

Role of Functional Mobility and Muscle Strengthening Exercises in Patient with Rheumatoid Arthritis of Knee Joint

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Abstract

Background: Rheumatoid arthritis (ra) is a chronic Autoimmune affection that causes pain, stiffness, swelling, muscle sickness, and functional limitations. knee involvement significantly affects mobility and daily activities.

Case presentation: A 45-Year-old female with a 12-year history of ra prevented with knee pain, stiffness, swelling, a 10° flexion deformity, reduced range of motion, muscle sickness, and trouble in walking, stair climbing, and sit-to-stand activities.

Intervention: The patient received physiotherapy 5 day's per week for 3 weeks, including moist heat therapy, range of motion exercises, stretching, strengthening exercises, patellar mobilization, and mobilization with movement (MWM).

Result: Pain decreased (vas: 7/10 to 3/10), knee flexion improved (70° to 90°), muscle strength increased, and gait, stair climbing, sit-to-stand consummation, and overall functional mobility improved. operable disability too decreased.

Conclusion: A structured physiotherapy program combining functional mobility and muscle strengthening effectively improved pain, knee function, muscle strength, and overall mobility in a patient with rheumatoid arthritis of the knee.

Keywords: Rheumatoid arthritis, knee joint, functional mobility, muscle strengthening, physiotherapy, rehabilitation, WOMAC.

Introduction

An autoimmune casualty called rheumatoid arthritis affects the lining of the synovial membrane, causing pain, stiffness, and swelling. in severe cases, rheumatoid arthritis can induce joint inflammation, which can lead to irreversible joints damage and disability. rheumatoid arthritis can also affect other organs, such as the Heart, Lungs, blood Vessels, skin, And Eyes.

Epidemiology

Approximately one in 200 persons worldwide suffer from rheumatoid arthritis, which affects women two to three times access commonly than it does males. although it can affect persons of any age, the peak onset occurs between the ages of 50 and 59.

Cause

although the exact causes of RA are unknown, a number of risk factors, such as smoking, poor dental health, viral infection, and a family history of RA or other autoimmune illnesses, are linked to an increased risk of getting RA. joint discomfort, especially in the hands and feet, together with joints stiffness that lasts more than half an hour in the morning, is the initial symptom of RA.

Clinical Manifestation

As the casualty worsens, RA-affected joints swell, become difficult to move, and become stiff in the morning. Periods of elevated inflammation are frequently followed by periods of relative relief in the pain and swelling. Patients may also have Flu-Like symptoms, such as exhaustion and muscle aches, during Flare-ups.

Investigation

To diagnose RA, a physical examination, blood test, and x-ray scan are used. The majority of RA patients show positive blood test findings for either anticyclic citrullinated protein antibodies, rheumatoid agent or both.

Treatment

Biologic medications like TNF inhibitors and disease-modifying antirheumatic medicines (DMARDs) like methotrexate. RA is treated with non-steroidal anti-inflammatory medications to reduce discomfort and steroids like prednisone during times of elevated inflammation known as flare-ups. physiotherapy management to increase mobility of knee and in reduce stiffness, gentle range of motion exercise such as knee flexion, extension, heel Slides, And assisted knee bending are carried out. The hamstring, quadriceps, and calf muscle can all follow stretched to improve flexibility and prevent contractors. To increase knees stability and muscle strength, try static quadriceps exercise straight leg raise, short arc knee extension, hamstring strengthening, sit to stand exercise, mini squats, and Step- up..

Prevalence

For the purpose of healthcare planning, policy maker's and medical experts can apply the prevalence of chronic illness as a regulate of the disease impact. geographical and temporal variations in the prevalence of rheumatoid arthritis have been noted. in nations where epidemiological research has been done in the past few decades, especially in the United States and the United Kingdom, The theory that the incidence of RA has decreased has been put out. According to estimates from previous decades, The geographic range of prevalence estimates throughout Europe is varied, ranging from 0.8–1% in northern countries to 0.3–0.5% recently in nations in the south. in Brittany, west France, a study was recently carried out employing An innovative survey plan of community case identifications Via telephone approach done by patient Interviewer, followed by case confirmation. The prevalence rate was 0.5%.

Objective

To reduce pain and stiffness in the knee joint.

To improve functional mobility in patients with rheumatoid arthritis of the knee.

