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Physiotherapy Management of Bilateral Knee Osteoarthritis in an Older Adult: A Case Report

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Abstract

Background: Knee osteoarthritis (KOA) is a common degenerative musculoskeletal disorder in older adults and a major cause of pain, mobility limitation, and reduced quality of life. Conservative physiotherapy is recommended as first-line management to improve symptoms and physical function.

Objective: To describe the short-term clinical outcomes of a multimodal physiotherapy intervention in an older adult with bilateral knee osteoarthritis.

Methods: This case report involved a 60-year-old woman with bilateral knee osteoarthritis presenting with knee pain, stiffness, muscle weakness, reduced mobility, and functional limitation. The patient underwent three supervised physiotherapy sessions over one month consisting of therapeutic ultrasound, proprioceptive neuromuscular facilitation stretching, hip strengthening exercise, and stationary cycling. Pain intensity was assessed using the Numeric Rating Scale (NRS), while functional activity was evaluated using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). Inferential statistical analysis, confidence intervals, and effect size calculations were not performed because of the descriptive single-case design.

Results: After intervention, pain intensity decreased in both knees. In the left knee, resting pain decreased from 5/10 to 3/10, pressure pain from 3/10 to 1/10, and movement pain from 4/10 to 3/10. In the right knee, resting pain and pressure pain decreased from 3/10 to 1/10, while movement pain decreased from 2/10 to 1/10. The WOMAC score improved from 52/96 to 30/96.

Conclusion: The multimodal physiotherapy program was associated with reduced pain and improved functional activity in this patient with bilateral KOA. Further controlled studies are needed to confirm these findings.

Keywords
Knee Osteoarthritis; Physical Therapy Modalities; Exercise Therapy; Rehabilitation; Aged; Case Reports

Introduction

Knee osteoarthritis (KOA) is one of the most common chronic musculoskeletal disorders affecting older adults and represents a major cause of pain, disability, and reduced quality of life worldwide. The condition is characterized by progressive degeneration of articular cartilage, subchondral bone remodeling, osteophyte formation, synovial inflammation, and muscular dysfunction, which collectively contribute to joint pain, stiffness, and impaired mobility.[1] Recent epidemiological evidence indicates that the global burden of KOA continues to increase alongside population aging, obesity, sedentary lifestyle, and prolonged mechanical joint loading.[2,3] The increasing prevalence of population aging has substantially increased the global burden of KOA, particularly among individuals older than 60 years. Age-related musculoskeletal decline, reduced muscle strength, altered joint biomechanics, and cumulative mechanical loading further accelerate degenerative changes within the knee joint.[4] Consequently, many older adults with KOA experience difficulties performing daily activities such as walking, standing from a sitting position, and climbing stairs, resulting in decreased independence and functional capacity.[2]

Pain is the predominant symptom in KOA and is frequently accompanied by joint stiffness, reduced range of motion, and muscle weakness, particularly in the quadriceps and hamstring muscles.[2] Persistent pain often leads patients to avoid physical activity because of fear of symptom exacerbation, thereby initiating a cycle of physical inactivity, muscle deconditioning, reduced joint stability, and worsening functional limitation.[5] Previous studies have demonstrated that pain severity and physical dysfunction are strongly associated with impaired quality of life and increased disability among patients with KOA.[6] In addition, age-related biomechanical alterations, including impaired proprioception, reduced shock absorption capacity, and decreased neuromuscular control, may further aggravate joint loading and contribute to disease progression in elderly individuals with bilateral KOA.[7]

Current clinical practice guidelines consistently recommend conservative and non-pharmacological management as the first-line treatment for KOA, particularly in older adults with mild-to-moderate symptoms. Exercise therapy, patient education, weight management, and physiotherapy interventions are strongly recommended because they can improve pain, physical function, and overall quality of life while minimizing the risks associated with long-term pharmacological therapy.[8,9] Recent systematic reviews and meta-analyses have shown that exercise-based physiotherapy interventions can reduce pain intensity and improve functional outcomes in patients with KOA.[10] Aerobic exercise, resistance training, flexibility exercise, and multimodal rehabilitation programs have demonstrated beneficial effects on physical performance, gait function, and WOMAC scores in patients with knee osteoarthritis.[10] In addition, strengthening exercises targeting the hip and quadriceps muscles may improve proximal stability, reduce abnormal knee loading, and enhance lower-extremity biomechanics during functional activities.[11,12]

