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CASE REPORT OPEN ACCESS

Range of Motion Exercise to Reduce the Fall Risk in Older Adult with Hypertension at Jember Nursing Home: A Case Report

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ABSTRACT

Falls are a major health concern among older adults, particularly those with chronic conditions such as hypertension that affect balance, muscle strength, and postural stability. This case report describes the nursing management of an older adult with hypertension and high fall risk who received range of motion (ROM) exercise as a non-pharmacological intervention. The patient was a 76-year-old woman residing at the Tresna Werdha Social Care Facility in Jember, presenting with instability during standing and walking and a history of near-fall episodes. Initial assessment showed a high fall risk, with a Timed Up and Go Test (TUGT) time of approximately 71 seconds and a Morse Fall Scale score of 55. ROM exercises were performed actively on the upper and lower extremities once daily for approximately 15–30 minutes over six consecutive days. Evaluation was conducted by measuring the Timed Up and Go Test (TUGT), Morse Fall Scale (MFS), blood pressure, and the client's subjective responses before and after the intervention. The results showed a gradual reduction in TUGT duration over the intervention period, indicating improvement in mobility and movement coordination. However, the TUGT values remained within the high fall risk category. The MFS score remained in the high-risk category, which may be influenced by the client's baseline condition and the relatively short duration of the intervention. Blood pressure measurements demonstrated a decreasing trend, although they had not yet reached normal levels. Subjectively, the client reported increased confidence and improved stability when standing and walking. In conclusion, the range of Motion exercises demonstrated early positive effects on mobility and stability in older adults with hypertension. However, continuous and long-term implementation is required to achieve a significant reduction in fall risk categories.

KEYWORDS

Range of motion; Fall risk; Older adults; Hypertension

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1 | Background

The global demographic shift toward an aging population has significantly increased the prevalence of age-related physiological and functional decline. Older adults are particularly vulnerable to geriatric syndromes, which often result from the complex interplay of multiple chronic conditions and diminished physiological reserves. Among these, the deterioration of the musculoskeletal and cardiovascular systems poses a substantial threat to their independence and overall quality of life, necessitating targeted, evidence-based healthcare interventions to mitigate functional loss.

Hypertension remains one of the most pervasive chronic conditions affecting the elderly, with a substantial proportion of older adults experiencing uncontrolled blood pressure. Beyond its well-documented cardiovascular complications, hypertension is increasingly recognized as a significant contributor to physical frailty and fall risk. Pathophysiological mechanisms, including altered cerebral perfusion, impaired baroreceptor sensitivity, and vascular

stiffness, can compromise postural stability and neuromuscular coordination, thereby elevating the susceptibility to falls in this demographic (Karayiannis, 2022; Maisura et al., 2024).

Falls represent a critical public health concern and a leading cause of injury-related morbidity and mortality among older adults. The consequences extend beyond physical injuries, such as fractures and traumatic brain injuries, often leading to a psychological "fear of falling," reduced physical activity, and subsequent functional decline. For older adults with hypertension, the compounding effects of fall-related trauma and cardiovascular instability create a complex clinical challenge, highlighting the urgent need for proactive fall prevention strategies, particularly in long-term residential care settings.

Current clinical guidelines emphasize the importance of fall prevention; however, interventions often rely heavily on pharmacological management or complex, resource-intensive physical therapy programs. In residential care facilities, where staffing ratios and resources may be limited, there is a pressing need for safe, cost-effective, and easily implementable non-pharmacological interventions. Furthermore, while pharmacological management of hypertension is standard, it does not directly address the musculoskeletal deficits that contribute to fall risk, underscoring the necessity for complementary nursing interventions that target both physical stability and cardiovascular health.

Range of Motion (ROM) exercises have emerged as a promising, evidence-based non-pharmacological intervention to mitigate functional decline in older adults. By promoting joint mobility, enhancing muscle strength, and improving proprioception, ROM exercises directly target the physical deficits associated with fall risk (Rasni et al., 2020; Sartika, 2023). Additionally, emerging evidence suggests that regular, light-to-moderate physical activity, including ROM exercises, can positively influence hemodynamic parameters, offering a dual benefit of improving physical stability and supporting blood pressure regulation in hypertensive patients (Nursalam et al., 2020; Luh et al., 2022).

