RESEARCH PAPER

Effectiveness of Patellar Mobilization and Sit-To-Stand Exercises Compared to Conventional Physiotherapy on Fall Risk and Functional Mobility in Geriatric Patients with Knee Osteoarthritis

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ABSTRACT

Background:
Knee osteoarthritis (OA) is a common joint problem in older adults that leads to pain, balance issues, reduced mobility, and a higher risk of falls. Many researched physiotherapy interventions focus on these problems; we still need to explore how well combining manual therapy with functional exercises works in improving the Quality of life with OA knee in older adults. Therefore, the need of the present study is to find the effectiveness of patellar mobilization and sit to stand exercise combined on fall risk and functional mobility in geriatric patients with knee osteoarthritis

Methodology:
An experimental randomized controlled trial involved 30 older patients aged 60 and above who had knee osteoarthritis (Kellgren-Lawrence grade 2 or 3) were randomly assigned to either the experimental Group (n=15) or the Control Group (n=15). The Experimental Group received patellar mobilization, sit-to-stand exercises, and regular physiotherapy were the Control Group received only regular physiotherapy. The primary outcome measures included fall risk, which was assessed using the Berg Balance Scale (BBS), and functional mobility, assessed with the Timed Up and Go (TUG) test. Secondary outcomes included pain measured by the Numerical Pain Rating Scale (NPRS), knee range of motion (ROM) measured with a goniometer, muscle strength evaluated through Manual Muscle Testing (MMT), and functional status assessed using the WOMAC index.

Results:
Both groups showed significant difference during pre and post intervention. However, the Experimental Group had greater changes in all outcome measures. BBS scores went up from 37 to 48 in the Experimental Group, while they increased from 37 to 41 in the Control Group. TUG time decreased from 15 to 11 seconds in the Experimental Group, compared to a drop from 15 to 14 seconds in the Control Group. The Experimental Group also had greater reductions in pain scores, increased knee range of motion (ROM), and better WOMAC scores.

Conclusion:
Patellar mobilization combined with sit-to-stand exercises was more effective than conventional physiotherapy alone in addressing fall risk and functional mobility in geriatric patients with knee osteoarthritis.

Keywords: *Knee osteoarthritis, Patellar mobilization, Sit-to-stand exercises, Fall risk, Functional mobility, Geriatric physiotherapy.*
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INTRODUCTION

Knee osteoarthritis (KOA) is one of the most common muscle and joint disorders in older adults. The prevalence is higher among women and individuals with sedentary lifestyles, obesity, and previous joint injuries. The rapid urbanization and lifestyle changes have further contributed to an increasing incidence of KOA. The economic burden of KOA on healthcare infrastructure is significant, with many elderly individuals requiring frequent medical consultations, pharmacological management, and, in severe cases, joint replacement surgeries.

It is a major cause of pain and disability around the world [1]. This condition leads to progressive wear and tear of the cartilage, stiffness in the joints, weakened muscles, and

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poor body position awareness. These issues together result in functional limitations and a higher risk of falling among older people [2].

Exercise-based physiotherapy is frequently recommended for treating KOA with an objective to improve strength, joint movement, balance, and independence in everyday activities [3]. Physiotherapy plays a crucial role in managing KOA, with conventional approaches including strengthening exercises, balance training, and pain management techniques.

However, despite the availability of these interventions, many patients continue to experience functional decline and an increased risk of falls. Limited awareness, accessibility, and adherence to rehabilitation programs pose additional challenges. There is a growing need for cost-effective and easily implementable therapeutic strategies tailored to the Indian healthcare landscape[4]. Several international studies have explored conservative management strategies for KOA, emphasizing exercise therapy, manual therapy, and neuromuscular training. Countries with well-established geriatric rehabilitation programs, such as the UK, Canada, and Australia, have successfully implemented community-based interventions to enhance functional mobility and reduce fall risk in elderly patients. Patellar mobilization, in combination with progressive resistance training and functional exercises like sit-to-stand movements, has been increasingly recognized for its benefits in improving knee joint function.