Therapeutic ultrasound and stretching interventions are also frequently incorporated into physiotherapy programs for KOA management. Recent evidence suggests that therapeutic ultrasound may provide beneficial thermal and non-thermal effects that contribute to pain modulation, improved tissue extensibility, and enhanced local circulation.[13] However, current evidence indicates

that ultrasound therapy may be more effective when integrated within multimodal rehabilitation programs rather than applied as a standalone intervention.[13] Meanwhile, proprioceptive neuromuscular facilitation (PNF) stretching has been associated with improvements in flexibility, joint mobility, and neuromuscular control through mechanisms involving autogenic and reciprocal inhibition.[14] These physiological effects may contribute to improved movement efficiency and reduced functional limitation in individuals with KOA.[15] Furthermore, aerobic exercise using stationary cycling has been shown to improve cardiovascular endurance, reduce joint stiffness, and support functional mobility with relatively low mechanical stress on the knee joint.[16]

Although substantial evidence from randomized controlled trials and systematic reviews supports the effectiveness of exercise-based physiotherapy for KOA, responses to intervention may vary according to patient characteristics, disease severity, comorbidities, and functional status.[17] Recent evidence also suggests that the magnitude of improvement following exercise therapy may differ across intervention types and clinical settings.[18,19] Consequently, detailed case-based clinical reports remain valuable for illustrating individualized physiotherapy management, documenting clinical progression, and providing practical insight into multimodal rehabilitation strategies in real-world settings.[20] However, reports describing the combined application of therapeutic ultrasound, PNF stretching, hip strengthening exercise, and stationary cycling in older adults with bilateral KOA remain limited, particularly within multimodal physiotherapy rehabilitation.

Therefore, this case report aimed to describe the clinical presentation, physiotherapy management, and short-term clinical outcomes of a multimodal physiotherapy intervention consisting of therapeutic ultrasound, proprioceptive neuromuscular facilitation stretching, hip strengthening exercise, and stationary cycling in an older adult with bilateral knee osteoarthritis. This report specifically evaluated changes in pain intensity and functional activity following three supervised physiotherapy sessions.

Methods

This study used a case report design to describe the clinical presentation, physiotherapy management, and short-term outcomes of a multimodal physiotherapy intervention in an older adult with bilateral knee osteoarthritis (KOA). The case report approach was selected because it enables detailed documentation of patient characteristics, clinical findings, therapeutic procedures, and individual responses to intervention in real-world clinical practice. This design is considered appropriate for exploring individualized rehabilitation management in patients with complex functional limitations and multiple impairments associated with KOA. The manuscript was prepared in accordance with the CARE (CAse REport) reporting guideline to improve transparency and completeness of reporting.[20]

The study involved one female patient aged 60 years who was referred to the physiotherapy outpatient clinic at RSUD Ibu Fatmawati Surakarta in September 2025 with a medical diagnosis of bilateral knee osteoarthritis. The patient reported bilateral knee pain and stiffness that had progressively worsened over the previous two months, particularly in the left knee. Symptoms were aggravated during standing, walking, stair negotiation, and transitions from sitting to standing. The patient also reported morning stiffness and pain after prolonged inactivity. Her occupational history as a construction laborer involving repetitive lifting activities was considered a potential contributing factor to chronic mechanical stress on the knee joints.

The patient had a history of falling forward approximately two years before presentation, resulting in trauma to both knees. Although the initial symptoms temporarily improved after traditional massage therapy, knee pain gradually recurred and became more severe over time. Radiographic examination of the left knee demonstrated subchondral sclerosis, narrowing of the tibiofemoral joint space, and osteophyte formation at the femoral condyles, tibia, and patella, which supported the diagnosis of knee osteoarthritis.

