Indonesian Journal of Global Health Research
Volume 7 Number 3, June 2025
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

SUPPORTING STROKE PATIENTS' MOBILITY: THE IMPORTANCE OF RANGE OF MOTION TRAINING IN PHYSICAL RECOVERY

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ABSTRACT
Stroke is a cerebrovascular disease caused by cerebral infarction, characterized by focal neurological deficits lasting more than 24 hours, impaired physical mobility, such as muscle weakness and decreased muscle function, often occurs in stroke patients and worsens their condition, one of the effective recovery steps is Range of Motion (ROM) exercises, which help improve muscle and joint flexibility and prevent muscle contractures, ROM functions to improve muscle strength, coordination, and balance in stroke patients. The purpose of this study was to analyze the action of Range of Motion (ROM) exercises on Muscle Strength in Stroke Patients. methods This study used a systematic review method with PRISMA guidelines. Journal searches were conducted using the keywords stroke, range of motion exercises, ROM applications, and post-stroke recovery through the PubMed, Science Direct, and Google Scholar databases for publications in 2020–2024. Articles were screened based on title and abstract to obtain relevant results. The journals used were in English or Indonesian and met the inclusion criteria, namely open access, discussing non-hemorrhagic stroke, with participants aged over 30 years. Results. From the selection of journals that meet the criteria, 10 journals were selected for further review. The results showed that ROM can increase muscle strength, joint flexibility, and reduce muscle stiffness in stroke patients. Conclusion. ROM exercises have a significant impact on the recovery of stroke patients' mobility by increasing muscle strength, joint flexibility, and quality of life. These exercises are recommended to be done routinely under medical supervision.

Keywords: muscle strength; non-communicable disease; range of motion (rom) exercises; stroke

How to cite (in APA style)
Wulandari, M. N., Ernawati, Y., Septianingrum, Y., & Hasina, S. N. (2025). Supporting Stroke Patients' Mobility: The Importance of Range of Motion Training in Physical Recovery. Indonesian Journal of Global Health Research, 7(3), 809-818. https://doi.org/10.37287/ijghr.v7i3.6249.

INTRODUCTION

Stroke is a cerebrovascular disease caused by cerebral infarction, which leads to brain tissue death and results in sudden and progressive neurological deficits. This condition can disrupt various bodily functions, including muscle weakness that affects the patient's ability to move, often accompanied by prolonged bed rest that worsens the physical condition (Nurain, 2023). The muscle weakness experienced by stroke patients is caused by reduced blood supply to the brain, which impairs nerve function and causes motor disorders. A lack of oxygen and nutrients to the brain can lead to serious issues, ranging from hemiparesis to death. Furthermore, the reduced physical activity during recovery exacerbates muscle function decline, affecting the overall quality of life of stroke patients (Agustina et al., 2021).According to WHO data, stroke is the leading cause of global disability and the second leading cause of death. The Global Stroke Fact Sheet 2022 indicates that the lifetime risk of having a stroke has increased by 50% over the past 17 years, with one in four people expected to experience it. Between 1990 and 2019, stroke incidence increased by 70%, stroke-related deaths by 43%, stroke prevalence by 102%, and Disability Adjusted Life Years (DALY) rose by 143%. A significant portion of the stroke burden (86% of deaths and 89% of DALYs) occurs in low- to middle-income countries (WHO, 2022).

In Indonesia, stroke was the leading cause of Disability Adjusted Life Years (DALYs) loss in 2019, accounting for 4% (3.280 per 1,000 population), followed by ischemic heart disease (2.8%; 2.330 per 1,000 population). Non-communicable diseases (NCDs) contributed to more than half of DALYs lost in Indonesia, with stroke accounting for 10.9%, cancer for 8.6%, and ischemic heart disease for 7.7% (GDB 2019; WHO 2019). Riskesdas 2018 shows an increase in the prevalence of NCDs, including stroke, which rose from 7% to 10.9% compared to Riskesdas 2013 (P2PM, 2022). In East Java, the prevalence of stroke in 2018 was recorded at 1.24 per 1,000 population, although this decreased compared to the previous year (Putri, 2023).Stroke can affect anyone, regardless of gender or age, with individuals between 35 to 85 years old being most at risk. Stroke occurs when blood vessels supplying blood to the brain are blocked, causing a disruption in blood circulation and resulting in a lack of blood flow to the brain (Maelani et al., 2022).

