



## Articles

## Application of Clove Oil Massage Combined with Range of Motion Exercises to Improve Muscle Strength in Non-Hemorrhagic Stroke Patients: A Case Report

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Nursing Insight Journal, Vol 1 No 1, March 2026

### Abstract

**Background:** Stroke is one of the leading causes of disability worldwide and frequently results in motor weakness, reduced functional mobility, and dependence in daily activities. Early rehabilitation is essential to prevent complications and enhance recovery. Non-pharmacological nursing interventions such as massage therapy and range of motion (ROM) exercises have been widely used to stimulate neuromuscular function. Clove oil contains eugenol, which has vasodilatory, anti-inflammatory, and analgesic properties that may facilitate movement and muscle activation.

**Objective:** To describe the clinical outcomes of combining clove oil massage with ROM exercises in improving muscle strength among non-hemorrhagic stroke patients.

**Methods:** This study employed a descriptive case report approach involving three non-hemorrhagic stroke patients with muscle weakness in an inpatient ward. The intervention consisted of clove oil effleurage massage followed by passive and active-assisted ROM exercises for seven consecutive days. Muscle strength was assessed using Manual Muscle Testing (MMT).

**Results:** All patients showed gradual improvement in muscle strength scores from grade 2 to grade 3–4 after the intervention period. Patients also demonstrated increased limb mobility and participation in basic activities.

**Conclusion:** The combination of clove oil massage and ROM exercises was associated with improvement in muscle strength in stroke patients. This intervention may be considered as a complementary nursing rehabilitation strategy.

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**Keywords:**

stroke rehabilitation; clove oil; massage therapy; range of motion; muscle strength; nursing intervention

Received: September 25, 2025  
Revision received: February 1, 2026  
Accepted: February 24, 2026  
Published: March 18, 2026

### INTRODUCTION

Stroke is a neurological disorder caused by disruption of cerebral blood flow resulting in brain tissue injury and functional impairment. It remains one of the leading causes of disability worldwide, with a large proportion of survivors experiencing long-term physical dependence. Motor impairment, particularly hemiparesis, is the most common consequence and significantly limits the ability to perform activities of daily living. Without early rehabilitation, patients may develop muscle atrophy, joint contractures, and decreased mobility (World Stroke Organization, 2022).

Non-hemorrhagic stroke, also known as ischemic stroke, accounts for the majority of stroke cases and occurs due to arterial obstruction leading to tissue ischemia. Damage to motor pathways disrupts voluntary movement and muscle strength. Recovery depends largely on neuroplasticity, a process where surviving neurons reorganize and form new functional connections. Repetitive movement, sensory stimulation, and early mobilization play essential roles in facilitating this recovery process (Rachmawati et al., 2020).

Range of Motion (ROM) exercises are widely recommended in stroke rehabilitation to maintain joint flexibility, prevent stiffness, and stimulate neuromuscular activity. Regular ROM training promotes circulation and prevents secondary complications of immobilization. In nursing care, ROM exercises are commonly performed as part of bedside rehabilitation to maintain physical function and prevent long-term disability (Siagian, 2021).

However, stroke patients often experience pain, stiffness, and discomfort that reduce participation in rehabilitation exercises. Pain and muscle rigidity may limit movement and decrease patient motivation. Therefore, supportive interventions are required to improve comfort and facilitate therapeutic activity.

Massage therapy is a complementary nursing intervention that stimulates sensory receptors, improves local circulation, and promotes relaxation. Effleurage massage, characterized by gentle stroking movements, enhances blood flow and reduces muscle tension. Tactile stimulation also activates sensory pathways that contribute to motor recovery (Darmareja et al., 2020).



The use of therapeutic oils during massage may enhance its physiological effects. Clove oil contains eugenol, a compound known for analgesic, anti-inflammatory, and vasodilatory properties. These effects may reduce discomfort, increase peripheral circulation, and facilitate movement performance during rehabilitation exercises (Ibrahim et al., 2022).

Combining massage and ROM exercises may provide synergistic stimulation of sensory and motor pathways. Massage prepares muscles and improves perfusion, while ROM exercises activate neuromuscular function. This combination may support neuroplasticity and improve muscle strength recovery in stroke patients.

In nursing practice, simple and safe bedside rehabilitation techniques are essential because nurses provide continuous patient care. Integrating complementary interventions into routine nursing care may enhance recovery and increase patient independence. However, clinical descriptions of combined massage and ROM interventions remain limited.

Therefore, this case report aims to describe the outcomes of combining clove oil massage with ROM exercises in improving muscle strength among non-hemorrhagic stroke patients.