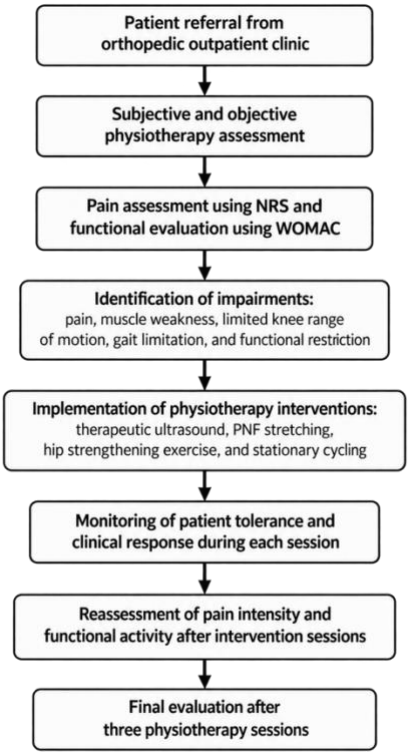
The inclusion criteria in this case report were older adults diagnosed with bilateral KOA who experienced pain and functional limitation and were able to participate in physiotherapy intervention. Patients with acute inflammatory joint disease, recent lower-extremity fracture, neurological disorders affecting gait and balance, severe cardiovascular instability, or contraindications to exercise and ultrasound therapy were excluded. Written informed consent was obtained from the patient before participation and publication of clinical data. The patient was informed regarding the therapeutic procedures, assessment process, and confidentiality of personal information.

Ethical clearance was not required because this study was conducted as a descriptive single-patient case report involving routine physiotherapy management without experimental intervention or collection of identifiable personal data. Written informed consent for publication was obtained from the patient prior to manuscript preparation.

During the initial physiotherapy assessment, vital sign examination showed blood pressure of 185/96 mmHg, and the patient had a history of hypertension. Therefore, exercise tolerance and clinical symptoms such as dizziness, excessive fatigue, or discomfort were monitored continuously during intervention sessions to minimize cardiovascular risk. Static inspection revealed the use of bilateral knee supports and a kyphotic posture. Dynamic inspection demonstrated a shortened step length during gait. Palpation identified tenderness in the medial aspect of both knees, quadriceps muscle spasm bilaterally, and decreased quadriceps and hamstring muscle strength without signs of edema or acute inflammation.

Pain intensity was assessed using the Numeric Rating Scale (NRS), a valid and reliable instrument commonly used to evaluate musculoskeletal pain intensity.[21] The NRS uses an 11-point scale ranging from 0 (no pain) to 10 (worst imaginable pain).[22] Functional activity was evaluated using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), which consists of three domains assessing pain, stiffness, and physical function in patients with osteoarthritis. The WOMAC instrument has demonstrated good validity, reliability, and responsiveness in patients with knee osteoarthritis.[23] Baseline assessment demonstrated resting pain of 7/10, movement pain of 5/10, and pressure pain of 3/10. The baseline WOMAC total score was 52/96, indicating severe functional limitation.

The clinical management pathway began with referral from the orthopedic outpatient clinic, followed by a comprehensive subjective and objective physiotherapy assessment. Pain intensity and functional status were evaluated using the Numeric Rating Scale (NRS) and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), respectively. The identified impairments included pain, muscle weakness, limited knee range of motion, gait limitation, and functional restriction. The subsequent sequence of physiotherapy intervention, monitoring, reassessment, and final evaluation is illustrated in Figure 1.



The physiotherapy program was conducted over one month and consisted of three treatment sessions. The intervention program included therapeutic ultrasound, proprioceptive neuromuscular facilitation (PNF) stretching, hip strengthening exercise, and aerobic exercise using a stationary bicycle. All interventions were supervised directly by a physiotherapist in the physiotherapy outpatient clinic.

Therapeutic ultrasound was applied using an effective radiating area (ERA) of 3.8 cm² with a frequency of 1 MHz, continuous mode (100% duty cycle), and intensity of 1.5 W/cm² for 10 minutes. Ultrasound therapy was administered to reduce pain and improve soft tissue extensibility through thermal and mechanical effects.[13] The intervention parameters were selected based on previous evidence supporting ultrasound use in knee osteoarthritis management.

