strength is in the category of more or less experience the influence due to the acceleration of more or less stimulus in the joints and even the degree of muscle strength so that the muscle strength experiences good or sufficient muscle strength. to do active ROM.

This is supported by the opinion of Purwanti (2008) that the appropriate exercise or activity for non-hemorrhagic stroke patients is the provision of active ROM. If this exercise is carried out regularly and continuously, both in the upper and lower extremities, it can accelerate the stimulus to increase joint flexibility and even the degree of muscle strength in non-hemorrhagic stroke patients and show that the motor function of the motion unit is optimal again (Irfan, 2010).

This is in line with the opinion of Lumantobing (2008), the results of research conducted by researchers prove that the contraction mechanism of motor neurons can increase smooth muscle in the lower extremities. Active range of motion (ROM) exercises can stimulate stimulation thereby increasing chemical, neuromuscular, and muscular activation. The mechanism through the muscles, especially the smooth muscles of the lower extremities, will increase metabolism to produce ATP which is used by the smooth muscles of the upper and lower extremities as energy.

## CONCLUSION AND RECOMMENDATIONS

Based on the results of the research discussion in finding the effect of giving active ROM on muscle strength in patients with non-hemorrhagic stroke in the Physiotherapy Room, Imelda General Hospital Medan, it can be concluded as follows:

1. Muscle strength in non-hemorrhagic stroke patients before active Range of Motion (ROM) was mostly experienced by respondents in the poor category and there was an increase in muscle strength in the lower extremities.
2. Muscle strength in non-hemorrhagic stroke patients after active Range of Motion (ROM) was mostly experienced by respondents in good category and there was an increase in muscle strength in the lower extremities.
3. There is an effect of giving active Range of Motion (ROM) on muscle strength in patients with non-hemorrhagic stroke in the Physiotherapy Room of Imelda General Hospital Medan.

## SUGGESTIONS

1. For respondents After taking action on the respondent, it is expected that when they are discharged from the hospital, it is recommended that the respondent continue to carry out active ROM at home assisted by family members, the goal is to prevent joint stiffness even though it does not have a serious effect on increasing the muscle.
2. For health workers, the results of the study can be used as reference material and information in providing independent nursing interventions and how many times to administer active ROM in the muscle strength of non-hemorrhagic stroke patients.
3. For further researchers, further research is needed to improve abilities and provide longer movements, so that the results obtained can describe more maximal results. It is also hoped that in further research that can affect the development of muscle strength recovery in post-op fracture patients so that more serious research results can be obtained. Based on the results of the study, the results showed good changes and made active ROM as an alternative to increase muscle strength.

## ETHICAL CONSIDERATIONS

### Funding Statement.

The author declares that no funding was received in connection with this research.

### Conflict of Interest statement

The author declares that there is no conflict of interest related to this research and that there are no ethical issues arising from this research.

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