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# CASE REPORT OF CYLINDRICAL GRIP ON IMPROVING UPPER LIMB MUSCLE STRENGTH OF SNH PATIENT

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**ABSTRACT**

Non-hemorrhagic stroke patients who do not get optimal treatment will experience disability or physical weakness such as paralysis and weakened muscle strength, which results in a lack of joint range of motion, limb function, and decreased daily life activities. One of the ROM techniques to help recover the upper extremities to stimulate the hands, can be done with cylindrical grip exercises which are functional hand exercises by grasping a cylindrical object in the palm of the hand which aims to support the recovery of the ability to move and function of the hand. Objective: This case repost aims to determine the effect of giving cylindrical grip to stroke ptients to increase muscle strengt in the upper extremities. Method: The method used is a descriptive case report design based on Evidance Based Nursing (EBN) conducted on two subjects with non-hemorrhagic stroke. Results: After the implementation of ROM exercise nursing: cylindrical grip for 3 days in each patient starting from 18-22 September 2023 which was carried out for 5 minutes and repeated 7 times, changes were obtained in the muscle strength of Mrs.M's right hand which was originally 3 to 4 and Mr.W which was originally left hand muscle strength 2 to 4. Conclusions: ROM Exercise: Cylindrical grip can improve upper extremity muscle strength in non-hemorrhagic stroke patients.

Keywords: cylindrical grip; muscle strength; non haemorrhagic stroke

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## INTRODUCTION

Non-hemorrhagic stroke is caused by a blockage in the cervical or cerebral arteries, resulting in the death of brain tissue due to disruption of blood flow to the brain. Factors that can affect nonhemorrhagic stroke include non-modifiable factors such as age, ethnicity, gender, and genetics, while modifiable factors are hypertension, diabetes, heart disease, smoking, physical activity/exercise, family history. pressure control, alcohol consumption (Siregar et al., 2019). Chronic hypertension or amyloid angiopathy, which causes arterial rupture, is the main cause of about 80% of spontaneous haemorrhagic strokes (Haiga, Salman & Wahyuni, 2022). Stroke is a major cause of functional impairment, with 20% of sufferers still requiring treatment after three months, and 15-30% of patients experiencing permanent disability. According to WHO, stroke is the most common cause of disability in the world and is usually higher than mortality. Negligence in the treatment or rehabilitation of patients certainly has negative consequences that can affect the speed of recovery of their disability. As a result of the disability, stroke patients' ability to perform daily activities decreases and deficits in independence and dependence (Jannah & Azam 2018).

Based on Riskesdas (2018), the incidence of stroke in Indonesia has continued to increase since 2013 to around 15% from 9%. The stroke rate in Central Java was 3.8%. Based on the Health Profile of Central Java Province (2018), the prevalence of non-hemorrhagic stroke (SNH) reached 58,189 people, compared to haemorrhagic stroke (SH) which was only around 16,415 people. In Banyumas Regency, the prevalence of non-hemorrhagic stroke (SNH) reached 3,295 people, the fourth highest in Central Java. One of the nursing problems that arise in stroke patients is impaired physical mobility, which is a condition where a person cannot move freely. This occurs because stroke patients experience limb weakness or hemiparesis. Hemiparesis, or muscle weakness, can cause paralysis and loss of muscle strength, resulting in reduced joint range of motion, limb function, and daily activities. To avoid disability, of course, it takes a long time to recover and achieve maximum adaptability (Susanti et al, 2019).

This extremity muscle weakness or paralysis can be restored as early as possible using non-pharmacological therapy, one of the rehabilitation programs that can be given to non-hemorrhagic stroke patients is joint mobilisation by providing Range Of Motion (ROM) exercise interventions (Gunawan et al. 2018). ROM Exercise is a joint movement exercise that allows active muscle contraction and movement. Range of Motion (ROM) exercise if done in non-hemorrhagic stroke patients can increase flexibility and joint motion in stroke patients. One form of ROM exercise is cylindrical grip, which is a functional hand exercise by grasping a cylindrical object. The fingers are folded so that the thumb is bent over the index and middle fingers. This applies to function, especially the flexor digitorum profundus function is helped when the required force is greater (Eva Agustina, Luthfiyatil Fitri & Purwono, 2021). Therefore, an application of muscle therapy is needed to maintain or maintain muscle strength, joint mobility, and stimulate circulation (Susanti et al, 2019).

Based on the results of the author's observations, in the Anyelir Room the ROM exercise SOP has been carried out properly by physiotherapy but the author did not find cylindrical grip exercises using special cylindrical tools / objects to train upper extremity muscle strength in non-hemorrhagic stroke patients, thus the authors are interested in compiling scientific papers with the aim of whether there is an effect of giving cylindrical grip on increasing upper limb muscle strength in non-hemorrhagic stroke patients.