PNF stretching was performed to improve flexibility and knee joint mobility. The intervention consisted of pain-free stretching exercises with eight repetitions for three sets over approximately 10 minutes per session. The stretching procedure emphasized controlled contraction-relaxation techniques targeting muscles surrounding the knee joint. Previous studies have shown that PNF stretching may improve range of motion and reduce pain in patients with KOA through neuromuscular facilitation mechanisms.[15]

Hip strengthening exercise consisted of side-lying leg lifts and straight leg raise exercises using resistance bands. The exercise program was performed for three sets of 10–15 repetitions with progressive adjustment according to patient tolerance and fatigue level. The intervention duration was approximately 20 minutes per session. Exercise supervision was conducted directly by the physiotherapist to ensure proper movement quality, exercise safety, and adherence to the prescribed intensity. Hip strengthening was included because proximal muscle weakness may contribute to altered lower-extremity biomechanics and increased knee joint loading in patients with KOA.[12]

Exercise progression was adjusted gradually according to patient tolerance, symptom response, perceived exertion, and movement quality during each session. Resistance and exercise volume were increased conservatively to minimize symptom exacerbation and maintain intervention safety, particularly considering the patient's advanced age and hypertension history.

Aerobic exercise was performed using a stationary bicycle at an intensity of approximately 70–75% of predicted maximum heart rate for 20 minutes. Exercise intensity and patient symptoms were monitored throughout the intervention because of the patient's hypertension history. Stationary cycling was selected because it provides low-impact aerobic exercise that may improve physical function and reduce joint stiffness while minimizing excessive mechanical loading on the knee joint.[16]

To maintain intervention fidelity, all physiotherapy procedures followed a predefined intervention protocol regarding exercise sequence, duration, intensity, and supervision. Continuous monitoring was also conducted during each session to ensure adherence to the prescribed rehabilitation program and patient safety.

Outcome evaluation was conducted before the first intervention session and after completion of the third physiotherapy session. Changes in pain intensity and WOMAC scores were analyzed descriptively because the study involved only one participant. Clinical interpretation focused on changes in symptom severity and functional activity after intervention. In addition, changes were interpreted with consideration of the minimal clinically important difference (MCID) reported in previous KOA literature to support clinical relevance.[24] Because this study used a descriptive single-case design (n=1), inferential statistical analysis, confidence interval estimation, and effect size calculation were not applicable. However, no inferential statistical analysis was performed because of the descriptive nature of the case report design.

Results

This case report aimed to evaluate changes in pain intensity and functional activity following a multimodal physiotherapy intervention in an older adult with bilateral knee osteoarthritis. Outcome evaluation was conducted before the first intervention session (T1) and after completion of the third physiotherapy session (T3). The findings demonstrated improvements in pain intensity and functional performance after the intervention program.

The patient's clinical management began with an orthopedic consultation and radiographic examination on September 9, 2025, which resulted in a diagnosis of bilateral knee osteoarthritis. The patient was subsequently referred to the physiotherapy

outpatient clinic on September 17, 2025, where a baseline physiotherapy assessment (T1) was conducted, including pain evaluation, WOMAC assessment, and physical examination. The intervention consisted of therapeutic ultrasound, PNF stretching, hip strengthening exercises, and stationary cycling, administered through three supervised physiotherapy sessions over a one-month period. The sequence of clinical assessment, intervention, and final reassessment is presented in Figure 1.

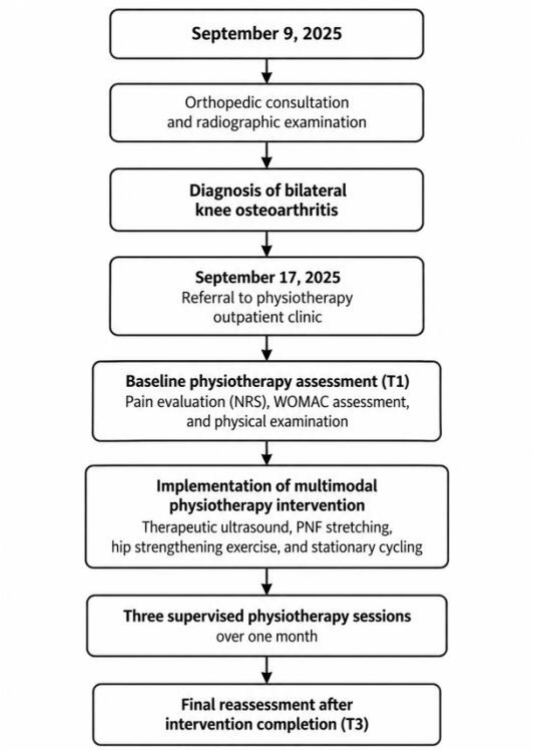


Figure 1. Clinical Timeline of Physiotherapy Management for Bilateral Knee Osteoarthritis

Pain intensity was assessed using the Numeric Rating Scale (NRS) for resting pain, pressure pain, and movement pain in both knees. The results demonstrated gradual reductions in pain intensity after intervention, particularly in the left knee, which initially showed more severe symptoms. The detailed changes in pain intensity before and after intervention are presented in Table 1.