Despite the established benefits of physical activity, there is a paucity of detailed clinical literature documenting the specific application and immediate outcomes of ROM exercises in older adults with concurrent hypertension and high fall risk within residential care environments. Therefore, this case report aims to describe the comprehensive nursing management of an older adult with hypertension and a high risk of falls who received a structured ROM exercise intervention. By evaluating changes in mobility, fall risk scores, and blood pressure, this report provides practical clinical insights into the implementation of ROM exercises as a viable, non-pharmacological fall prevention strategy in gerontic nursing.

2 | Case Presentation

The patient was a 76-year-old older woman (Mrs. N) residing in the Special Care Unit (RPK) of Jember Nursing Home. She had a history of hypertension for approximately 10 years. During assessment, the patient reported frequent feelings of unsteadiness while standing and walking, particularly when rising from a seated position. She had experienced a fall four years prior that required hospital treatment and reported several near-fall incidents in the weeks before assessment. Vital sign assessment revealed blood pressure values consistently above normal limits, indicating uncontrolled hypertension.

Fall risk assessment using the Timed Up and Go Test showed an initial average time of approximately 71 seconds, indicating a high risk of falls. The Morse Fall Scale score was 55, also classified as high fall risk. These findings were supported by observed gait instability and reduced lower-extremity muscle strength. The primary nursing intervention was the implementation of range of motion exercises based on evidence-based nursing principles. The patient performed active-assisted ROM exercises for the upper and lower extremities once daily, with each session lasting approximately 15–30 minutes, over six consecutive days. Exercises were conducted under nurse supervision to ensure safety and prevent fatigue. Vital signs and patient tolerance were monitored before and after each session.

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2.1 Evaluation and Outcomes

Table 1. TUGT Score Measurements Before and After ROM Exercise

Day	Before ROM Exercise (seconds)	After ROM Exercise (seconds)
Monday	75	70
Tuesday	67	68
Wednesday	80	75
Thursday	72	69
Friday	63	57
Saturday	59	53

Notes: TUGT = Timed Up and Go Test.; TUGT scores are measured in seconds, representing the time required for the patient to complete the test; Fall Risk Categorization: A TUGT score of >30 seconds indicates a high risk of falls.

Table 2. Blood Pressure Measurements Before and After ROM Exercise

Day	Systolic Before Exercise (mmHg)	Systolic After Exercise (mmHg)	Diastolic Before Exercise (mmHg)	Diastolic After Exercise (mmHg)
Monday	154	153	74	74
Tuesday	162	162	81	81
Wednesday	163	152	74	74
Thursday	153	148	75	75
Friday	147	147	78	78
Saturday	152	177	90	90

Notes: Blood pressure is measured in millimeters of mercury (mmHg); Normal blood pressure: <120/80 mmHg; Hypertension: ≥140/90 mmHg; ROM = Range of Motion

Outcomes were evaluated by comparing Timed Up and Go Test (TUGT) scores, Morse Fall Scale (MFS) scores, and blood pressure measurements before and after the ROM exercise intervention. Over six days of intervention, TUGT scores showed a general downward trend, indicating improvement in mobility and balance performance. However, all TUGT values remained within the high fall risk category (>30 seconds), suggesting that the fall risk category did not change.

The MFS score remained unchanged at 55, indicating a persistent high fall risk. Blood pressure measurements showed a tendency toward reduced systolic values on most observation days, although readings remained above normal thresholds. Despite the absence of categorical improvement, the patient demonstrated increased confidence during standing and walking activities and was able to perform ROM exercises more independently by the final day of intervention.

3 | Discussion

This case report illustrates the early functional response of a 76-year-old woman with long-standing hypertension and high fall risk to a short-term, nurse-led range of motion (ROM) exercise intervention. The primary findings indicate a progressive reduction in Timed Up and Go Test (TUGT) duration, modest systolic blood pressure lowering, and improved subjective confidence in standing and walking, despite persistent high-risk categorization on both TUGT and the Morse Fall Scale (MFS). These outcomes underscore the potential of structured ROM exercise as a feasible, non-pharmacological nursing intervention to initiate mobility restoration in frail older adults with cardiovascular comorbidities, while also highlighting the necessity of prolonged implementation for clinically meaningful risk reclassification.

The gradual decline in TUGT performance aligns with emerging evidence that repetitive, low-intensity joint mobilization stimulates neuromuscular re-education and proprioceptive refinement in older populations (Sartika, 2023; Azkia et al., 2021). Prolonged TUGT times (>30 seconds) in this case reflect age-related sarcopenia, reduced joint capsule elasticity, and impaired postural control, which are further compounded by chronic hypertension (Mujiadi & Rachmah, 2022). Hypertension contributes to microvascular remodeling and diminished cerebral perfusion reserve, thereby impairing sensorimotor integration and dynamic balance (Karayiannis, 2022; Yasa et al., 2024). The observed improvement, though insufficient to cross the high-risk threshold, suggests that active ROM exercise may partially restore lower-extremity coordination and gait efficiency by enhancing muscle-tendon compliance and motor unit recruitment. This mechanistic pathway is

consistent with studies reporting that even brief periods of structured movement can yield measurable gains in functional mobility among institutionalized older adults (Shende et al., 2020).

