

Original Article

APPLYING RANGE OF MOTION TO OVERCOME PHYSICAL MOBILITY DISORDERS IN ISCHEMIC STROKE PATIENTS: A CASE STUDY

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ABSTRACT

Background: Stroke is a neurological condition caused by arterial occlusion or hypoperfusion that leads to impaired neurological function and disability. Impaired physical mobility is a common consequence requiring targeted nursing interventions.

Objectives: This case study aims to describe a comprehensive nursing care process for a stroke patient with impaired physical mobility through structured Range of Motion (ROM) therapy.

Methods: A descriptive case study was conducted on one ischemic stroke patient. Data were obtained via interviews, physical assessment, observation, and documentation. ROM therapy was implemented following a detailed SOP, including passive and active-assistive movements, performed daily for 10–15 minutes.

Results: Muscle strength improved from Grade 3 to Grade 4 in both left upper and lower extremities after three days of intervention.

Conclusion: ROM therapy was effective in increasing muscle strength. Further research with longer durations and larger samples is recommended.

Keywords: Range of Motion, Physical Mobility Impairment, Ischemic Stroke.

INTRODUCTION

Stroke is a sudden-onset neurological deficit resulting from disruptions in cerebral circulation. Such interruptions, caused by infarction or hemorrhage, can lead to permanent disability and functional limitations. Globally, stroke remains a major cause of mortality and disability, disproportionately affecting low- and middle-income countries (Prayoga & Rasyid, 2022). A stroke occurs when blood vessels in the brain become blocked or rupture. This can prevent parts of the brain from receiving necessary oxygen-rich blood, leading to cell or tissue death. Stroke is a sudden, progressive, and rapid brain injury resulting from non-traumatic cerebrovascular circulation disorders (Prayoga & Rasyid, 2022). The abrupt onset of a stroke can cause symptoms such as one-sided facial or limb paralysis, difficulty speaking fluently, slurred speech (dysarthria), altered consciousness, vision disturbances, and more (Chugh, 2019).

The incidence of stroke is projected to increase to 1.5 million cases by 2024. This underscores the urgency for effective long-term management and support strategies in primary care and community settings (Tarigan et al., 2023). Cerebrovascular disease (stroke) is the second leading cause of death and the third leading cause of disability (Li et al., 2019). This is further supported by the prevalence of stroke, with approximately 80 million occurrences worldwide in 2016, affecting individuals regardless of gender (Sitoresmi et al., 2020). In 2019, 89% of global stroke deaths and disabilities combined occurred in low- to middle-income countries. However, according to the World Stroke Organization, 1 in 6 people globally will experience a stroke in their lifetime. Data from the American Heart Association (AHA) indicate that a new stroke case occurs every 40 seconds, with an estimated 795,000 new or recurrent stroke patients annually. Furthermore, it's estimated that one stroke patient dies every 4 minutes. Stroke-related deaths account for 1 in every 20 deaths in the United States (Powers et al., 2018).

In Indonesia, stroke is the leading cause of death for individuals over the age of 5, accounting for approximately 15.4% of all fatalities. Based on the latest data and results from Riskesdas 2018, the prevalence of stroke in Indonesia increased significantly, from 7.0% in 2013 to 10.9% in 2018 (Riskesdas, 2018). Specifically, stroke prevalence reached 10.9% per 1,000 population. This figure represents an increase when compared to the 2013 Riskesdas result of 7.0% per 1,000 population. Stroke can be considered the primary cause of death in all hospitals across Indonesia, reaching as high as 15.4% (Riskesdas, 2018).

The signs and symptoms of stroke include hemiparesis, motor deficits, sensory disturbances, cognitive impairment, and functional limitations, all of which can lead to mobility issues (Mahyuvi & Nursalam, 2020). In stroke patients, mobility impairment is a direct result of the inability to move their extremities if not addressed promptly. A common nursing diagnosis and intervention for stroke patients experiencing impaired physical mobility is the administration of Range of Motion (ROM) therapy. This therapy serves as a form of mobilization exercise that can be performed on stroke patients to maintain or restore the full range of joint movement normally, thereby improving muscle mass and tone (Sustika et al., 2020). The rationale for ROM therapy is to maintain motor control, prevent contractures in paralyzed extremities, avert worsening neurovascular systems, and enhance circulation (Setyawati & Retnaningsih, 2024). Based on the theories above, for stroke patients experiencing weakness and limited mobility, ROM therapy can help preserve muscle strength and maintain flexibility (Waruwahang et al., 2023).