Stroke is a serious medical condition that occurs when the blood supply to part of the brain is disrupted, either by a blocked blood vessel or by the rupture of a blood vessel in the brain. This condition can cause permanent brain damage and negatively impact a person's physical mobility (Ekawati, 2021). Mobility impairment is one of the most common complications experienced by stroke patients. Loss of muscle strength, muscle stiffness, and imbalance can limit movement and make it difficult to perform daily activities. Therefore, the implementation of Range of Motion (ROM) exercises is crucial in helping restore physical mobility in stroke patients. Range of Motion (ROM) refers to the ability of a joint to move within a full or normal range (Irwandy, 2020).In stroke patients, the primary issue often encountered is the impairment of limb movement, which limits physical mobility and is known as Range of Motion (ROM) disorders (Maelani, 2022). This limitation of ROM can affect daily activities such as walking, standing, or even self-care, thus reducing the overall quality of life. In addition to physical consequences, stroke can also cause severe psychological problems such as prolonged stress and depression. Patients often feel angry, sad, and helpless about their physical and mental limitations, which can exacerbate emotional conditions. Symptoms of depression commonly include sleep difficulties, loss of appetite, fatigue, social withdrawal, self-hatred, and suicidal thoughts. Therefore, it is essential for stroke patients to have spiritual support that can help them accept their reality, think positively, and maintain mental resilience during recovery (Petty, 2021).

The application of ROM in stroke patients aims to maintain or improve muscle and joint flexibility, prevent muscle contractures, and minimize joint stiffness (Faradisi, 2021). The primary goal of implementing ROM for stroke patients with physical mobility impairments is to maintain muscle and joint flexibility. Regular and controlled movements in joints affected by stroke can help maintain muscle and joint flexibility (Maelani, 2022). This is crucial in preventing muscle and joint stiffness, which can worsen the patient's condition.Increasing muscle strength: Muscle weakness is often experienced by stroke patients. Directed ROM exercises can help strengthen weakened or affected muscles. The increase in muscle strength will assist the patient in improving their movement ability and performing daily activities. Improving balance and coordination: ROM exercises can also help improve a patient's balance and coordination. Stroke patients often face issues in maintaining balance and performing coordinated movements. By performing appropriate ROM exercises, patients can improve their balance and movement coordination (Waluyo, 2021).

The novelty of this systematic review (SR) lies in its specific emphasis on the benefits of ROM exercises not only for maintaining flexibility but also for deliberately strengthening weakened muscles and improving balance and coordination in stroke patients. This SR delves deeper into the impact of ROM exercises on critical aspects of physical recovery that have often been overlooked in previous research, such as strengthening affected muscles and

improving movement coordination, which allows patients to be more independent in daily activities. The difference lies in the broader and more integrated understanding of how ROM can significantly contribute to the overall stroke recovery process, extending beyond preventing joint and muscle stiffness.

Preventing muscle contractures is a condition where muscles become stiff and difficult to extend, which can occur if muscles are not moved regularly and fully after a stroke. By performing regular ROM exercises, the risk of muscle contractures can be reduced. Improving quality of life: Through consistent ROM application, stroke patients can benefit from increased mobility, independence in daily activities, and greater participation in social activities. This contributes to an overall improvement in their quality of life. The application of ROM in stroke patients with physical mobility impairments should be conducted under the supervision of healthcare professionals, such as physiotherapists or trained medical personnel (Suriyani, 2023). They will help design an exercise program tailored to the patient's condition and needs, ensuring that movements are performed safely and effectively (Hutahaean, 2020). Based on the background, the author aims to identify the effects of Range of Motion (ROM) exercise on muscle strength in stroke patients.

