

Case Study: The Effect of Range of Motion (ROM) Exercises on Muscle Strength Improvement in Patient Mrs. T with Ischemic Stroke at Jakarta Islamic Hospital Cempaka Putih

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ABSTRACT

Background & Objective : Ischemic stroke is one of the leading health issues and the primary cause of death and disability worldwide, including in Indonesia. The main impact of ischemic stroke is the occurrence of neurological disorders in the form of muscle weakness, which leads to limited mobility and reduced independence in performing daily activities. One non-pharmacological nursing intervention that can be implemented to address this issue is Range of Motion (ROM) exercises. **Objective:** The objective of this final research project is to determine the effectiveness of passive ROM exercises in improving muscle strength in patients with ischemic stroke. **Method:** A case report was used, employing a nursing care approach that included assessment, determination of nursing diagnoses, planning, implementation, and evaluation of nursing care for one ischemic stroke patient (Mrs. T) admitted to Room Shafa 2 at RSIJ Cempaka Putih. Passive ROM interventions were administered regularly throughout the treatment period, with muscle strength monitored using the Medical Research Council (MRC) scale. **Results:** The intervention demonstrated a gradual increase in muscle strength, marked by the emergence of movement in previously weak extremities, a reduction in joint stiffness, and improved patient tolerance for the exercises. **Conclusion:** Consistent implementation of ROM exercises on the right upper and lower extremities over a three-day period has shown positive changes and can improve muscle strength.

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Introduction

Stroke is a cerebrovascular disease that is one of the main causes of death and disability in various countries, whether due to blockage or rupture of blood vessels in the brain, causing brain tissue to not receive adequate oxygen and nutrients (Wahyu et al., 2023).

Stroke causes a condition of neurological function impairment that lasts 24 hours or more, can worsen, and has the potential to cause death without any other clear cause besides vascular system disorders. Ultimately, inadequate nutrition and oxygen to the brain cause damage and even death of brain cells (Nugraha Agung et al., n.d).

According to the World Health Organization (2023), each year around 15 million people experience stroke, with about 5 million people dying and another 5 million experiencing permanent disability that affects quality of life. This figure makes stroke still relatively high and carries a high risk of death. The highest prevalence of stroke occurs in Europe and Asia, which ranks fourth with a prevalence of 4.5 million people. As many as 1 in 6 people in the world can be affected by stroke, and based on statistical data, it is estimated that stroke will continue to increase from year to year, and the number of deaths due to stroke in 2030 is estimated to reach 20.5% (Feigin et al., 2022).

Stroke ranks third as a cause of death after heart disease and cancer; it is recorded that around 28.5% of stroke patients die, while most of the rest experience paralysis, either partial or total. This condition shows that stroke is still a serious health problem at the global level. (Nur et al., 2025). Based on the American Heart Association (2022), the number of stroke patients in the world is dominated by non-hemorrhagic stroke (77.2%). This data shows that stroke is still a serious global health problem and has a major impact on mortality and disability, so efforts for prevention, management, and optimal nursing care for stroke patients are needed. (Wahyu et al., 2023).

Based on Riskesdas data (2024), most stroke cases are ischemic stroke, with a proportion of around 80–85%. Stroke prevalence shows an increasing trend, from 7% to 10.9% in 2022. East Kalimantan reported cases at 14.7%, making it the province with the highest percentage, while DKI Jakarta reported a figure of 12.2%. This condition emphasizes the importance of optimal stroke management to prevent severe disability (Sahirah et al., 2023).

Ischemic stroke causes clinical impacts in the form of hemiparesis, namely muscle weakness on one side of the body due to impaired blood flow to the brain (Wahyu et al., 2023).

In non-hemorrhagic stroke, symptoms that often appear include sudden weakness or numbness in the face, arm, or leg, accompanied by sudden confusion, difficulty speaking or understanding speech, visual disturbances, and decreased balance (Kartika et al., 2022). Hemiparesis causes mobility disorders and impaired ability to perform daily functional activities. This condition also increases the risk of secondary complications, including joint contractures, muscle atrophy, and thromboembolism due to long-term immobility. Therefore, nursing interventions such as passive range of motion (ROM) exercises are very necessary as part of early nursing management to prevent complications and maintain function itself (Nugraha et al., 2024).