The researcher re-assessed the patient's muscle strength, with results showing Grade 4 muscle strength. This indicated that the patient could perform full ROM and withstand moderate resistance. This means there was a difference in muscle strength before and after ROM administration. This finding aligns with Susanti & Bistara (2019) research, which states that a range of motion exercises can improve joint movement, function, and muscle tone. These exercises are also beneficial for enhancing the physical and mental health of stroke patients by alleviating pain, cramps, dizziness, and stress, as well as relaxing the body. Although epidemiological data highlight the burden of stroke, a clearer research gap is related to the lack of detailed nursing case studies that thoroughly document structured ROM interventions aligned with standardized nursing guidelines. Impaired physical mobility is one of the most

common nursing problems in stroke patients, requiring evidence-based intervention such as ROM therapy to prevent contractures, improve circulation, and enhance functional mobility.

However, existing literature often lacks detailed SOP-based descriptions of ROM implementation in a clinical context. This study seeks to address this gap by presenting a structured case study that documents a ROM intervention with explicit operational steps, measurable outcomes, and clinical reasoning. This case study aims to describe the nursing care process for impaired physical mobility in an ischemic stroke patient through the implementation of structured ROM exercises, including assessment, diagnosis, intervention, and evaluation.

METHODS

Study Design

A descriptive case study approach was used to explore the effectiveness of ROM therapy on improving muscle strength in an ischemic stroke patient.

Settings

The study was conducted in the Nakula Ward of Bhakti Dharma Husada (BDH) Hospital in Surabaya, a secondary-level health facility that provides comprehensive neurological and rehabilitative nursing services. This ward accommodates patients with acute and subacute stroke conditions who require continuous monitoring, medication management, and rehabilitative interventions such as Range of Motion (ROM) exercises. The setting was chosen because it offered access to stroke patients with impaired physical mobility and ensured adequate supervision during nursing interventions. The controlled hospital environment also enabled consistent implementation of the intervention in accordance with standard operating procedures (SOPs).

Research Subject

The research subject consisted of one ischemic stroke patient, a 47-year-old female, who had been hospitalized for less than 24 hours before assessment. The patient presented with impaired physical mobility characterized by decreased muscle strength in the left upper and lower extremities. She also had a medical history of uncontrolled hypertension for seven years and diabetes mellitus for four years, both of which are known risk factors for ischemic stroke. The patient was cooperative, able to communicate basic needs despite mild speech difficulties, and met the inclusion criteria for receiving ROM therapy as part of nursing care.

Instruments

Data were collected using several clinical and observational instruments to ensure a comprehensive assessment. Muscle strength was measured using the Manual Muscle Testing (MMT) scale, which rates muscle performance from 0 (no movement) to 5 (normal movement against full resistance). An interview guide based on Henderson's functional health patterns was used to gather subjective information from the patient and family. Additional instruments included observation checklists for mobility assessment, patient response to therapy, and adherence to ROM implementation. Documentation tools such as medical records, laboratory reports, and imaging results were also utilized to support clinical decision-making and confirm the patient's medical status.

Intervention

The intervention consisted of structured Range of Motion (ROM) therapy administered once daily for three consecutive days, with each session lasting 10–15 minutes. The intervention followed the hospital's nursing SOP for ROM exercises and included passive and active-assistive movements. The ROM routine covered multiple joints, including flexion, extension, abduction, adduction, rotation, and circumduction for both upper and lower extremities. The patient was positioned comfortably in a supine position, and movements were performed with 8–10 repetitions per joint group. During the intervention, the nurse monitored the patient's pain tolerance, vital signs, and fatigue levels. The family was also educated and encouraged to assist in performing ROM exercises to support continuity of care.

Data Collection

Data collection was carried out through a combination of interviews, direct observation, physical examination, and documentation review. Interviews with the patient and family gathered information about daily activities, functional limitations, and perceptions of mobility challenges. Direct observation focused on gait, posture, limb movement, and the patient's participation during ROM therapy. Physical examination included a detailed assessment of muscle strength, joint stiffness, and range of motion using standardized clinical procedures. Medical records—including laboratory tests, CT scan results, and medication history—were reviewed to ensure alignment between clinical conditions and the selected nursing interventions. Data were collected consistently before and after each ROM session to monitor changes.

Data Analysis

Data analysis was performed using descriptive methods to compare muscle strength and mobility performance before and after the intervention. The MMT scores were analyzed to identify measurable improvements in muscle strength across the three-day intervention period. Observational notes and interview findings were synthesized to provide qualitative insights into patient participation, comfort, and perceived changes in mobility. All assessment results were validated using the Indonesian Nursing Diagnosis Standards (SDKI) to ensure accurate problem identification. Findings were then integrated to form a clinical conclusion regarding the effectiveness of ROM therapy in addressing impaired physical mobility.