Patellofemoral joint dysfunction significantly affects both symptoms of knee osteoarthritis and daily functioning. It is proposed that Patellar mobilization can improve patellar tracking, ease pain, and enhance quadriceps muscle activation [5]. Sit-to-stand exercises are practical, closed-chain movements that are crucial for daily life and for building lower-limb strength in older adults [6]. Though there is evidence supporting both manual therapy and functional exercises on their own, very few studies have looked at their combined impact on fall risk and mobility in elderly patients with knee osteoarthritis. This study aims to assess how effective patellar mobilization combined with sit-to-stand exercises is compared to conventional physiotherapy alone.

The present study aims to evaluate the effectiveness of patellar mobilization and sit-to-stand exercises compared to conventional physiotherapy on fall risk and functional mobility in geriatric patients with knee osteoarthritis. The study objectives are 1. To assess the impact of patellar mobilization and sit-to-stand exercises on fall risk in geriatric patients with knee osteoarthritis. 2. To compare the functional mobility outcomes between the intervention group and the conventional physiotherapy group. 3. To determine the short-term and long-term effects of the intervention on pain, balance, and gait parameters. 4. To analyze the improvement in muscle strength and joint range of motion following the intervention.

MATERIALS AND METHODOLOGY

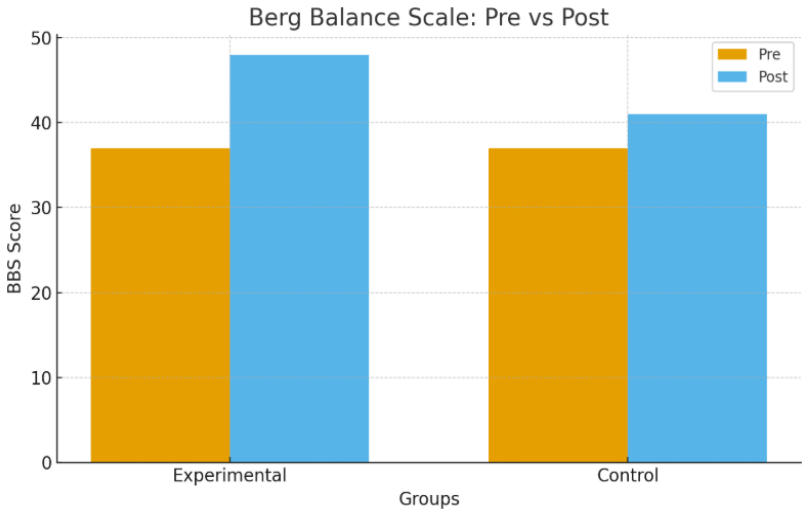
An experimental randomized controlled trial design was used to see the effect of patellar mobilization and sit to stand exercise combined on fall risk and functional mobility in geriatric patients with knee osteoarthritis. Thirty geriatric patients aged 60 and older, all with clinically diagnosed knee osteoarthritis (Kellgren-Lawrence grade 2 or 3), were recruited based on specific inclusion and exclusion criteria. Subject with the history of able to walk independently with/without assistive device and no recent knee surgery or corticosteroid injections taken for at least last 3 months before the commencement of the study were included in the study. Exclusion Criteria included 1. Severe knee deformities (e.g., varus/valgus > 10°) 2. Neurological conditions affecting mobility (e.g., stroke, Parkinson's) 3. Cognitive impairments affecting participation 4. Uncontrolled hypertension or cardiovascular conditions.

Participants were randomly assigned to two groups: the Experimental Group (n=15) and the Control Group (n=15). At the baseline all participants the assessments were for the outcome measures. In the present study Primary Outcomes were 1. Fall risk: Berg Balance Scale and Functional mobility: Timed Up and Go test. The Secondary Outcomes were Pain: on 0-10 VAS scale, Strength by Hand-held dynamometer 3. Range of motion by Goniometer and Patient-reported function on WOMAC Scale. The Experimental Group received patellar mobilization, sit-to-stand exercises, and conventional physiotherapy. The Control Group received conventional physiotherapy only. Post-intervention assessments were conducted using the same outcome measures.