Passive Range of Motion (ROM) is joint movement performed by health workers for the patient without the active involvement of the patient themselves. This intervention aims to maintain joint flexibility, prevent stiffness, and stimulate neuromuscular activity. Passive ROM also promotes peripheral blood circulation and

maintains muscle and joint function in patients who experience movement limitations due to stroke. (Kartika et al., 2022).

Based on research conducted by Alfisyah et al., (2021), routine passive ROM can increase muscle electrical activity and improve peripheral nervous system function through neuromuscular stimulation. Management of stroke accompanied by muscle weakness requires both pharmacological and non-pharmacological approaches. Pharmacologically, patients are given medications such as anticoagulants, antiplatelets, and muscle relaxants aimed at preventing complications, controlling risk factors, and reducing muscle stiffness or spasticity (Kartika et al., 2022).

However, giving medication alone is not enough to restore motor function optimally. Therefore, a non-pharmacological approach is needed as a complement, one of which is through range of motion (ROM) exercises. ROM exercises are beneficial for preventing contractures, increasing muscle flexibility, improving blood circulation, and helping restore motor nerve function through the process of neuroplasticity. In addition, ROM exercises can also prevent complications due to immobilization and improve the patient's quality of life by helping patients become more independent in carrying out daily activities (Muhammad et al., 2023).

Based on a preliminary study conducted by the researcher using the observation method in the Shafa 2 inpatient room at Rumah Sakit Islam Jakarta Cempaka Putih on January 15, 2026, the results showed that there was one patient with ischemic stroke who experienced muscle weakness on the right side of the body accompanied by difficulty speaking. This condition indicates the presence of motor and neurological function disorders that affect the patient's ability to perform daily activities.

This problem illustrates that ischemic stroke is a condition that requires comprehensive and continuous management and nursing care to prevent worsening of the condition, complications due to immobilization, and to improve the patient's quality of life. One nursing intervention that can be provided is range of motion (ROM) exercises, which aim to maintain and increase muscle strength and prevent joint stiffness. Therefore, the researcher is interested in conducting a case study related to "Nursing Care for Ischemic Stroke Patients with the Application of Range of Motion (ROM) Exercises on Increasing Muscle Strength in Mrs. T at Rumah Sakit Islam Jakarta Cempaka Putih."

Objective

The purpose of this case study is to determine the effectiveness of ROM therapy for the right upper and lower extremities at the Jakarta Cempaka Putih Islamic Hospital.

Method

This study used a case study design conducted in the inpatient room at RSII Cempaka Putih, Central Jakarta. The patient was selected based on criteria including stroke or decreased consciousness, muscle weakness, and prolonged bed rest. Data were collected through a comprehensive assessment of the patient's physical and neurological condition using the Medical Research Council (MRC) scale, nursing assessment sheets, and the patient's medical records.

The intervention focused on passive Range of Motion (ROM) exercises performed for three consecutive days (January 16–18, 2026), twice daily in the morning and evening. The therapy began by explaining the goals and benefits of ROM

to the patient and family, followed by gradual exercises adjusted to the patient's tolerance. Exercises were performed on all extremities, including the shoulders, elbows, wrists, fingers, thighs, knees, ankles, and toes, with family involvement to provide support and motivation. Evaluation was conducted to assess muscle strength, pain response, and patient motivation.

Results

On the first day, the patient still experienced significant weakness in the right extremity, characterized by limited active range of motion and muscle strength; therefore, ROM exercises focused primarily on passive ROM or those assisted by a nurse or family member. At this stage, the care goals had not yet been fully achieved.

On the second day, the patient began to show increased tolerance for ROM exercises. The patient's facial expression appeared more relaxed, and the patient was able to follow instructions with assistance from a nurse or family member. Increased muscle contraction was palpable compared to the previous day; however, this was not yet accompanied by joint movement, and the patient was still unable to perform active movements, either without resistance or against gravity.

On the final day of ROM exercises, the patient was still found to require full assistance to move the right upper extremity, while the right lower extremity showed improved muscle strength compared to before, as evidenced by the ability to perform active movements without resisting gravity; however, the patient was still unable to lift or maintain the position of the extremity against gravity. Although her physical condition was weak and she had a history of hypertension and diabetes mellitus, Mrs. T's motivation continued to increase as she experienced the immediate benefits of the therapy.