To increase the strength of the quadriceps, hamstrings, and calf muscles.

To improve knee joint range of motion.

To enhance walking, stair climbing, and sit-to-stand performance.
To improve overall functional independence and quality of life.

Need of study

This study aims to examine how functional mobility and strengthening activities affect patients with rheumatoid arthritis in the knee.

Case description

A 45 year old female housewife has been afflicted with rheumatoid arthritis for the previous 12 years. She complaints of knee joint discomfort, stiffness ,swelling, and **flexion deformity**, as well as related ankle pain .walking ,climbing stairs and standing for extended periods of time all made the pain worse overtime. due to pain and decreased knee mobility she reported having trouble walking, standing up from a sitting posture, and carrying out domestic task. as part of her medical caution and diagnostic assessment, the patient had An **Arthroscopic Synovectomy and knee joint Biopsy**. there was no history of alcohol use, smoking ,or any other serious aliment. The patient reported a **visual analogue scale (vas) score of 3/ 10 at rest and 7/ 10 while activity**. less weight bearing on the afflicted lower leg, and diminished mobility were all observed. palpation revealed pain over the knee joint. movement and palpation caused access pain.

A functional examination revealed that pain, stiffness, ankle involvement, and little knee function made it difficult to walks stand up from a sitting position, climb stairs, and originate and everyday tasks.while laboratory tests revealed positive rheumatoid agent and abstruse erythrocyte sedimentation rate, confirming the inflammatory inclination of the disease especial studies included x-ray findings suggested of joints space constriction.

Uniqueness of study

Combines functional mobility training with muscle strengthening exercises.Focuses on improving walking, stair climbing, and sit-to-stand performance.Improves pain, muscle strength, knee function, and functional mobility.highlights the effectiveness of a structured physiotherapy rehabilitation program in rheumatoid arthritis of the knee.

Intervention

For three weeks the patient nnderwent physiotherapy 5 day's a week. The goals of treatment were to increase lower limb muscular strength, improve knee joint mobility, reduce pain and stiffness, and improve functional mobility. Thermotherapy, mobility exercise, stretching, strengthening exercise ,mobilization with movement(MWM),and patellar mobilization comprised the intervention.

Moist heat therapy

Patient situation:- supine lying with a cushion supporting the kneejoint.

Therapist situation:-standing close to the afflicted limb.

Procedure:-A hot pack is placed round the knee joint

Duration:- it last for 15-20 minutes.

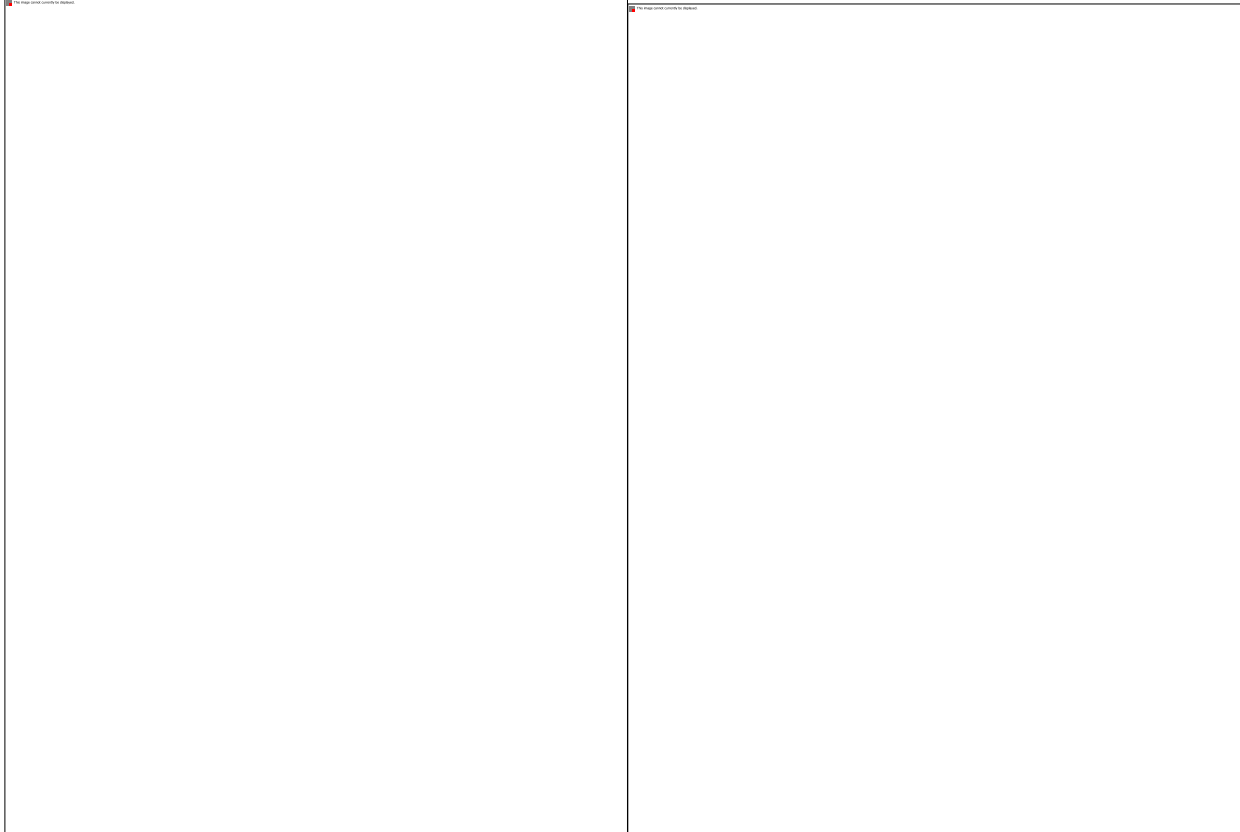
Goal:- To reduce stiffness and soreness.