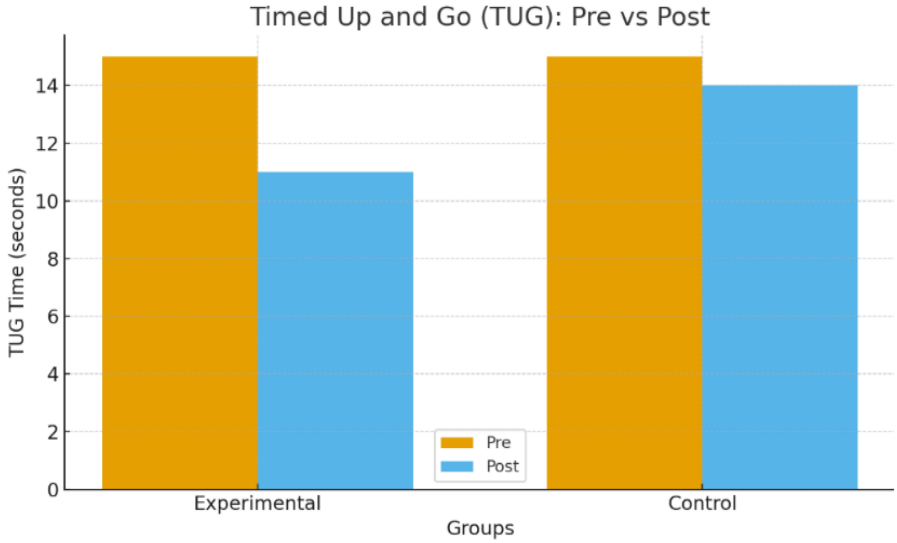
STATISTICAL ANALYSIS

Descriptive statistics were used to analyze pre- and post-intervention values. The data were summarized using mean values. Clustered bar charts visually represented changes between groups before and after the intervention.