## METHOD

This study was conducted using a descriptive case report design within a nursing care framework. The purpose of the report was to describe the clinical progression of muscle strength in non-hemorrhagic stroke patients after receiving a combination of clove oil massage and range of motion (ROM) exercises as part of bedside nursing rehabilitation. Because the aim was observational and exploratory, the study did not attempt to establish causal relationships or treatment effectiveness but rather to document patient responses to the intervention over time.

The observation was carried out in an adult inpatient neurological ward of a referral hospital providing care for patients with stroke and other neurological disorders. The ward routinely manages patients who require monitoring, prevention of complications, and early mobilization assistance. Standard care in the ward includes positioning, assistance with activities of daily living, and basic mobilization exercises. The intervention described in this report was integrated into routine nursing care and did not replace medical therapy or physiotherapy prescribed by physicians.

Three patients diagnosed with non-hemorrhagic stroke were selected purposively based on nursing assessment findings. All patients were over 45 years old, experienced muscle weakness, were hemodynamically stable, and were conscious enough to follow simple instructions. Patients were excluded if they had severe cognitive impairment, unstable vital signs, musculoskeletal injuries preventing movement, severe contractures, or known hypersensitivity to topical oils. Prior to the intervention, each patient and family received an explanation

regarding the procedures, and informed consent was obtained. Patient confidentiality was maintained by using coded identifiers.

The intervention consisted of two sequential components: effleurage massage using diluted clove oil followed by ROM exercises. The therapy was administered once daily for seven consecutive days by trained nurses familiar with rehabilitation nursing procedures.

Before massage application, clove oil was diluted with a carrier oil to minimize the risk of skin irritation. A small sensitivity test was conducted on the patient's forearm. Patients were positioned comfortably in a supine or semi-Fowler position to promote relaxation and accessibility of the affected extremities. The nurse applied a small amount of diluted clove oil onto the affected limb and performed effleurage massage using gentle, rhythmic stroking movements directed from distal to proximal areas to facilitate venous return and circulation. The pressure was maintained at a light-to-moderate level to avoid discomfort or muscle guarding. Each session lasted approximately 10 to 15 minutes and covered both upper and lower extremities affected by weakness.

Immediately after the massage session, ROM exercises were initiated to utilize the improved muscle relaxation and circulation produced by the massage. Movements included shoulder flexion and extension, abduction and adduction, elbow flexion and extension, wrist and finger movements for the upper extremities, and hip, knee, and ankle movements for the lower extremities. Each movement was performed slowly and within the patient's tolerance range, with approximately eight to ten repetitions per joint. When patients were unable to move independently, passive movements were performed, and as the patients improved, active-assisted participation was encouraged. The ROM session lasted approximately 15 to 20 minutes.

Muscle strength was assessed using the Manual Muscle Testing (MMT) scale, which ranges from grade 0 (no contraction) to grade 5 (normal strength). Assessments were performed at baseline on the first day, during mid-observation on the fourth day, and at the end of the seventh day. In addition to numerical scoring, functional observations were documented, including the ability to lift limbs, maintain limb position against gravity, and participate in simple self-care activities.

Data were analyzed descriptively by comparing muscle strength scores and functional observations across the observation period for each patient. No statistical inference was performed because the objective was clinical description rather than hypothesis testing.

## RESULTS

Three patients diagnosed with non-hemorrhagic stroke participated in this clinical observation. All patients presented with unilateral muscle weakness affecting their functional mobility and self-care abilities. The intervention consisting of clove oil massage followed by range of motion (ROM) exercises was implemented once



daily for seven consecutive days. Changes in muscle strength and functional movement were documented using Manual Muscle Testing (MMT) and descriptive clinical observation.

### Patient Characteristics

Patient 1 was a 58-year-old male admitted with left-sided hemiparesis three days after the onset of ischemic stroke. The patient was conscious and able to communicate clearly but required assistance in all mobility activities. Initial nursing assessment showed muscle strength grade 2 in the affected upper and lower extremities, indicating movement possible only without gravity. The patient was unable to lift the arm or leg against gravity and remained dependent for repositioning and feeding.

Patient 2 was a 64-year-old female admitted five days after stroke onset. She experienced right-sided weakness and demonstrated limited voluntary movement. Initial MMT evaluation showed muscle strength grade 2 in the arm and grade 3 in the leg. The patient could slightly move the leg against gravity but could not maintain sustained movement. She required assistance for sitting balance and hygiene activities.

Patient 3 was a 71-year-old male admitted four days after stroke onset with right hemiparesis. Initial muscle strength was grade 1–2 in the upper extremity and grade 2 in the lower extremity. Only minimal muscle contraction was visible in the arm, and the patient was unable to perform functional movement independently. The patient required total assistance for transfers and repositioning.

### Daily Clinical Progression

#### Day 1 (Baseline Assessment)

Before the intervention, all patients demonstrated limited voluntary movement and reduced muscle tone on the affected side. Passive movement produced stiffness in joints, particularly the shoulder and ankle areas. Patients also expressed discomfort when movement was attempted. Functional activities such as grasping objects, lifting limbs, or repositioning independently were not possible.

