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RESEARCH

Description of Upper Extremity Muscle Strength In Patients Post Stroke in The Working Area of The Sidoarjo Community Health Center

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ABSTRACT

Stroke is a functional disorder of the brain caused by blocked blood vessels in the brain which reduces the supply of oxygen and nutrients to the brain. Decreased muscle strength often occurs in stroke patients. Muscle strength is the ability of the muscles to perform one full contraction against resistance or load. The purpose of this study was to describe the strength of the upper extremity muscles in post-stroke patients in the working area of the Sidoarjo Health Center. The research method used is descriptive. The sampling technique in this study used a quota sampling technique with a sample of 30 people. The data collection tool uses the Medical Research Council Muscle Scale muscle strength scale. The results showed that data obtained for upper extremity muscle strength in lifting as much as 23% with a right hand muscle strength scale of 3 and 27% with a left hand muscle strength scale of 0 and upper limb muscle strength in grasping as much as 20% with a right hand muscle strength scale of 3 and 27%. with the left hand muscle strength scale 3. It is hoped that the patient can do range of motion exercises so that the joints are not stiff.

Keywords : Stroke, Muscle Strength, Medical Research Council Muscle Scale

INTRODUCTION

Stroke is a focal or general brain functional disorder that appears as a person ages. This is caused by bursting of blood vessels or blockage of blood vessels in the brain which reduces the supply of oxygen and nutrients to the brain (Ghani et al., 2016). Brain attack is another term for stroke. The cause of the high mortality and disability in stroke is caused by pathophysiological processes that occur in brain tissue (Kusuma & Anggraeni, 2021).

Stroke is a clinical manifestation of impaired brain function, both focal and global (overall), which occurs suddenly, lasts more than 24 hours or until it causes death, without any other cause other than vascular disorders (Nurhidayat et al., 2021). Stroke is a condition that occurs when the blood supply to the brain is cut off due to blockage or rupture of blood vessels resulting in the death of cells in certain areas of the brain. In the brain tissue, the lack of blood flow causes a series of biochemical reactions that can damage or kill the brain's nerve cells (Elisabet & Taviyanda, 2013).

The risk factors that cause stroke are divided into two, namely the first that cannot be controlled, such as age, gender, race and ethnicity, family history of stroke. The second is factors that can be controlled such as high blood pressure, cholesterol levels, smoking habits, diabetes, alcohol consumption, obesity, lifestyle, and stress (Pajri et al., 2018). When people are stressed, the adrenaline hormone in their body will increase so that it will cause blood pressure in the body to rise (Anies, 2018).

At present the increase in non-communicable diseases is more rapid than infectious diseases. The more dominant factor that results in high rates of non-communicable diseases includes an unhealthy lifestyle. One type of non-communicable disease with a high mortality rate is stroke. The stroke causes several symptoms, namely paralysis of the face or limbs, speech is not fluent, speech is not clear, changes in consciousness, and visual disturbances (Alway, 2012).

According to the World Health Organization (WHO) almost 73% of deaths today are due to non-

communicable diseases. The World Health Organization (WHO) reveals that every year there are 13.7 million new cases of stroke, and around 5.5 million deaths occur due to stroke (Retnaningsih, 2023). The World Stroke Organization shows that 43.0% of deaths are from stroke, and the prevalence of stroke is 102.0%. Over the past 15 years, stroke has been an average cause of death in low- and middle-income countries more than in high-income countries (Feigin et al., 2022).

In Indonesia, the prevalence of stroke in 2018 was 10.9%. The highest prevalence of stroke was in the province of East Kalimantan, which was 14.7 per mile and the lowest was in Papua, which was 4.1 per mile. Meanwhile, the prevalence of stroke according to a doctor's diagnosis in residents aged ≥15 years in East Java province in 2018 was 12.4 or 16% (Kemenkes RI, 2018). Cases of stroke in Indonesia every year there are an estimated 500,000 people affected by stroke (Mardiyanti & Aktifah, 2021).

The problem that is often experienced or often feared by stroke patients is sensory disturbance. Sensory loss in stroke patients such as decreased muscle strength and inability to move. In stroke patients, decreased muscle strength occurs due to obstruction of blood supply to the brain (Lewis, 2017). Stroke patients are not abnormalities of the musculoskeletal system, but stroke conditions are abnormalities of the brain as the central nervous system which controls and triggers movements of the neuromusculoskeletal system. Because muscle and joint stiffness can cause problems in carrying out daily activities or activity daily living (ADL) after a stroke (Alfisyah et al., 2021).