Discussion

Patient Mrs. T, 62 years old, was treated in the Shafa 2 room with a diagnosis of ischemic stroke. The patient had a history of hypertension, type 2 diabetes mellitus, and heart disease since 2017. Blood glucose examination on January 15, 2025, showed that Mrs. T's random blood glucose (RBG) was 323 mg/dL, indicating hyperglycemia.

Ischemic stroke is the cessation of blood supply to the brain caused by a thrombus or embolus, resulting in impaired brain function (Rodo & Susanti, 2023). According to Hanna et al. (2024), ischemic stroke is a condition in which an artery is blocked, especially the middle cerebral artery, which functions to supply blood to the brain. If this artery is blocked, the brain will lack oxygen, which then affects motor pathways such as paralysis or weakness on one side of the body. In this case, the patient experienced ischemic stroke with risk factors of uncontrolled hypertension and diabetes mellitus as well as heart disease. The family said the patient rarely took medication because she had begun to become forgetful. According to Puspiyanti et al. (2025), patients with uncontrolled hypertension will damage blood vessel walls, which can cause atherosclerosis and aneurysms; when this disorder occurs in blood vessels in the brain, it will cause complications, one of which is stroke. This is in line with research conducted by Andini et al. (2023) that hypertension has a relationship with the occurrence of ischemic stroke; patients with hypertension will increase and accelerate the occurrence of stroke. Patients with diabetes mellitus often experience increased blood glucose levels or chronic hyperglycemia; this condition will trigger

the formation of atherosclerosis and endothelial dysfunction, which ultimately increases the risk of microvascular and macrovascular complications, including ischemic stroke (Wahyu et al., 2025).

According to Juniarti et al. (2025), heart disease is one of the risk factors for ischemic stroke; when heart atheroma or atherosclerotic plaque moves away from the artery wall, it will cause blood clotting, which then leads to a blood blockage process. When there is a blockage in the blood supply to the brain, ischemic stroke will occur.

Clinical manifestations in stroke patients vary, including sudden neurological deficits preceded by prodromal symptoms that occur at rest or upon waking in the morning; decreased consciousness does not always occur; neurological symptoms that arise depend on the severity of the blood vessel disorder and its location.

Other symptoms that can occur include headache, vomiting, dysarthria/difficulty speaking, and sudden changes in mental status (Ernawati & Baidah, 2022).

The head CT-scan results in this case showed hypodense lesions in the left temporoparietal lobe and left occipital lobe, with the conclusion of left cerebral infarction. Hypodensity on CT-scan indicates an area of brain tissue experiencing ischemia, occurring due to decreased or stopped cerebral blood flow. Physiologically, one brain artery can still be compensated by the collateral circulation system. However, with anatomical variations in blood vessels, the presence of atherosclerosis, and other vascular disorders, collateral blood flow will be inhibited, causing ischemia of brain tissue. Ischemia that lasts for a certain period will cause neuron death, depending on the degree of perfusion decrease. In severe ischemia, brain tissue will experience infarction and cell necrosis. Then the ischemic process will also trigger the emergence of edema, microvascular thrombosis, and inflammatory activation, which can worsen brain tissue damage (MSD Manual, 2025). This condition causes neurological decline in patients, such as hemiplegia and speech impairment, in accordance with the location of the lesion in the left hemisphere.

Hemiplegia is a condition of paralysis on one side of the body, or a major motor disorder that often occurs in patients after stroke. Hemiplegia contributes to decreased motor function and activity ability, which is influenced by structural changes in muscles and motor units after stroke (Aze et al., 2023). This is in line with the clinical symptoms shown by the patient during assessment, where the patient experienced right hemiplegia. The intervention carried out to address the hemiplegia problem is by providing ROM exercises.

ROM exercises are exercises or rehabilitation that are quite effective in preventing disability in stroke patients. ROM exercises are one effort to prevent permanent disability in stroke patients; in addition, ROM exercises also help reduce the dependence of stroke patients on family members (Putri & Anita, 2021). ROM can be done in two ways, namely actively or passively. Active ROM is joint movement that can be achieved with active muscle contraction that can be performed independently by the patient, while passive ROM is ROM exercise performed on the patient with the assistance of a nurse or family member (Maljuliani, Harun, & Fitri, 2023).

In this case, the patient was given passive ROM on the weakened extremity and active ROM on the left extremity, or the one not experiencing weakness. In addition, education was provided to help improve family independence so that they could perform exercises on the patient independently.