Following the first session of clove oil massage, patients reported warmth and relaxation in the treated extremities. ROM exercises were performed passively with minimal patient participation. No adverse reactions to the oil were observed.

#### Day 2

Patients began to show reduced resistance during passive ROM exercises. Joint movement became smoother, and muscle stiffness decreased. Patient 1 demonstrated slight initiation of elbow flexion when assisted. Patient 2 showed improved knee flexion control during assisted movement. Patient 3 exhibited visible muscle contraction during shoulder movement although still unable to lift against gravity.

Patients reported decreased discomfort during movement compared to the previous day. The affected extremities felt warmer, and caregivers noted easier positioning.

#### Day 3

Gradual improvement in voluntary movement appeared. Patient 1 was able to slightly lift the forearm with assistance and maintain position briefly before fatigue. Patient 2 demonstrated improved hip flexion and could maintain the leg against gravity for several seconds. Patient 3 began initiating active movement during ROM exercises although still weak.

Muscle strength scores remained mostly grade 2 but showed improved endurance and control. Passive exercises required less effort from the nurse as patients began participating in movement.

#### Day 4 (Mid-Observation Evaluation)

Mid-evaluation revealed measurable changes in muscle strength. Patient 1 improved to grade 3 in the lower extremity and grade 2–3 in the upper extremity. Patient 2 improved to grade 3–4 in the lower extremity and grade 3 in the upper extremity. Patient 3 improved to grade 2–3 in both extremities.

Patients began assisting with bed repositioning. Patient 2 was able to sit with minimal assistance for a short duration. Patients tolerated ROM exercises without complaints of pain.

#### Day 5

Further improvement in motor control was observed. Patient 1 lifted the arm against gravity although unable to resist pressure. Patient 2 performed active-assisted exercises with minimal help. Patient 3 showed improved hand opening and closing movements.

Functional changes included attempts to hold bed rails and partial participation during hygiene care. Movement coordination improved, and tremor or stiffness decreased.

#### Day 6

All patients demonstrated increased endurance during exercise sessions. Patient 1 maintained leg elevation longer than previous days. Patient 2 began partial standing with assistance from family members and nurses. Patient 3 could maintain arm elevation for several seconds.

Muscle tone appeared more balanced, and joint flexibility improved. Nurses noted that passive ROM required significantly less force compared to baseline.



Day 7 (Final Evaluation)

Table 1. Final assessment showed consistent improvement in muscle strength across all patients.

Patient	Upper Extremity	Lower Extremity
Patient 1	Grade 3	Grade 3–4
Patient 2	Grade 3–4	Grade 4
Patient 3	Grade 3	Grade 3

Patients demonstrated improved functional participation:

1. Able to assist repositioning
2. Able to maintain limb against gravity
3. Able to initiate simple self-care movements

No adverse skin reactions or discomfort from clove oil massage were observed during the intervention period.

### Summary of Observed Changes

Across the seven-day observation period, the following clinical patterns were noted:

1. Reduction in joint stiffness within the first two days
2. Emergence of voluntary contraction by day three
3. Improved muscle strength by day four onward
4. Increased functional participation by day seven

All patients progressed from severe weakness toward moderate motor control. The progression appeared gradual and consistent with daily stimulation and exercise participation.

## DISCUSSION

This case report described the clinical progression of muscle strength in three non-hemorrhagic stroke patients who received a combination of clove oil effleurage massage and range of motion (ROM) exercises for seven consecutive days. Improvements in muscle strength and functional participation were observed gradually during the observation period. Because this report is descriptive, the findings should be interpreted as clinical associations rather than evidence of treatment effectiveness.

### Motor Impairment in Stroke Patients

Motor weakness following stroke results from disruption of corticospinal pathways responsible for voluntary movement. Damage to these neural structures leads to decreased motor unit recruitment, impaired coordination, and reduced muscle activation. Patients frequently experience flaccidity during the acute phase followed by gradual return of muscle tone. Without appropriate stimulation, prolonged immobilization may cause muscle atrophy, joint stiffness, and functional decline (Rachmawati et al., 2020).

In the present cases, all patients initially presented with muscle strength scores of grade 1–2, indicating minimal contraction or movement without gravity. This finding is consistent with early post-stroke neuromuscular impairment, in which voluntary motor control is limited. Gradual improvement over time is expected as part of

natural neurological recovery; however, rehabilitation interventions aim to facilitate and optimize this process.

### Role of Sensory Stimulation Through Massage

Effleurage massage provides continuous tactile input that stimulates cutaneous mechanoreceptors and proprioceptive pathways. Sensory input is known to activate cortical areas adjacent to damaged regions, supporting neuroplasticity and motor relearning. The gentle stroking movement used in effleurage may improve circulation and reduce muscle stiffness, thereby facilitating movement initiation (Darmareja et al., 2020).