Active knee joint range of motion

Patient Position:- patient position is supine lying.

Therapist position:- Standing close to the afflicted limb.

Procedure:- The patient flex and extend their knee inside a Pain- free range



Repetition:- 10 Repetition×3 sets

Duration:- it last for 10 minutes.

Goal:- To increase knee range of motion.

Heel slide

Patient position:- Supine Lying

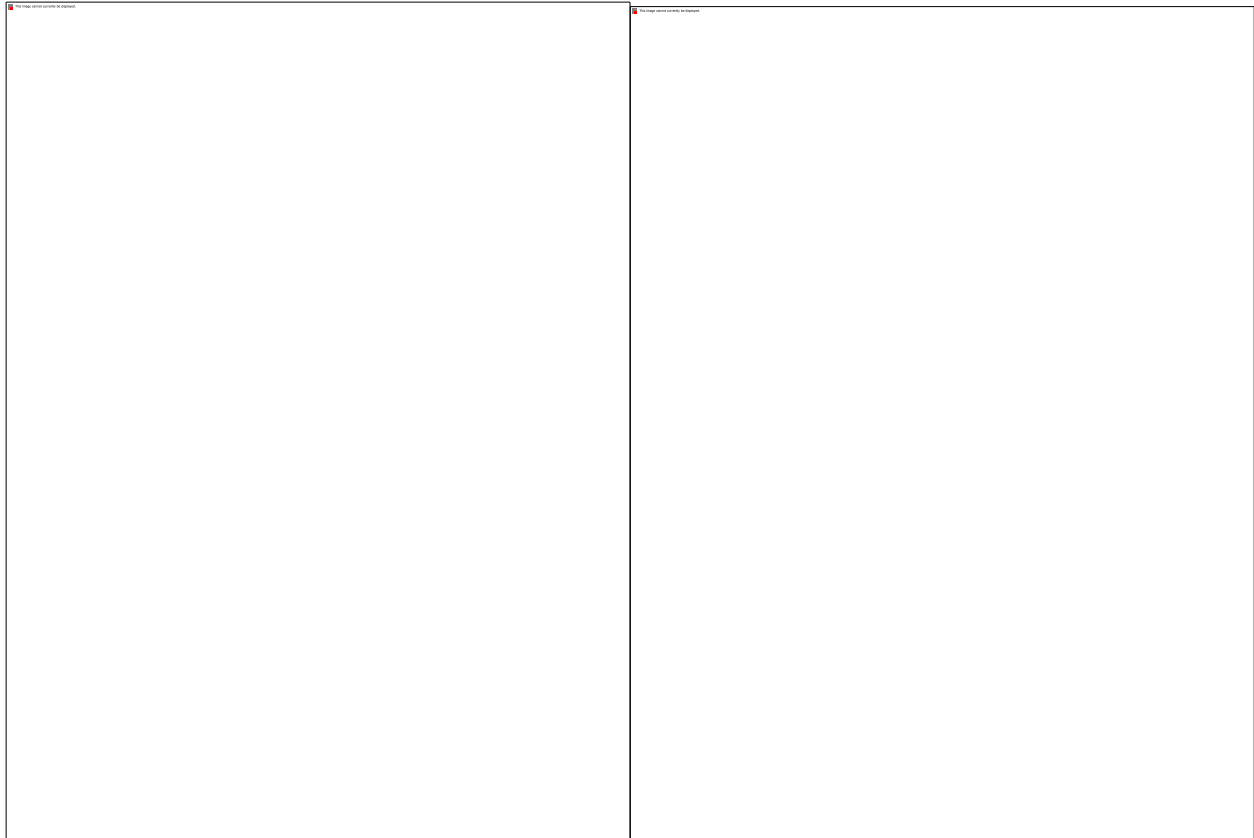
Therapist position:- Standing near to the afflicted limb.