Table 1. Changes in Pain Intensity Based on Numeric Rating Scale (NRS)

Pain Assessment	Baseline (T1)	Final Evaluation (T3)
Right Knee		
Resting pain	3/10	1/10
Pressure pain	3/10	1/10
Movement pain	2/10	1/10
Left Knee		
Resting pain	5/10	3/10
Pressure pain	3/10	1/10
Movement pain	4/10	3/10

As shown in Table 1, reductions in pain intensity were observed in both knees after the physiotherapy program. The right knee demonstrated reductions in resting pain and pressure pain from 3/10 to 1/10, while movement pain decreased from 2/10 to 1/10. In the left knee, resting pain decreased from 5/10 to 3/10, pressure pain from 3/10 to 1/10, and movement pain from 4/10 to 3/10. These findings indicate short-term improvement in pain symptoms following the multimodal physiotherapy intervention.

Functional activity was evaluated using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), which assesses pain, stiffness, and physical function associated with knee osteoarthritis. Baseline WOMAC evaluation demonstrated substantial functional limitation, particularly during activities involving walking, standing, and stair climbing.
The changes in WOMAC scores before and after intervention are presented in Table 2.

Table 2. Changes in WOMAC Scores Following Physiotherapy Intervention

WOMAC Domain	Baseline (T1)	Final Evaluation (T3)
Pain	Higher symptom severity	Reduced symptom severity
Stiffness	Moderate limitation	Reduced limitation
Physical function	Significant limitation	Improved function
Total WOMAC score	52/96	30/96

Table 2 demonstrates an improvement in functional activity after completion of the physiotherapy program. The WOMAC total score decreased from 52/96 at baseline to 30/96 after intervention, indicating reduced disability severity and improved functional capacity. Improvements were observed across all WOMAC domains, including pain, stiffness, and physical function. The magnitude of WOMAC improvement exceeded previously reported minimal clinically important difference (MCID) values for patients with knee osteoarthritis, suggesting clinically meaningful short-term functional improvement.

In addition to pain reduction and functional improvement, observational findings during reassessment suggested better movement performance during daily activities. The patient demonstrated improved tolerance during walking and sit-to-stand movement, accompanied by reduced guarding behavior and improved movement confidence compared with the initial assessment.

Although formal gait analysis and muscle strength quantification were not performed, subjective and observational findings indicated positive short-term clinical progression following intervention.

The patient demonstrated good adherence throughout the intervention period and completed all prescribed physiotherapy sessions without interruption. No adverse events, symptom exacerbation, cardiovascular complications, or exercise-related injuries were reported during treatment sessions. Because the patient had a history of hypertension, cardiovascular symptoms and exercise tolerance were continuously monitored to ensure intervention safety.

Given the descriptive nature of this case report and the inclusion of only one participant (n=1), no inferential statistical analysis, confidence interval estimation, or effect size calculation was performed. Clinical interpretation was therefore based on descriptive changes in pain intensity and WOMAC scores after intervention.

Discussion

This case report described the short-term clinical outcomes of a multimodal physiotherapy intervention consisting of therapeutic ultrasound, proprioceptive neuromuscular facilitation (PNF) stretching, hip strengthening exercise, and stationary cycling in an older adult with bilateral knee osteoarthritis (KOA). Following three physiotherapy sessions over one month, the patient demonstrated reductions in pain intensity and improvements in functional activity, as reflected by decreased Numeric Rating Scale (NRS) scores and improvement in the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) score. These findings suggest that a multimodal physiotherapy approach may contribute to symptom reduction and functional improvement in elderly individuals with KOA, although interpretation should remain cautious because of the descriptive nature of a single-case design.[10]

The reduction in pain intensity observed in this case is consistent with current evidence supporting exercise-based and multimodal physiotherapy interventions for KOA management. Pain in KOA is multifactorial and involves mechanical stress, synovial inflammation, subchondral bone remodeling, muscle dysfunction, and altered neuromuscular control.[1] Recent systematic reviews and international clinical guidelines have consistently reported that conservative physiotherapy interventions can reduce pain and improve physical function in patients with KOA.[9,10] A recent network meta-analysis also demonstrated that multimodal exercise interventions may provide superior improvements in pain and functional outcomes compared with minimal intervention or usual care in individuals with knee osteoarthritis.[10] In the present case, reductions in resting pain, pressure pain, and movement pain were observed in both knees after intervention, with greater symptom severity initially identified in the left knee. This asymmetrical presentation may reflect differences in mechanical loading, previous trauma history, or disease progression between joints.