In this observation, reduced joint resistance and increased warmth were noted within the first two days of intervention. These findings may be related to increased peripheral blood flow. Improved circulation enhances oxygen delivery and metabolic activity in muscle tissue, potentially supporting contraction ability.

Clove oil contains eugenol, which has vasodilatory and analgesic properties. Vasodilation may increase tissue perfusion, while analgesic effects may decrease discomfort during movement. Reduced discomfort can improve patient participation in rehabilitation activities (Ibrahim et al., 2022). The patients in this report demonstrated improved tolerance to movement after massage sessions, suggesting that sensory comfort may influence engagement in exercise.

However, it should be noted that the observed improvement cannot be attributed solely to clove oil. The therapeutic touch itself may produce relaxation and neuromuscular activation independent of the oil's chemical properties.

### Role of Range of Motion Exercises

ROM exercises are a fundamental component of stroke rehabilitation aimed at maintaining joint flexibility and stimulating neuromuscular pathways. Repetitive movement enhances motor relearning through activation of remaining neural networks. Early mobilization also prevents secondary complications such as contractures and muscle shortening (Siagian, 2021).

In the present cases, voluntary contraction began appearing around the third day of intervention. This pattern aligns with the concept of motor relearning, in which repeated movement exposure gradually increases neural activation. Passive movement likely provided initial sensory input, followed by active-assisted movement that strengthened voluntary control.

The progression from grade 2 to grade 3 muscle strength indicates the ability to move against gravity, representing a meaningful functional improvement. Patients began assisting repositioning and participating in basic self-care tasks, suggesting that motor recovery had functional significance.



### Possible Synergistic Mechanism

The combination of massage and ROM exercises may provide complementary stimulation. Massage prepares muscles by improving circulation and reducing stiffness, while ROM exercises activate motor pathways through repetitive contraction. This sequential approach may enhance patient readiness for movement.

The sensory stimulation from massage may prime cortical activation, while motor stimulation from ROM reinforces neural pathways. Neuroplasticity depends on repeated sensory-motor integration; therefore, combining both modalities may support recovery processes. Nevertheless, because natural recovery occurs during the first weeks after stroke, the improvements observed cannot be separated from spontaneous neurological healing.

### Functional Implications for Nursing Care

In nursing practice, bedside rehabilitation is essential because nurses interact with patients continuously. Simple interventions that can be safely performed during routine care may improve patient participation and comfort. The described intervention required minimal equipment and was feasible within daily nursing activities.

Patients became progressively more cooperative during repositioning and hygiene care, suggesting improved confidence and comfort. Encouraging participation in movement may reduce dependency and promote independence in daily activities. Family members also observed visible improvement, which may enhance motivation for continued rehabilitation.

However, implementation should consider patient tolerance and safety. Excessive pressure during massage or forced joint movement may cause injury. Proper technique training is necessary to ensure safe application.

### Limitations

Several limitations should be acknowledged. First, this report involved only three patients and lacked a control comparison, so the findings cannot be generalized. Second, natural recovery during the acute phase of stroke likely contributed to improvement. Third, other medical and rehabilitation treatments provided simultaneously may influence outcomes. Finally, muscle strength was measured using manual testing, which may be subjective.

Therefore, the results should be interpreted as clinical observations rather than evidence of efficacy. Further controlled studies are required to evaluate the independent contribution of this intervention.

### CONCLUSION

This case report described the clinical progression of three non-hemorrhagic stroke patients who received

nursing care consisting of clove oil effleurage massage combined with range of motion (ROM) exercises for seven consecutive days. Gradual improvement in muscle strength was observed in all patients, progressing from minimal contraction toward movement against gravity, accompanied by increased participation in daily activities and improved tolerance to repositioning.

The findings suggest that the intervention may support motor stimulation, circulation, and patient comfort during early rehabilitation. The combination of sensory stimulation from massage and repetitive motor activation from ROM exercises appeared to facilitate patient engagement in movement activities. However, because this study used a descriptive case report design without comparison or control, the improvement cannot be interpreted as causal effectiveness. Natural neurological recovery and other concurrent treatments may also contribute to the observed changes.

Therefore, the intervention can be considered a feasible supportive nursing care approach in early stroke rehabilitation, but further experimental research with larger samples and controlled designs is necessary to determine its effectiveness and clinical impact.

### ACKNOWLEDGEMENT

The authors would like to express sincere gratitude to the Stroke Unit nurses of K.R.M.T. Wongsonegoro Hospital for their cooperation and assistance during the implementation of nursing care. Appreciation is also extended to the patients and their families for their willingness to participate in this case report. Their cooperation made the clinical observation and documentation possible.

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