Decreased muscle strength is caused by reduced muscle contraction due to obstruction of blood supply to the hindbrain and midbrain (Guyton, 2014). This can block the conduction of the main pathways between the brain and spinal cord. This causes neuromuscular disorders in non-hemorrhagic stroke patients resulting in impaired physical mobility (PPNI, 2016). Stroke can cause a decrease or even loss of functions controlled by body tissues. One of the symptoms is muscle weakness (Anugrah et al., 2022).

On the first day after a stroke, muscle strength will decrease and may even disappear. Someone who has had a stroke needs to undergo a rehabilitation or exercise process that can restore motor function so that the patient does not experience a deficit in the ability to carry out daily activities. Muscle strength can be assessed clinically by classifying the patient's ability to contract skeletal muscles against resistance exerted by the examiner and also against gravity. Within the initial 3 hours after a stroke, the patient must immediately receive comprehensive and optimal therapy from the hospital to prevent serious complications (Setianingsih et al., 2019).

There are several therapies that can be done to overcome muscle weakness and limited range of motion of the upper extremities due to stroke, such as arm exercises and positioning (Hutagalung, 2021). Counseling therapy, spiritual therapy, speech therapy, and physical therapy are rehabilitations that can be carried out for stroke patients (Susanti et al., 2019).

From the description above, the problem is post-stroke patients who experience limb weakness. At the research site, the number of stroke sufferers in 2020 was 125 people, in 2021 it will decrease to 120 people, but in 2022 the number of stroke sufferers will increase to 129 people. For this reason, the authors are interested in conducting research with the title "Description of Upper Extremity Muscle Strength in Post-Stroke Patients in the Work Area of the Sidoarjo Health Center".

METHOD

This research method is descriptive research. Descriptive research is research with a method of describing a research result (Ramadhan, 2021). The research was conducted in the working area of the Sidoarjo Health Center in March 2023. The sample used in this study was 30 post-stroke patients in the working area of the Sidoarjo Health Center. The instrument used for data collection in this study was to use the Medical Research Council (MRC) muscle strength measurement scale for muscle strength described by (Kleyweg, 1988). The data collection method uses a questionnaire in which there is an informed consent sheet which will be signed by the respondent and a sheet measuring the muscle strength scale. Then put a check mark on the sheet of muscle strength measurement scale that has been made after measuring the muscle strength scale.

RESULT

The research results obtained from 30 post-stroke patients in March 2023 in the working area of the Sidoarjo Health Center are:

Characteristics of post-stroke patients by age

Tabel 1

The frequency of post-stroke patients by age in the working area of the Sidoarjo

No.	Age	Frequency	Percentage
1.	40-45	1	3%
2.	46-50	1	3%
3.	51-55	5	17%

4.	56-60	5	17%
5.	61-65	18	60%
Amount		30	100%

Data source: Primary data March 2023

Table 1 shows that in post-stroke patients 3% are 40-45 years old, 3% are 46-50 years old, 17% are 51-55 years old, 17% are 56-60 years old, and 60% are 61-65 years old.

Characteristics of post-stroke patients by gender

Tabel 2
The frequency of post-stroke patients by sex in the working area of the Sidoarjo Health Center

No.	Gender	Frequency	Percentage
1.	Male	17	57%
2.	Female	13	43%
Amount		30	100%

Data source: Primary data March 2023

Table 2 shows that in post-stroke patients, 57% were male and 43% were female.

Characteristics of post stroke patients based on occupation

Tabel 3
The frequency of post-stroke patients by occupation in the working area of the Sidoarjo Health Center

No.	Work	Frequency	Percentage
1.	Self-employed	1	3%
2.	Not Working / Housewives	22	73%
3.	Other	7	23%
Amount		30	100%

Data source: Primary data March 2023

Table 3 shows that 3% of post-stroke patients in the working area of the Sidoarjo Health Center work as self-employed, 73% do not work or are housewives, and 23% other are retired.