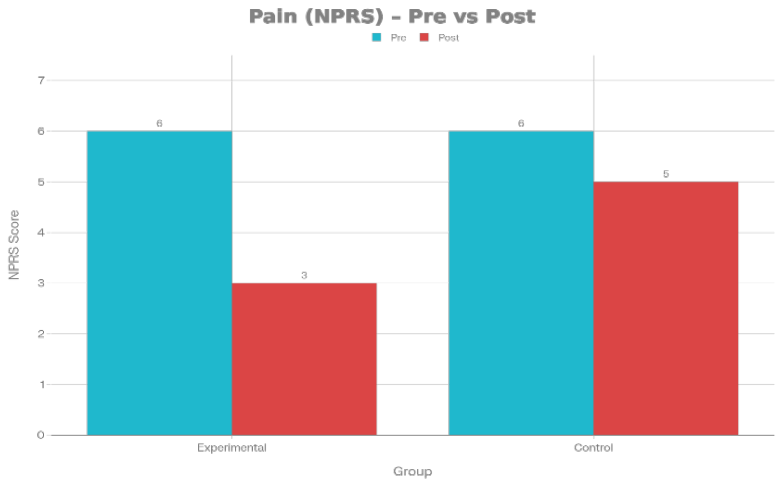
GRAPH INTERPRETATION



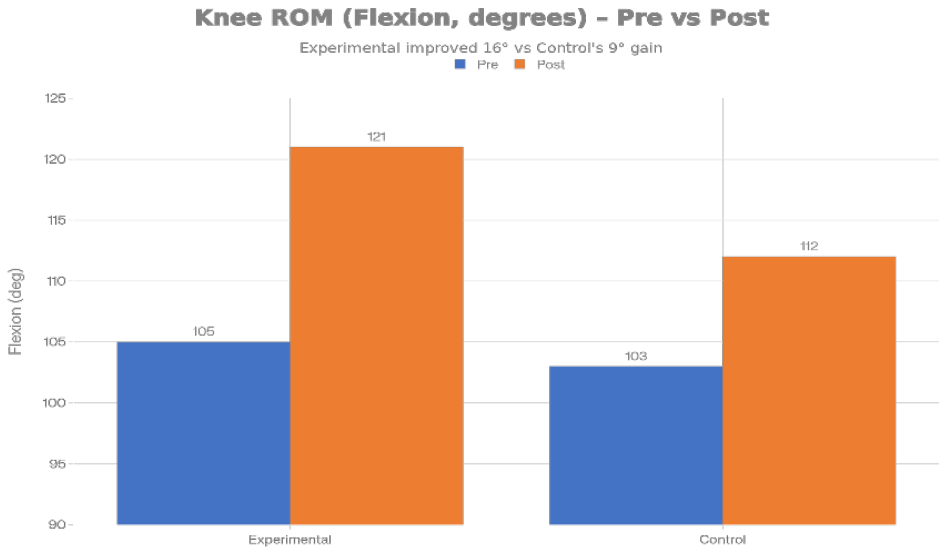
1. Interpretation: The Experimental Group improved from 37 to 48, while the Control Group increased from 37 to 41, showing a greater balance gain in the Experimental Group.



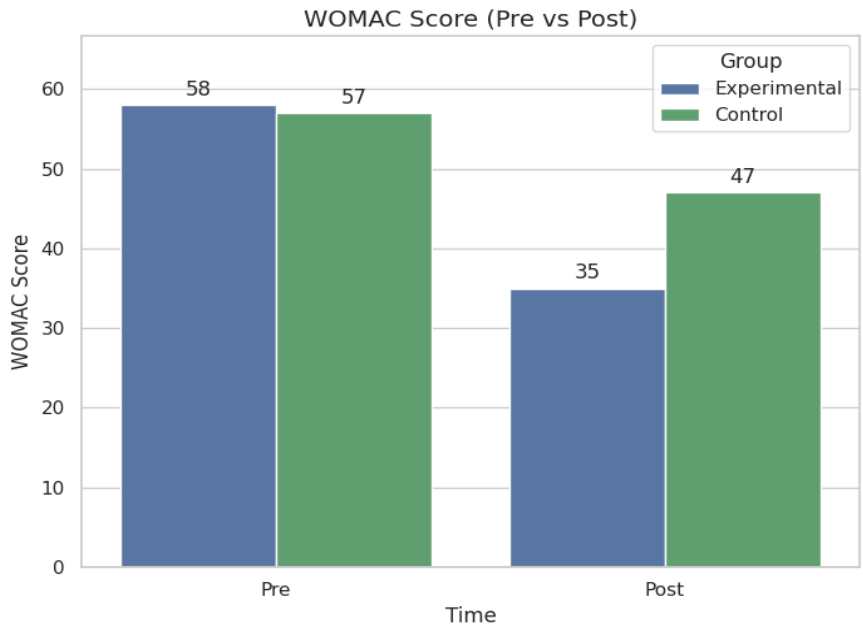
2. Interpretation: The Experimental Group improved from 15 to 14 seconds, indicating markedly better mobility from 15 to 11 seconds, while the Control Group changed gains in the Experimental Group.



3. Interpretation: The Experimental Group reduced pain from 6 to 3, while the Control Group decreased only from 6 to 5, indicating a greater reduction in pain levels for the Experimental Group.



4. Interpretation: The Experimental Group increased knee flexion from 105° to 121°, whereas the Control Group improved from 103° to 112°, showing a greater enhancement in ROM in the Experimental Group.



5. Interpretation: The Experimental Group's WOMAC score improved from 58 to 35, while the Control Group improved from 57 to 47, indicating a greater enhancement in overall knee function and reduced disability in the Experimental Group.