Ethical Considerations

Ethical principles were upheld throughout the study to ensure patient safety, autonomy, and confidentiality. The patient was informed about the purpose, procedures, and potential benefits of ROM therapy, and verbal informed consent was obtained before beginning the intervention. The study adhered to institutional ethical guidelines and respected the patient's right to refuse or discontinue participation at any time. Personal and medical information was kept confidential and used solely for clinical and academic purposes. Family involvement was permitted only after obtaining the patient's consent and ensuring the patient understood the study procedures.

RESULTS

Table 1. Muscle Strength Before and After ROM Action.

Day to	Before the ROM	After the ROM
1	Upper extremity 3 and left lower extremity 3	Upper extremity 3 and left lower extremity 3
2	Upper extremity 3 and left lower extremity 3	Upper extremity 3 and left lower extremity 3
3	Upper extremity 3 and left lower extremity 3	Upper extremity 4 and left lower extremity <u>4</u>

Based on Table 1, the nursing care that incorporated the Range of Motion (ROM) application proved effective in increasing muscle strength. This was evident from the improvement in muscle strength observed from day 1, with a noticeable increase by day 3 after ROM exercises. Specifically, the upper extremities showed an increase to 4, and the left lower extremity also increased to 4.

DISCUSSION

On June 2, 2025, at 10:30 AM, an assessment was conducted through an interview. The patient was highly cooperative for ROM therapy. It was discovered that the patient has a history of uncontrolled hypertension since 2018 and diabetes mellitus since 2021. This case study found that structured ROM therapy improved muscle strength in a stroke patient within three days. While short, these improvements align with prior studies demonstrating that ROM exercises help maintain joint flexibility and enhance circulation. The left upper extremity was weak, with a score of 4, and the right extremity had a score of 2 on a 0-5 scale. The patient also experienced difficulty speaking. The tool used for the assessment was a muscle strength scale with a range of 0-5. CT scan results indicated hypoxic ischemic encephalopathy.

Based on the Indonesian Nursing Diagnosis Standard (SDKI, 2018), the nursing diagnosis established was impaired physical mobility related to decreased muscle strength. This was evidenced by the patient's report of weakness and difficulty moving both upper and lower extremities. The patient also complained of pain during movement and was reluctant to move. Muscle strength was assessed as 5 for the right hand and right foot, and 3 for the left hand and left foot. Other indicators included decreased muscle strength, reduced range of motion, decreased joint stiffness, and limited movement. Based on the factual descriptions and theoretical framework, this study assumes that the diagnosis of impaired physical mobility was established based on assessment findings, specifically the major and minor signs and symptoms observed in the stroke patient. The diagnosis aligns with the data showing decreased muscle strength (Masliah et al., 2022). During the assessment phase, interviews with the patient and their family were cooperative and active, ensuring the assessment process was well understood and accepted by both parties.

Planning for this case study was developed based on both the specific case and established theories, drawing from various literature, including textbooks, journal articles, and nursing care articles focused on stroke patients with impaired physical mobility. The desired

outcomes included increased physical mobility, improved extremity movement, enhanced muscle strength, greater range of motion, decreased joint stiffness, reduced limited movement, and diminished physical weakness (Ferry & Nurani, 2022).

Interventions can be broadly categorized into pharmacological and non-pharmacological therapies. Pharmacological therapy primarily involves the administration of anticoagulants, such as aspirin and clopidogrel. However, pharmaceutical intervention alone is often insufficient, and non-pharmacological therapies, like Range of Motion (ROM) therapy, are crucial for increasing muscle strength (Faridah et al., 2022).

Based on the nursing care process and the diagnosis of impaired physical mobility related to decreased muscle strength, the author chose ROM therapy as an intervention. This decision aligns with the findings of Widya (2023), which demonstrated that ROM therapy is proven effective in improving muscle strength in stroke patients. (Yuliasani et al., 2023) research specifically highlighted that ROM therapy, performed once daily per shift for 10 to 15 minutes over three days, following patterns for the neck, shoulders, elbows, wrists, fingers, hips, knees, ankles, and toes, yielded positive results.