## METHOD

The method used is a descriptive case report design by focusing on efforts to provide ROM Exercise: cylindrical grip to increase upper limb muscle strength in patients with non-hemorrhagic stroke in the Anyelir Room of Prof.Dr Margono Soekarjo Hospital with implementation based on Evidance Based Nursing (EBN). The subjects in this scientific work are two non-hemorrhagic stroke patients in Anyelir Room at Prof.Dr.Margono Soekarjo Hospital. The inclusion criteria for subjects in this scientific work are as follows: Clients with a medical diagnosis of non-hemorrhagic stroke, clients who experience muscle weakness, clients who have composmentis consciousness, and are male or female. Implementation is carried out for 3 days with a duration of 5 minutes and repetition is carried out 7 times / day and measurement of muscle strength using the MMT scale before and after application.

## RESULTS

On 10 September the author conducted an assessment on Mrs M aged 61 years and female. The patient came from the emergency room with complaints that the right side of the body was weak and difficult to move, especially in the hands and feet. In addition, the patient felt dizzy and had vomited once. The patient had been admitted to Sumpyuh Hospital due to

kidney swelling since one month ago. Every week routine for control of kidney swelling but a week after the control right on Wednesday the right hand and foot felt tingling then could not be moved and could not walk. During the assessment, the right hand could be moved slowly, able to fight gravity minimally and the right leg could not be moved, felt heavy, but could still feel the touch. The patient's main complaint was right hand and right foot weakness. The patient had a history of uncontrolled hypertension since 5 years, a history of cholesterol and gout and a history of cardiomegaly and bronchitis. The patient's family history is that the patient's parents have hypertension. The results of the physical examination of the patient obtained motor muscle strength on the right 3/2 and the left 5/5. The patient's general condition was adequate. Consciousness composmentis (E4V5M6), vital signs BP: 150/95 mmHg, temperature: 36.4, SpO2: 98, RR: 20x/min, Pulse: 82x/min.

Then the author also conducted an assessment on Mr. Mr M is 67 years old and male. The results of the assessment found that the patient complained of weakness in his left hand and left leg. The patient came from the emergency room with complaints of weakness of the left limbs since waking up this morning (at 04.30). When he woke up, the left limb was no longer immobilised. In addition, the patient also felt dizzy and had mutah once at home. When the patient was assessed, the left leg had no tactile sensation, and could not be moved, the left hand still had a tactile sensation, could not grasp, could be moved slightly, and could not resist gravity. The patient said he was still a little dizzy. The patient looks weak lying in bed. The results of the physical examination of the patient obtained motor muscle strength on the right extremity 5/5 and left extremity 2/1. The results of the CT Scan on 20 September were CT Scan (20 September 2023): Lancunar infarct semiovale sinistra, bilateral nucleus lentiformis and bilateral crus posterior capaula interna, No bleeding, SOL or signs of increased intracranial pressure, Senile cerebral atrophy with ventriculomegaly ex vacuo, Sinus maxillaris sinistra mild. The patient's general condition was adequate, consciousness composmentis, GCS 15 (E4M6V5). Vital signs BP: 130/80 mmHg, Pulse 78 x/min, RR 20 x/min, SpO2 99%, and Temperature 36.0℃.

Application of ROM exercise: cylindrical grip can be done in non-hemorrhagic stroke. This application was carried out on subject I on 18-20 September 2023 and on subject II on 20-22 September 2023. Performed for 3 days with a duration of 5 minutes and repeated 7 times / day and measuring muscle strength using the MMT scale before and after application. The results of the assessment of muscle strength in the subject can be seen in the table below :

Table 1.
Results of monitoring the increase in upper limb muscle strength of Mrs M patient

| Day/Date | Mucle Strength (Mrs.M) | |
|---|---|---|
| Monday, 18 September 2023<br>Day I | Right hand<br>3 | Left hand<br>5 |
| | Right foot<br>2 | Left foot<br>5 |
| Tuesday, 19 September 2023<br>Day 2 | Right hand<br>3 | Left hand<br>5 |
| | Right foot<br>2 | Left foot<br>5 |
| Wednesday, 20 September 2023<br>Day 3 | Right hand<br>4 | Left hand<br>5 |
| | Right foot<br>3 | Left foot<br>5 |