RESULTS

Descriptive analysis of outcome measures showed greater changes in the Experimental Group compared to the Control Group. Balance, measured by the Berg Balance Scale, increased from 37 to 48 in the Experimental Group, while the Control Group increased from 37 to 41. Functional mobility, assessed by the Timed Up and Go test, improved from 15 to 11 seconds in the Experimental Group, whereas the Control Group made a smaller change from 15 to 14 seconds.

Pain levels, measured by the Numerical Pain Rating Scale, decreased from 6 to 3 in the Experimental Group compared to a drop from 6 to 5 in the Control Group. Knee range of motion in flexion went up from 105° to 121° in the Experimental Group, while the Control Group improved from 103° to 112°. Functional status, measured by the WOMAC index, improved from 58 to 35 in the Experimental Group, whereas the Control Group improved from 57 to 47.

Overall, the Experimental Group showed greater changes in balance, mobility, pain, joint range of motion, and functional outcomes compared to the Control Group.

DISCUSSION

The findings of this study suggest that combining patellar mobilization with sit-to-stand exercises may effectively addressed both biomechanical and functional issues commonly seen in older patients with knee osteoarthritis. This condition often leads to pain, joint stiffness, altered patellofemoral mechanics, and weakness in the quadriceps. Together, these factors can reduce balance and mobility in older adults [1,2].

Patellar mobilization may help improve alignment and mobility of the patellofemoral joint, which can reduce stiffness and allow for better activation of the quadriceps muscle. Good quadriceps function is important for activities such as standing, walking, and maintaining balance, all of which can be affected in people with knee osteoarthritis [5]. Reducing pain through patellar mobilization may also help participants engage more effectively in daily activities, leading to better movement efficiency and increased confidence [3].

Sit-to-stand exercises are practical, closed-chain movements that closely resemble daily tasks necessary for independence in older adults. Regularly doing these exercises may improve lower-limb strength, postural control, and coordination, which can enhance balance and mobility [6,10]. Training that focuses on specific tasks has proven especially useful in rehabilitation for older patients because it directly relates to daily living activities [7].

The combined approach used in this study may have offered additional benefits by addressing joint mechanics through manual therapy and functional movement patterns through exercise. The present approach that integrates patellar mobilization with functional movement training is necessary. Patellar mobilization techniques have been shown to improve joint congruency, enhance quadriceps activation, and reduce pain, thereby facilitating more efficient movement patterns during weight-bearing activities When combined with STS exercises, which focus on functional strength and dynamic stability, this approach may offer a more targeted intervention for improving lower limb coordination and reducing fall risk in elderly individuals with knee OA.This integrated strategy aligns with past research showing that multimodal physiotherapy methods lead to better functional results than single-method treatments for people with knee osteoarthritis [3,4,8].

The combination of patellar mobilization and STS exercises must have enhanced neuromuscular control, optimize load distribution across the knee joint, and promote smoother movement transitions. This method directly addressed key biomechanical impairments contributing to falls, unlike traditional strength-based interventions that may not sufficiently restore optimal joint mechanics. By incorporating joint mobilization techniques alongside functional exercises, this approach facilitated better movement efficiency and postural control, ultimately improving overall mobility and independence in elderly individuals with knee OA. Thus, these findings support existing literature that encourages the use of manual therapy techniques alongside functional exercise programs when managing knee osteoarthritis in older patients.

CONCLUSION

Patellar mobilization, along with sit-to-stand exercises, was shown to be more effective than regular physiotherapy alone. This approach reduced fall risk and improved functional mobility in elderly patients with knee osteoarthritis. Proven effectiveness of the new intervention can now be widely implemented in geriatric rehabilitation settings, providing a simple yet impactful addition to existing physiotherapy regimens. The application of patellar mobilization in fall prevention programs represents an innovative direction in geriatric rehabilitation, potentially influencing future advanced research on joint-specific mobilization techniques and their role in improving functional mobility.

Recommendations

This combined intervention approach can be included in regular geriatric physiotherapy programs to improve balance, mobility, and functional independence in patients with knee osteoarthritis.

Conflict of Interest

The authors declare no conflict of interest.

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