METHOD

This study uses a systematic review with the technique used is PRISMA. The keywords used in searching for journals are as follows: stroke, range of motion exercises, ROM application, stroke recovery. Data were obtained from journals in PubMed, Science Direct and Google Scholar from 2020-2024 by filtering articles as a whole from selected references without exception based on the title and abstract, so that more relevant articles are obtained. All journals are taken in English and Indonesian, then have inclusion criteria in the form of: 1. Open access. 2. Stroke. 3. non-hemorrhagic stroke, 4. Age >30 years

RESULT

In the search related to the research title, 502 journals were found, then a selection was made to 477 journals after removing duplicates. Furthermore, filtering was carried out based on the title, leaving 318 journals that were requested to be accessed. Of these, 165 journals could not be accessed, leaving 153 journals that were evaluated based on the inclusion criteria. After further assessment, 20 journals were excluded because they were not available in full text form, 88 journals were excluded because of inappropriate research designs, and 35 journals did not meet the population or intervention criteria. Finally, 10 articles were accepted for review.

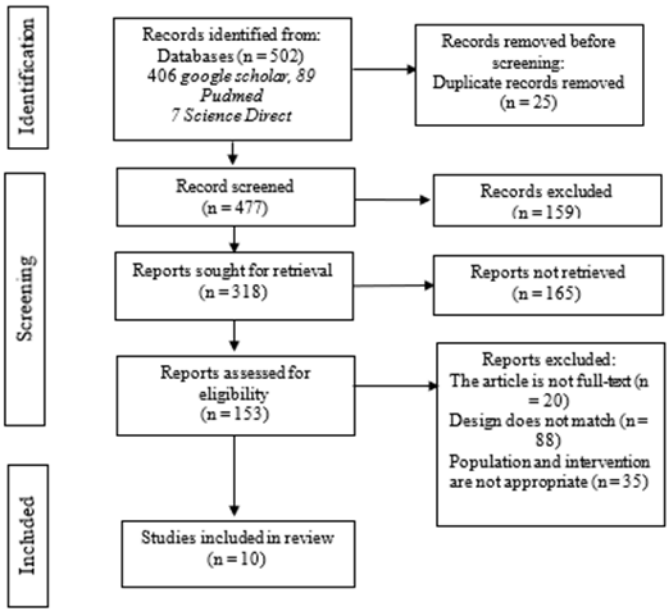

Figure 1. Literature Search Flow Diagram

Systematic Review. Supporting Stroke Patients' Mobility: The Importance Of Range Of Motion Training In Physical Recovery

Table 1.
Article Analysis

	Year - Title	Peneliti	Research Variables	Research Design	Research purposes	Research result
1	Management of Physical Mobility Disorders in Hemiparesis Patients with Non-Hemorrhagic Stroke (2024)	Muhammad Aldo Aditama, Ummu Muntamah	Range Of Motion (ROM) Exercises and Physical Mobility Disorders	This study used a nursing approach with a descriptive management method.	The purpose of this study is to describe the assessment, nursing diagnosis, nursing intervention, nursing implementation, and nursing evaluation in patients with non-hemorrhagic stroke hemiparesis.	Although there was an increase in muscle strength of the right hand from score 2 to 3 and the right leg from score 1 to 3 after 3 days of management, the problem of impaired physical mobility has not been completely resolved. Providing appropriate care will increase the patient's hope of achieving optimal recovery and improving their quality of life after experiencing a stroke.