The results of lifting the right hand muscle strength

Tabel 4
Distribution of right hand muscle strength (lifting)

Muscle Strength	N	%
0	6	20
1	4	13
2	6	20
3	7	23
4	5	17
5	2	7
Amount	30	100

Data source: Primary data March 2023

Table 4 shows that from 30 people the muscle strength of the right hand lifted was 20% with a muscle strength scale of 0.13% with a muscle strength scale of 1, 20% with a muscle strength scale of 2, 23% with a muscle strength scale of 3, 17% with a strength scale muscle 4, and 7% with a muscle strength scale of 5.

The results of the right hand grip muscle strength

Tabel 5
Distribution of right hand muscle strength (grasping)

Muscle Strength	N	%
0	3	10
1	6	20
2	5	17
3	6	20
4	6	20
5	4	13
Amount	30	100

Data source: Primary data March

Table 5 shows that from 30 people the muscle strength of the right hand gripping was obtained 10% on a muscle strength scale of 0.20% on a muscle strength scale of 1, 17% on a muscle strength scale of 2, 20% on a muscle strength scale of 3, 20% on a strength scale muscle 4, and 13% with a muscle strength scale of 5.

The results of the left hand muscle strength raised

Tabel 6
Distribution of left hand muscle strength (lifting)

Muscle Strength	N	%
0	8	27
1	5	17
2	5	17
3	6	20
4	3	10
5	3	10
Amount	30	100

Data source: Primary data March 2023

Table 6 shows that from 30 people the muscle strength of the left hand raised was 27% on a strength scale of 0.17% on a muscle strength scale of 1, 17% on a muscle strength scale of 2, 20% on a muscle strength scale of 3, 10% on a muscle strength scale 4, and 10% with a muscle strength scale of 5.

The results of the left hand gripping muscle strength

Tabel 7
Distribution of left hand muscle strength (grasping)

Muscle Strength	N	%
0	7	23
1	5	17
2	4	13
3	8	27
4	3	10
5	3	10
Amount	30	100

Data source: Primary data March 2023

Table 3.7 shows that out of 30 people the muscle strength of the left hand gripping was obtained 23% on a muscle strength scale of 0.17% on a muscle strength scale of 1, 13% on a muscle strength scale of 2, 27% on a muscle strength scale of 3, 10% on a strength scale muscle 4, and 10% with a muscle strength scale of 5.

DISCUSSION

Upper limb muscle strength lifting

Based on the results of research on the upper extremity muscle strength scale in post-stroke patients from 30 people, data was obtained that the upper extremity muscle strength of the right hand raised more on the right hand scale of 3 by 23% and on the left hand 0 by 27%. Stroke is a loss of brain function caused by obstruction of blood supply to parts of the brain.

Stroke sufferers will experience weakness in muscle strength that occurs due to blockages in blood vessels so that blood does not flow properly and damages various nerves, one of which is the neuromuscular nerve which causes muscle weakness. Stroke patients who experience weakness on one side of the body are caused by decreased muscle tone so they are unable to move their bodies (immobilization). Immobilization that does not get proper treatment will cause complications in the form of abnormal tone and contractures. Contractures are one of the causes of a decrease in the ability of stroke patients to carry out the range of motion of the joints (Garrison, 2003).

Post-attack stroke patients need a long time to recover their motor function, so therapy is needed to reduce further cerebral injury. One way of rehabilitation that can be given to post-stroke patients is Range of Motion exercises (Anita, 2021). ROM exercises can be an alternative to increase the range of motion of the joints in the upper and lower extremities in post-stroke patients where contraction and relaxation reactions during ROM movements performed in stroke patients occur stretching of muscle fibers and increased blood flow in paralyzed joints resulting in an increase in the range of motion.

The results of the study in table 3.2 and the results of measuring the strength of the upper extremity muscles show that the majority of stroke patients are male. Where in table 3.2 data obtained from 30 post-stroke patients, 57% were male. This is in line with research (Mardiyanti & Aktifah, 2021), which stated that 65.4% of the respondent characteristics were male. Men have a greater risk than women, this is because men tend to be more smokers, smoking can damage the lining of blood vessels. Research at the University of California found that the female hormone estrogen can keep blood vessels in the brain healthy by increasing the efficiency of mitochondria in blood vessels in the brain so that high risks occur more in men.