Procedure:- To establish knee flexion, the patient actively slides the heel toward the buttocks before returning to the Initial position.

Dosage:- 3 sets of 10 repetition with a 5 second hold at the end range.

Goal:- To increase functional mobility and knee range of motion.

Hamstring stretching



Patient position:- supine Lying

Therapist position:- standing close to the afflicted limb.

Procedure:- Until a miniature stretch is noticed, the therapist passively stretches the hamstring.

Hold:- for 20-30 second.

Repetition:- 3 to 5 times.

Goal:- To reduce deformity caused by knee flexion.

Straight leg raise

Patient position:- supine lying.

Therapist position:- Positioned close to the patient.

Procedure:- The patient progressively lower the straight leg after raising it to a 30 to 45° angle.

Hold:- for 5 second.

Repetition:- 10×3 sets

Goal:- To strengthen the hip flexors and quad.

Patellar mobilization

Patient position:- lying supine with the afflicted knee relaxed and slightly flexed.

Therapist position:- Positioned close to the afflicted knee.

Procedure:- within the pain free range, mild superior, Inferior, medial and lateral patellar glides were carried out.

Dosage:- 2-3 sets of 10 repetition in apiece direction.

Time:- 3 - 5 minutes.

Goal:- To increase knee range of motion, lessening stiffness, and improve patellar mobility.

Mini Squads

Patient position:- place feet, shoulder width apart and, if necessary, grab onto a proper support.

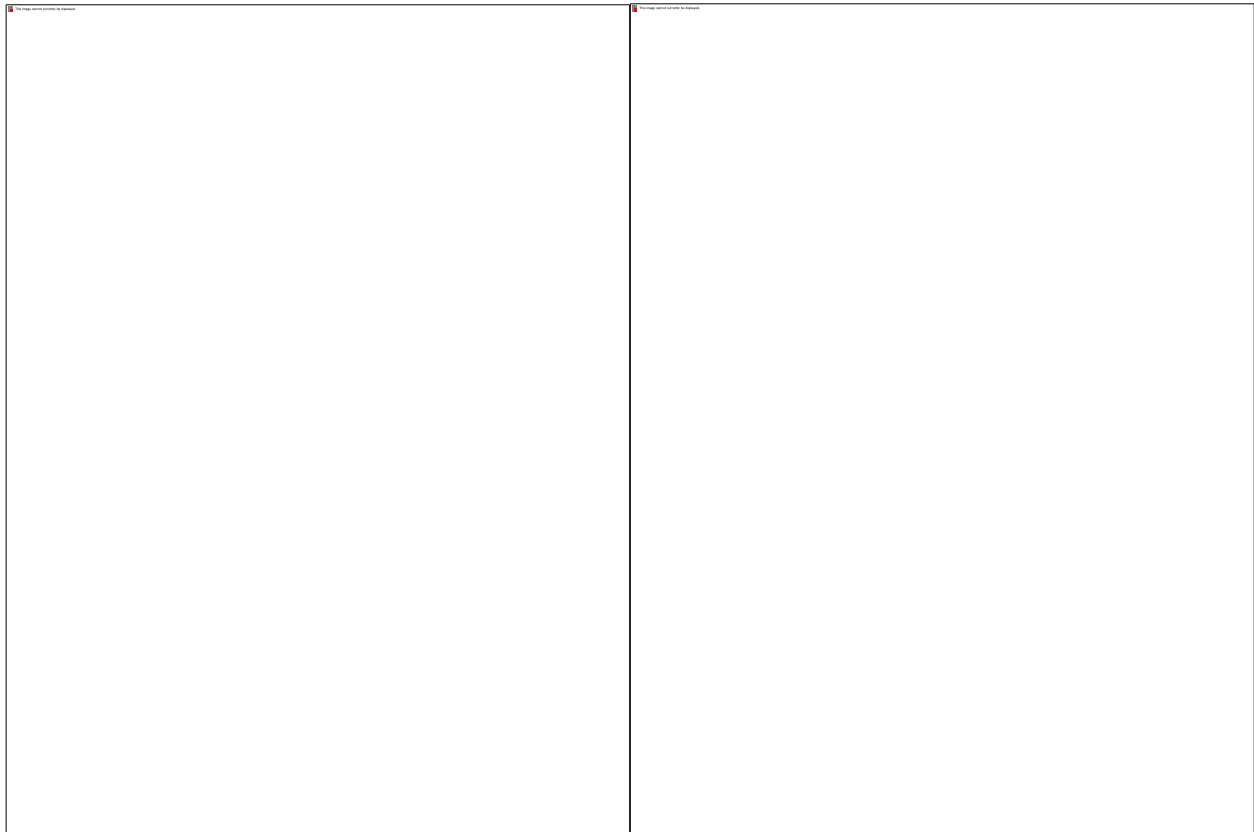
Therapist position:- Standing near to the patient.