	Year - Title	Peneliti	Research Variables	Research Design	Research purposes	Research result
2	Application of Range of Motion in Stroke Patients with Impaired Physical Mobility (2024)	Suprapto Suprapto, Trimaya Cahya Mulat, A. Syamsinar Asmi, Muridah Muridah	Application of Range of Motion and Physical Mobility Impairments	Descriptive qualitative research design with a case study approach	Knowing how to apply range of motion to stroke patients with impaired physical mobility	It can be concluded that the application of passive ROM techniques to patients was carried out on the left extremity, the application of passive ROM techniques to patients was carried out on the right extremity, and was partially resolved.
3	Nursing Care For Adult Patients With Non-Hemorrhagic Stroke With Nursing Problems Physical Mobility Impairment (2024)	Fitri Aprilia, Dwi Rahayu	Range of Motion and Physical Mobility Impairments	This study used a nursing approach with a descriptive management method	Provide nursing care to SNH patients with impaired physical mobility with ROM (Range of Motion) exercises	The results of the study showed that there were 2 Non-Hemorrhagic Stroke patients experiencing nursing problems of physical mobility disorders related to neuromuscular disorders with the nursing actions carried out being mobilization support and ROM (Range of Motion) exercises by performing passive range of motion exercises, monitoring pain complaints and monitoring muscle strength.

	Year - Title	Peneliti	Research Variables	Research Design	Research purposes	Research result
4	Implementation of Nursing Care for Stroke Patients' Families with Muscle Strength Problems Through Range of Motion Exercises (2021)	Faiza Yuniati, Indra Pebriani, Siti Rahayu Indri Puspita Sari	Range Of Motion And Muscle Strength	The design of this research is descriptive qualitative with a family nursing care approach	Implementing range of motion exercises in post-stroke patients	The family nursing diagnoses that can be identified are physical mobility barriers of post-stroke patients related to muscle weakness, lack of family knowledge related to the inability to recognize problems and risk of falling related to the lack of family ability to modify a healthy home environment. The evaluation results showed an increase in muscle strength by one scale of the Manual Muscle Test.
5	Range of Motion Training for Family Caregivers Increases Independence of Daily Living Activities for Post-Stroke Clients (2024)	Ni Ketut Sujati, Wibowo Apriandi, Supangat Marzuki, Ina Yatul Khoiriyah, M Agung Akbar	Range Of Motion And Daily Living Activities	Metode yang digunakan memberikan presentasi atau demonstrasi	Provide ROM (Range of Motion) training to family caregivers of stroke clients in order to improve the knowledge, skills and comfort of caregivers in providing support for the independence of clients after a stroke	improving caregiver skills in performing ROM exercises on stroke clients. Training for family caregivers has a crucial role in improving their practical skills in caring for post-stroke patients.
6	Effectiveness of ROM (Range off Motion) on Muscle Strength in Stroke Patients at Royal Prima Hospital	Sry Desnayati Purba, Bagus Sidiq, Ingkai Krisdayanti Purba, ElfrideHutapea, Kristina L Silalahi, Dedek Sucahyo, Dian	ROM (Range off Motion) and Muscle Strength	ekperimen semu	Knowing the effectiveness of ROM (Range of Motion) on muscle strength in stroke patients	Implementing range of motion exercises in hemorrhagic stroke patients can increase muscle strength in