Therapeutic ultrasound was included in the intervention program because of its potential thermal and mechanical effects on soft tissue and pain modulation. Previous studies have demonstrated that ultrasound therapy may increase local circulation, improve tissue extensibility, and reduce pain perception through modulation of nociceptive activity.[18] Recent systematic reviews have reported that therapeutic ultrasound may provide short-term pain relief and modest functional improvement in individuals with KOA, particularly when combined with structured exercise therapy.[25] However, evidence regarding the isolated effectiveness of ultrasound remains inconsistent, and current rehabilitation literature generally supports its role as an adjunctive rather than primary intervention modality. The present findings are generally aligned with this evidence, as reductions in pain intensity were observed after intervention. Nevertheless, the specific contribution of ultrasound remains difficult to isolate because the intervention was delivered as part of a multimodal rehabilitation program rather than as a standalone treatment.

In addition to ultrasound therapy, PNF stretching may also have contributed to the observed improvements in mobility and functional activity. Patients with KOA frequently demonstrate reduced flexibility, muscle stiffness, and limited joint range of motion, all of which may impair gait performance and daily activity participation. PNF stretching has been reported to improve flexibility and neuromuscular coordination through mechanisms involving autogenic inhibition, reciprocal inhibition, and enhanced proprioceptive feedback.[19] Recent rehabilitation studies have further suggested that flexibility-based interventions may improve movement efficiency and reduce stiffness-related disability in patients with degenerative knee disorders.[26] Improved movement efficiency and reduced joint stiffness following stretching intervention may partially explain the reduction in movement-related pain observed in this patient.

Hip strengthening exercise was incorporated because proximal muscle weakness is increasingly recognized as an important biomechanical factor in KOA progression and symptom severity. Weakness of the hip abductors and surrounding stabilizing musculature may alter lower-extremity alignment and increase medial knee joint loading during functional movement.[12] Previous randomized controlled trials have demonstrated that hip strengthening programs can improve pain, physical function, and movement mechanics in individuals with KOA.[11] Recent evidence also indicates that proximal strengthening strategies may improve lower-extremity kinetic chain control and reduce compensatory movement patterns during gait and sit-to-stand activities.[12] In the present case, improved functional activity and movement tolerance following intervention may have been associated with improved proximal stability and reduced compensatory movement patterns during functional movement.

Aerobic exercise using a stationary bicycle was also included as part of the intervention program because low-impact aerobic training may improve joint mobility, circulation, and physical endurance while minimizing excessive mechanical stress on the knee joint.[16] Previous studies have shown that stationary cycling can reduce pain and improve functional capacity in patients with KOA through both biomechanical and anti-inflammatory mechanisms.[16] Aerobic exercise may also improve confidence during movement and reduce fear-avoidance behavior, which commonly contributes to reduced physical activity and progressive deconditioning in older adults with chronic musculoskeletal pain.[2,7] In this case, observational findings during reassessment suggested improvements in walking tolerance and movement confidence, which may reflect the combined influence of reduced pain and improved physical conditioning.

The improvement in WOMAC scores observed in this case indicates clinically meaningful changes in functional activity after intervention. Functional limitations in KOA are strongly associated with pain severity, muscle weakness, impaired balance, and reduced mobility.[27] The WOMAC score decreased from 52/96 to 30/96 following intervention, suggesting reduced disability severity and improved ability to perform daily activities**.** The magnitude of WOMAC improvement exceeded previously reported minimal clinically important difference (MCID) thresholds for KOA populations, supporting the potential clinical relevance of the observed functional changes.[28] However, caution is warranted because short-term improvements may also be influenced by variability in pain perception, adaptation to movement, or non-specific therapeutic effects.