Nursing implementation for addressing impaired physical mobility in stroke patients through ROM application involves performing Range of Motion exercises according to standard operating procedures. This ROM intervention is an independent nursing action, meaning nurses are authorized to perform it autonomously (Masliah et al., 2022). Based on the nursing care process for Mrs. S, the ROM implementation steps began with a "Bismillahirrahmanirahim" (in the name of God, the Most Gracious, the Most Merciful) and an assessment of the patient's muscle strength using a 0-5 scoring system.

The muscle strength scoring system is as follows:

- 0: No movement at all.
- 1: Able to move only fingertips.
- 2: Able to perform movement involving two or more joints but unable to overcome minimal resistance.
- 3: Able to lift an upper extremity/body part but unable to overcome moderate resistance.
- 4: Able to perform normal movement but unable to overcome maximum resistance.
- 5: Patient can move normally.

ROM therapy to increase Mrs. S's muscle strength included flexion, extension, hyperextension, abduction, adduction, rotation, eversion, inversion, pronation, supination, and opposition movements. These exercises were performed daily for three consecutive days, lasting 10-15 minutes each session (Sustika et al., 2020).

During the 3-day evaluation period at BDH Hospital Surabaya, the first range of motion (ROM) exercise session was conducted in the afternoon for 10-15 minutes, focusing on the patient's left limbs. After the passive ROM was explained and demonstrated on the first day, the family showed great enthusiasm and cooperation. However, the patient still complained of weakness in her left hand and foot when moving them. On the second day, passive ROM was practiced on the patient's left upper and lower extremities. The family was also encouraged to

support the patient during independent exercises. By the third day, the patient was performing ROM exercises independently, and an improvement in muscle strength was noted.

Before ROM therapy, the left upper extremity's muscle strength was a 3 (on a 0-5 scale). After 4 days of ROM therapy, the score increased to 4, as the patient could lift her left hand but could not withstand maximum resistance. Similarly, the left foot's muscle strength, which was initially 3, increased to 4 after therapy, allowing the patient to lift her left foot, though she still couldn't withstand maximum resistance. This improvement is attributed to the significant encouragement and motivation provided by the patient and her family, along with the family's patience in assisting with joint exercises.

Based on this case study and relevant theories, it is assumed that the patient experienced increased extremity movement, improved muscle strength, enhanced range of motion (ROM), reduced joint stiffness, decreased limited movement, and diminished physical weakness. The administration of ROM therapy proved effective in improving muscle strength in this stroke patient. Clinical reasoning suggests that consistent passive and active-assistive movements helped reduce stiffness and stimulated neuromuscular activation. Family involvement played a significant role in the patient's progress.

CONCLUSION

The results of this case study demonstrate that structured Range of Motion (ROM) therapy implemented consistently over a three-day period was effective in improving muscle strength in an ischemic stroke patient with impaired physical mobility. Through systematic nursing assessment, diagnosis, intervention, and evaluation, there was a measurable increase in muscle strength from Grade 3 to Grade 4 in both the left upper and lower extremities. The improvement was supported by active patient participation and strong family involvement, which contributed to continuity of care throughout the intervention process. Although the intervention period was brief, the findings indicate that ROM exercises play an important role in maintaining joint flexibility, preventing muscle stiffness, and enhancing early mobility in stroke patients. This case reinforces the clinical value of ROM therapy as an independent nursing intervention within stroke rehabilitation.

SUGGESTION

Based on the findings, it is recommended that ROM therapy be integrated as a routine component of nursing care for stroke patients experiencing impaired physical mobility, particularly during the early stages of hospitalization. Nurses should apply ROM following standardized operating procedures and ensure family engagement to strengthen adherence and continuity of therapy beyond the hospital setting. Future research is encouraged to involve a larger number of patients, longer intervention durations, and additional functional outcome measures such as gait stability, balance, and activities of daily living. Comparative studies evaluating different types of ROM (active, passive, and active-assisted) or combining ROM with other rehabilitative modalities may also provide deeper insights into optimal strategies for improving mobility in stroke rehabilitation.

LIMITATIONS

This study has several limitations that should be considered when interpreting the findings. First, the study used a relatively limited sample size and was conducted in a specific community setting, which may reduce the generalizability of the results to broader populations. Second, the use of self-reported data may introduce the possibility of response bias, as participants might not fully recall or accurately report their experiences and behaviors. Third, the study design may not fully capture long-term outcomes of the intervention, as the observation period was limited. In addition, potential confounding variables such as lifestyle factors, socioeconomic status, and existing health conditions might not have been completely controlled. Therefore, future studies with larger sample sizes, longer follow-up periods, and more rigorous research designs are recommended to further validate and strengthen the findings of this study.

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