	Year - Title	Peneliti	Research Variables	Research Design	Research purposes	Research result
	(2021)					stroke patients who experience muscle weakness.
7	Increasing muscle strength in non-hemorrhagic stroke patients through a combination of range of motion exercises and rubber ball grip exercises: A case study of nursing care (2024)	Sitti Muhsinah, Nasir Muna, Ravly Alfananda	range of motion (ROM) and rubber ball grip and muscle strength	This study used a nursing approach with a descriptive management method	Applying combination therapy of range of motion (ROM) exercises and rubber ball grip on muscle strength in non-hemorrhagic stroke patients.	The application of a combination of range of motion (ROM) exercises and rubber ball grip exercises on the muscle strength of clients with a medical diagnosis of non-hemorrhagic stroke increased the muscle strength of the upper and lower right extremities and grip strength.
8	The Effect of Range of Motion Exercises on the Upper Extremities with Rubber Ball Grasping on Muscle Strength in Stroke Patients (Literature Study)) (2022)	Imelda Appulembang, I Made Sudarta	Range Of Motion and Muscle Strength	This study aims to determine the management of ROM and rubber ball grip exercises in stroke patients with impaired physical mobility. This is a literature study that summarizes several theoretical references and journals related to the theme.	Knowing the management of ROM rubber ball grip exercises in stroke patients with impaired physical mobility	there is an influence on increasing muscle strength after ROM exercises and grip exercises with rubber balls
9	Management of Physical Mobility Disorders with Range of Motion in Non-Hemorrhagic	Yuni Salmawanti, Dewi Siyamti	Range Of Motion and Physical Mobility Disorders	The research method is a qualitative descriptive case study	Describes the management of physical mobility disorders with range of motion	This indicates that there is an effect of administering ROM therapy on non-hemorrhagic

	Year - Title	Peneliti	Research Variables	Research Design	Research purposes	Research result
	Stroke (2025)					stroke patients who experience physical mobility impairments.
10	The Effect of Range of Motion (ROM) Training on Caregivers on the Independence of Daily Living Activities in Post-Stroke Patients (2022)	Ni Ketut Sujati, Nelly Rustiati, Supangat, M. Agung Akbar	Range of Motion and Activities of Daily Living	Research design using a quasi-experimental.	To determine the effect of the Range of Motion (ROM) training program on caregivers of stroke patients at home as an effort to increase the independence of post-stroke patients.	The test results showed a significant difference between the intervention and control groups in terms of the client's independence in performing ADL and the caregiver's ability to train with each

DISCUSSION

The purpose of this study was to analyze the effects of Range of Motion (ROM) exercises on muscle strength in stroke patients with impaired physical mobility. The results of a literature review of 10 journals showed that the application of ROM has a positive impact on the recovery of muscle strength, joint flexibility, and increasing patient independence in daily activities. Most of the studies analyzed reported an increase in muscle strength after ROM exercises were performed, although without a comparison group. ROM exercises that are performed routinely have been shown to increase the Manual Muscle Test (MMT) scale in stroke patients, as well as help prevent muscle contractures that can occur due to immobilization (Mei et al., 2020). Studies have also shown that regular ROM exercises can help maintain joint flexibility and prevent muscle stiffness, which are important to support stroke patients in carrying out daily activities. Stroke patients often experience decreased mobility, especially on one side of the body, which can affect their quality of life. ROM exercises can help reduce the risk of physical complications, such as tissue damage and muscle deformities due to lack of movement. In addition, the involvement of family or caregivers in this exercise can speed up the recovery process, because they are more skilled in providing the necessary care for patients (Ketut, 2024).

Through ROM exercises, patients can increase the strength of weakened muscles, improve movement coordination, and increase their independence in daily activities. A ROM exercise program that is tailored to the patient's needs and monitored regularly can increase the effectiveness of recovery, especially in non-hemorrhagic stroke patients (Hutahean & Hasibuan, 2020). Thus, ROM exercises have been shown to be effective in improving muscle strength, joint flexibility, and quality of life in stroke patients, as well as accelerating their recovery process

CONCLUSION

Based on the results of the systematic review conducted, it can be concluded that Range of Motion (ROM) exercises have a significant positive effect on muscle strength, joint flexibility, and independence of stroke patients with impaired physical mobility. Regular ROM exercises have been shown to increase muscle strength, prevent contractures, and reduce muscle stiffness, which are very important in supporting stroke patients to carry out

daily activities. The involvement of family or caregivers has also been shown to accelerate the patient's recovery process, because they can provide more effective care support. In addition, ROM exercise programs that are adjusted to the patient's condition and abilities and monitored regularly can increase the effectiveness of recovery in stroke patients, especially non-hemorrhagic stroke. Overall, ROM is an effective approach in improving the quality of life of stroke patients with impaired physical mobility.

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