Passive ROM exercises can be performed from the acute phase and have been proven to improve upper and lower extremity motor function and contribute to improving the ability to perform daily activities. Randomized clinical trials show that passive ROM performed in the first 48 hours after stroke significantly helps improve motor function compared with no intervention. Another study also found that ROM exercises help reduce edema and protect muscles from atrophy (Zhang et al., 2019).

Passive ROM exercises involve moving the extremities without involving the patient's active muscle contraction; therefore, these exercises can be given to stroke patients in the acute phase. However, in patients with a history of heart disease, the provision of ROM exercises must pay attention to the patient's hemodynamic status or be accompanied by close monitoring of the patient's physiological responses, such as blood pressure status, pulse rate, respiratory rate, and level of fatigue. When passive ROM exercises are performed and there are no complaints of chest pain, shortness of breath, decreased consciousness, or significant changes in vital signs, the ROM exercise intervention can be carried out safely and gradually.

In this case, although there was suspected cardiomegaly, passive ROM exercises could still be performed with caution and by paying attention to the patient's vital signs. This is because passive ROM does not cause a significant increase in cardiac workload, so it is relatively safe and can be performed in patients with stable cardiovascular conditions. Then, when passive ROM exercises were performed on the patient, the patient's vital signs were within normal limits: BP 133/78 mmHg; pulse 71x/minute; respiration 20x/minute, and there was no pain response shown by the patient. However, with these radiological results, this certainly becomes a consideration for performing ROM exercises with light intensity and continuous evaluation of the patient's response.

According to Maljuliani, Harun, Fitri (2023), the indications for passive ROM exercises are patients with decreased consciousness, patients with mobilization barriers, and patients on bed rest. The movements performed in passive ROM exercises include flexion, extension, hyperextension, circumduction, abduction, adduction, and opposition. ROM exercises aim to increase cerebral blood supply, minimize disability, and improve sensorimotor function. ROM exercises function to maintain and improve muscle flexibility and strength, maintain joint mobility, prevent deformity, and prevent contractures.

Early ROM exercises in stroke patients can increase muscle strength because they stimulate the movement of the involved muscles, resulting in increased muscle strength; the disadvantage for patients who experience extremity weakness if not treated will increase the risk of permanent disability (Sitohang & Purba, 2023). ROM exercises will stimulate excitation, so there will be an increase in neurovascular muscle chemical activity. Actin and myosin present in smooth muscle will interact chemically. The interaction process in extremity muscle contraction is activated by calcium ions and adenosine triphosphate (ATP), which is then broken down into adenosine

diphosphate (ADP). Muscle contraction occurs due to stimulation through the neuromuscular system, which increases parasympathetic nerve stimulation, which will stimulate acetylcholine (Renke et al., 2023).

The results of implementing ROM (Range of Motion) exercises showed gradual positive changes in the patient's right lower extremity. The patient's family reported additional movement in the patient's right leg with muscle strength 2/5, meaning there was muscle contraction but it could not resist gravity, while in the patient's right upper extremity there had been no significant change after ROM exercises for 3 days. These findings are consistent with a literature review regarding the effect of ROM exercises on muscle strength in stroke patients, which concluded that ROM exercises can increase muscle strength and joint movement ability in stroke patients (Syahrim, Azhar, & Risnah, 2019). In line with the success of this intervention, the researcher not only provided intervention but also provided education so that the family would be able to help the patient perform ROM exercises independently.

Overall, the application of ROM (Range of Motion) exercises in nursing care showed positive results in ischemic stroke patients in terms of increasing muscle strength and reducing joint stiffness. This intervention is simple, safe, and very easy to apply.

Thus, ROM exercises can be used as one technique that supports efforts to restore muscle strength and reduce joint stiffness; with consistent application and supported by education and therapeutic communication, it greatly enhances holistic and patient-centered nursing care.

This study still has limitations in research design and sample size. Therefore, it is hoped that future research can test with a larger research design and a larger sample size to examine the effectiveness of the Range of Motion (ROM) intervention.

Conclusion

ROM exercises applied to ischemic stroke patients with right extremity weakness for three days showed gradual positive changes in muscle strength and served as an important initial step in long-term rehabilitation. This intervention is simple, safe, inexpensive, and can be widely applied in both healthcare facilities and homes with strong family support. Therefore, ROM exercises can be integrated into the standard of nursing practice for ischemic stroke patients from the early phase of care.

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