Table 2.
Results of monitoring the increase in upper limb muscle strength of Mr.W patient

| Day/Date | Muscle Strength (Mr.W) | |
|---|---|---|
| Thursday, 21 September 2023 | | |
| Day 1 | Right hand<br>5 | Left hand<br>2 |
| | Right foot<br>5 | Left foot<br>1 |
| Friday, 22 September 2023 | | |
| Day 2 | Right hand<br>5 | Left hand<br>3 |
| | Right foot<br>5 | Left foot<br>2 |
| Saturday, 23 September 2023 | | |
| Day 3 | Right hand<br>5 | Left hand<br>4 |
| | Right foot<br>5 | Left foot<br>3 |

Tabel 2 based on the results of the monitoring table of ROM Exercise improvement: Cylindrical Grip which was carried out for 3x24 hours, with a duration of 5 minutes and repetition for 7 times each exercise, there were changes in the patient's muscle strength where the muscle strength of Mrs M's right hand which was originally 3 which means the muscle strength is contracted, able to fight resistance, gravity, and still minimally perform ROM: cylindrical grip increased to 4 which means there is an increase in muscle, and the patient pat against gravity but not maximally. The patient can follow instructions to open and grasp cylindrical objects and can do so slowly. Then in Mr. Mr W, whose original left hand muscle strength was 2 which means muscle strength contracted, but was unable to fight resistance (gravity) increased to 4 which means there is an increase in muscle strength, the patient is able to fight gravity but moderately, can follow instructions to open and grasp cylindrical objects and can do so slowly. Some other indicators that changes occurred were in limb movement, muscle strength, range of motion (ROM), limited movement and physical weakness.

## DISCUSSION

This case report is in line with Choirunnisya and Utami's research, (2023) which found that ROM Cylindrical Grip exercise for three days can increase upper limb muscle strength. Another study by Mardiana, Yulisetyaningrum and Wijayanti, (2021) said that the physical ability to move before being given ROM Cylindical Grip still obtained less muscle strength as much as 29.4% and after being given ROM Cylindical Grip to 5.9%. The patient's hand muscle strength after being given ROM cylindrical grip therapy is good, indicated by the patient being able to move muscles with minimal resistance, can move and fight light obstacles and move freely against equal resistance. Giving ROM Exercise cylindrical grip exercise effectively increases muscle strength which can help develop ways to compensate for paralysis through use that still has normal function, helps maintain, form strength, and control the marks it affects on the muscles and helps maintain ROM in affecting the limbs in preventing muscles from shortening (contracture) and disability in stroke patients (Mardiana et al., (2021).

The cylindrical grip exercise, with the thumb folded over the index finger of the middle finger, involves mainly the flexor digitorum profundus function. The subliminal and interosseous muscles help when the required force is greater, for example, pulling and rotating the finger to adjust the object, the flexor pollicis longus and tenar are active, then the muscle contracts and muscle strength increases. The muscles involved in performing cylindrical grip movements are

flexor digitorum profundus and flexor pollicis longus, and are also assisted by flexor digitorum superficialis and interrosse (Ismoyowati et al. 2021).

The cylindrical grip exercise is useful for increasing muscle tone and weak tendon reflexes, because if done continuously it can stimulate and stimulate the surrounding muscles to contract. If this movement is done regularly, muscle strength will increase. ROM cylindrical grip exercises can stimulate neuromuscular and muscular chemical activity. Stimulation through neuromuscular will increase stimulation to the nerve fibres of the limb muscles, especially parasympathetic nerves which stimulate the production of acetylcholine, resulting in contraction. Mechanisms through the musculus, especially limb smooth muscle, will increase metabolism in metaconderia to produce adenosine tripospate (ATP) which is utilised by limb muscles as energy for contraction and increase limb smooth muscle tone (Liza, et al., 2022). Based on the results of the application above, the authors can conclude that the application of range of motion cylindrical grip (grasping tissue) can help increase the muscle strength of non-hemorrhagic stroke patients. So that non-hemorrhagic stroke patients can carry out management or exercise in increasing muscle strength.

## CONCLUSION

Giving ROM Exercise: Cylindrical grip (exercise in grasping cylindrical objects) can increase upper extremity muscle strength in non-hemorrhagic stroke patients. Advice for clients, non-pharmacological nursing interventions in the form of ROM Exercise: Cylindrical grip (exercise in grasping cylindrical objects) can later be reapplied at home by families regularly with a duration of 15 minutes of exercise, 3x a week to increase upper extremity muscle strength. In addition, future researchers are expected to conduct research with cylindrical materials or tools other than using rolled tissue, so that future researchers can compare the level of effectiveness in increasing upper limb muscle strength in non-hemorrhagic stroke patients.

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