It can be concluded that table 3.4 shows that 53% of the muscle strength of raising the right hand and table 3.6 shows that 60% of the muscle strength of raising the left hand is not good. From the results of the study, muscle strength was considered good if the muscle strength scale was equal to 3 and considered bad if the muscle strength scale was equal to 0. Upper extremity muscle strength training can be given to post-stroke patients in the form of functional hand exercises so that the joints are not stiff.

Upper extremity muscle strength grip

Based on the results of the study through the upper extremity muscle strength scale in post-stroke patients from 30 people, it was obtained data that the upper extremity muscle strength grips more in right hand 1 by 20%, right hand 3 by 20%, right hand 4 by 20%, and left hand 3 as much as 27%. One that affects muscle strength in post-stroke patients is the lack of ROM exercises. Therefore, the way that can be done to overcome weakness in muscle strength is Range of Motion (ROM) exercises.

ROM is a routine exercise by training the joints by flexing the joints so there will be no stiffness in the joints. The purpose of ROM is to train movement in order to maintain muscle or joint function. ROM exercise is a form of exercise in the rehabilitation process which is considered to be quite effective in preventing disability in stroke patients. Conceptually, ROM exercises are said to be able to prevent a decrease in joint flexibility and joint stiffness (Lewis, 2017).

ROM affects the increase in upper or lower extremity muscle strength in stroke patients. Mobilization is carried out on the patient by

optimizing the healthy side to compensate for the diseased side so that peripheral blood circulation becomes smooth which can cause the ability of the limb muscle strength to be optimized again.

ROM can reduce pain intensity because it improves blood circulation, maintains joint mobility, reduces tension, and increases relaxation. There are two types of ROM namely active ROM and passive ROM (Purba et al., 2022). Where active ROM nurses provide motivation and guide clients in carrying out joint movements independently according to the client's normal joint range of motion. While passive ROM, the nurse moves the client's joints according to the normal range of motion. ROM exercises are also a form of nurse intervention in efforts to prevent permanent disability (Nofiyanto et al., 2019).

The results of the research in table 3.1 and the results of measuring muscle strength show that more post-stroke patients are aged 61-65 years, namely 60%. The results of this study are different from research conducted by (Susanti et al., 2019), who found the most age group who suffered from stroke, namely 30-50 years as much as 47%. The age factor is one of the most important human characteristics because many diseases are found with various variations. As a person ages, muscle strength will decrease as reduced muscle mass causes immobilization.

Based on the results of the study in table 3.5 it shows that 53% of the muscle strength of gripping the right hand is considered good and table 3.7 shows that 53% of the muscle strength of gripping the left hand is considered not good. Muscle strength is considered good if the muscle strength scale is equal to 3 and is considered bad if the muscle strength scale is 0. ROM exercises that can be given to post-stroke patients who experience decreased upper extremity muscle strength are in the form of ball gripping exercises. Ball gripping exercises can be performed by post-stroke patients of all ages. Even though they are old, holding the ball can be done as a functional hand movement exercise in post-stroke patients.

CONCLUSIONS

Based on the results of the research that has been done, several conclusions can be drawn as follows:

1. The most data obtained was the strength of the upper extremity muscles lifting 23% with a scale of muscle strength of the right hand 3 and 27% with a scale of muscle strength of the left hand 0.
2. The most data obtained is the strength of the upper extremity muscles gripping 20% with a right hand muscle strength scale of 0.20% with a right hand muscle strength scale of 3, 20% with a right hand muscle strength scale of 4, and 27% with a left hand muscle strength scale of 3.
3. Post-stroke patients are mostly aged 61 to 65 years (60%).
4. Most of the post-stroke sufferers were male (57%)

SUGGESTION

Based on the conclusions that have been made, the following suggestions can be taken:

1. For respondents
   Respondents are expected to pay attention to their condition after having a stroke and often to practice range of motion so that muscles and joints are not stiff.
2. For the respondent's family
   It is hoped that the family can play an active role in providing support and can help care in the form of ROM exercises or muscle movement exercises in patients.
3. For research sites
   It is expected to maintain or improve health and education facilities for patients in providing education or knowledge of health-related information that patients are currently experiencing.
4. For further researchers
   It is hoped that it can be used as a source of learning and a basis for further research activities regarding limb muscle strength in post-stroke patients as well as research with different variables.

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