Several alternative explanations should also be considered when interpreting the findings of this case report. Because the intervention period was relatively short and no control condition was included, the observed improvements cannot be attributed solely to the physiotherapy interventions. Placebo responses, therapist-patient interaction, increased patient attention, and natural symptom fluctuation may have contributed to short-term clinical improvement.[29] Contextual factors such as therapeutic alliance, patient

expectation, supervised exercise participation, and reassurance during treatment may also influence pain perception and rehabilitation outcomes in chronic musculoskeletal conditions. In addition, the patient's motivation and adherence to supervised exercise may have positively influenced functional outcomes.

The relatively rapid improvement observed after only three intervention sessions may also be explained by several interacting mechanisms. Early reductions in pain may improve movement confidence and facilitate increased participation in daily activities, thereby contributing to secondary functional improvement. Furthermore, exercise interventions may rapidly enhance neuromuscular activation, movement efficiency, and joint mobility before substantial structural adaptation occurs.[7] Nevertheless, because no long-term follow-up assessment was conducted, it remains unclear whether the observed improvements were sustained beyond the intervention period.

This case report has several limitations that should be acknowledged. First, the study involved only one participant, limiting generalizability to broader KOA populations. Second, the absence of a control group prevents causal inference regarding intervention effectiveness. Third, the follow-up period was relatively short, and long-term outcomes could not be evaluated. Fourth, objective biomechanical assessment, quantified muscle strength measurement, and detailed range-of-motion analysis were not performed. Finally, because multiple interventions were administered simultaneously, the individual contribution of each modality could not be determined. In addition, the descriptive nature of the case report design precluded inferential statistical analysis, confidence interval estimation, and effect size calculation.

Despite these limitations, this case report provides clinically relevant insight into the application of multimodal physiotherapy management in an older adult with bilateral KOA. The findings support the potential role of combined exercise-based and symptom-modulation interventions in improving pain and functional activity in elderly patients with degenerative knee disorders.[10] From a clinical perspective, individualized physiotherapy programs incorporating flexibility training, strengthening exercise, aerobic conditioning, and adjunctive symptom-modulation modalities may represent a practical conservative rehabilitation strategy for older adults with KOA in outpatient physiotherapy settings.[9]

Future research should prioritize randomized controlled trials with larger sample sizes, standardized intervention protocols, and longer follow-up periods to evaluate the effectiveness and sustainability of multimodal physiotherapy programs in KOA management. Further investigation is also needed to clarify the relative contribution of specific intervention components and to identify patient characteristics associated with optimal rehabilitation outcomes.

Conclusion

This case report described the clinical outcomes of a multimodal physiotherapy intervention in an older adult with bilateral knee osteoarthritis. Following three physiotherapy sessions consisting of therapeutic ultrasound, proprioceptive neuromuscular facilitation stretching, hip strengthening exercise, and stationary cycling, the patient demonstrated reduced pain intensity and improved functional activity, as reflected by improvements in NRS and WOMAC scores.

The observed reduction in WOMAC score and pain intensity suggests that multimodal physiotherapy intervention may contribute to short-term improvement in symptoms and functional performance in older adults with bilateral KOA. From a clinical perspective, the integration of flexibility exercise, strengthening exercise, aerobic conditioning, and symptom-modulation modalities may serve as a practical conservative management approach in physiotherapy settings.

However, interpretation of the findings should consider the limitations of a single-case design, including the absence of a control group, short intervention duration, and limited generalizability. In addition, inferential statistical analysis, confidence interval estimation, and effect size calculation were not applicable because this study involved only one participant. Further studies involving larger sample sizes, controlled study designs, and long-term follow-up are required to confirm the effectiveness and sustainability of multimodal physiotherapy interventions in patients with knee osteoarthritis.

Author Contribution

Tasya Okdzan Setyaningrum: Conceptualization, Data curation, Investigation, Writing original draft.
Dwi Rosella Komalasari: Methodology, Formal analysis, Writing review and editing, Supervision.

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Conflict of Interest Statement

The authors declare no conflict of interest related to this study.

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This study received no external funding.

Ethics Statement

Written informed consent was obtained from the patient for participation and publication of clinical information related to this case report. This study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical clearance was not required because this study was conducted as a descriptive single-patient case report involving routine physiotherapy management without experimental intervention or collection of identifiable personal data.

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