The stability of the MFS score (55) throughout the intervention warrants careful interpretation. Unlike performance-based measures such as TUGT, the MFS incorporates historical and static risk factors (e.g., prior fall history, secondary diagnosis, use of assistive devices) that are inherently insensitive to short-term physiological changes (Maisura et al., 2024). Consequently, a six-day intervention is unlikely to alter MFS categorization, particularly in patients with entrenched functional limitations. This limitation highlights the importance of selecting outcome tools that align with the expected trajectory of change; future studies should complement MFS with dynamic balance assessments (e.g., the Berg Balance Scale, gait speed variability) to more accurately capture incremental functional gains.

The modest reduction in systolic blood pressure observed across intervention days further supports the systemic benefits of ROM exercise. Light-to-moderate muscular contraction promotes endothelial nitric oxide release, improves arterial compliance, and enhances parasympathetic modulation, collectively contributing to short-term hemodynamic stabilization (Nursalam et al., 2020; Luh et al., 2022). While blood pressure remained above clinical thresholds, the downward trend suggests that ROM exercise may serve as an adjunctive strategy in comprehensive hypertension management for older adults, particularly in settings where pharmacological optimization is limited by polypharmacy or orthostatic intolerance.

From a clinical perspective, this case reinforces the role of structured ROM exercise as a foundational, low-cost nursing intervention that can be safely integrated into daily care routines in long-term residential facilities. The improvement in the patient's self-reported confidence and willingness to engage in movement activities underscores the psychosocial dimension of fall prevention, which is often overlooked in purely biomechanical assessments (Osoba et al., 2019). Nevertheless, several limitations must be acknowledged. As a single-case report, findings cannot be generalized to broader older adult populations. The six-day intervention period was insufficient to produce categorical shifts in fall risk, and outcomes relied primarily on performance-based and subjective indicators without objective kinematic or hemodynamic monitoring. Additionally, the absence of a control or comparison condition limits causal inference.

Limitations

This case report has several limitations that must be acknowledged. First, the single-subject design (N=1) inherently restricts the external validity and generalizability of the findings, precluding definitive causal inferences regarding the intervention's efficacy. Second, the brief intervention period (six days) was insufficient to induce the long-term neuromuscular and cardiovascular adaptations required for categorical shifts in fall risk or sustained hemodynamic regulation. Third, the outcome evaluation relied predominantly on performance-based instruments (TUGT, MFS) and subjective self-reports. The absence of objective kinematic, biomechanical, or continuous physiological monitoring (e.g., wearable sensors, muscle dynamometry) limits the granularity of the functional assessment. Finally, uncontrolled confounding variables, such as variations in daily unstructured physical activity, nutritional intake, and medication adherence, may have influenced the observed outcomes.

4 | Conclusions

In conclusion, this case illustrates that a short-term, structured range of motion exercise program can initiate early functional and hemodynamic improvements in an older adult with chronic hypertension and a high fall risk. While the intervention did not immediately reclassify the patient into a lower fall-risk category, it demonstrated measurable gains in mobility, postural confidence, and systolic blood pressure trends. Clinically, these findings validate ROM exercises as a feasible, low-cost, non-pharmacological foundational intervention that can be seamlessly integrated into daily care routines in long-term residential facilities. Future research should prioritize longitudinal, controlled designs with extended intervention durations (e.g., ≥8 weeks) and incorporate multimodal, objective outcome measures such as gait kinematics and continuous physiological monitoring to establish robust, evidence-based guidelines for comprehensive fall prevention and

cardiovascular management in frail older populations.

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Author Contributions

YHM and **LAS:** contributed substantially to the study conceptualization, data curation, data analysis, and manuscript review and editing. **FK** and **GWP**: Supervision. **YHM:** Manuscript revisions.

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Ethics Statement
The data supporting this case report are not publicly available due to patient confidentiality, but can be obtained from the corresponding author upon reasonable request and with appropriate ethical approval.

Conflicts of Interest
The authors declare that there are no conflicts of interest regarding the publication of this case report.

Data Availability Statement
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