Procedure:- The patient executed small squads by flexing both knee and to a 30 - 45° angle, then returning to the starting position while keeping the heels in contact with the floor and preserving correct alignment.

Dosage:- 3 sets of 10 repetition.

Time:- 5 - 10 minutes.

Goal:- To increase functional mobility, weight- bearing capacity, and lower- limb muscle strength.

**Static quadriceps exercises**

Patient position:- sitting for a long time with a towel roll beneath the afflicted knee.

Therapist position:- Standing near to the afflicted leg.

Procedure:- The patient was told to contract their quadriceps by keeping their heel in touch with the bed and forcing their knee down against the towel roll. after holding the contraction for 5 - 10 second, it was released.

Dosage:- 3 sets of 10 repetition.

Time:- 5 - 10 minutes.

Goal:- To increase functional mobility, knee stability, and quadriceps strength.

Mobilization with movement for knee extension

Patient position:- Standing on a low step or with the afflicted foot on the ground.

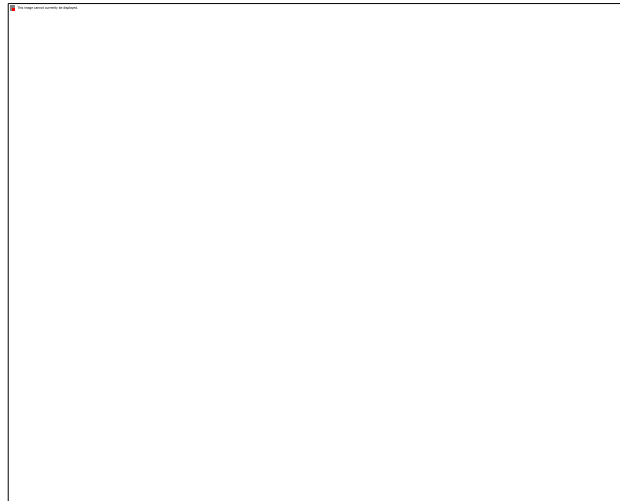
Therapist position:- Standing near to or in front of the patient.

Procedure:- while the patient actively performs knee flexion and extension or a small squats, the therapist uses a belt or hands to apply a prolonged medial or lateral Tibial glide, depending on the patient's preferred direction. there should be no pain during the movement after returning to the starting position, the glide is removed after being maintained During the movement.

Dosage:- 3 sets of 10 repetition.

Time:- 5 - 10 minutes.

Goal:- boost the extension of knee, diminish discomfort, enhance gait and Perform practical tasks like walking and sit- to- stand.



Outcome measures use

The following outcome measures were used both before and after the physiotherapy intervention to gauge the patient's progress:-

Visual analogue scale:- knee pain severity is measured using the vas. Goniometric measurment:- knee range of motion (flexion and extension) can be measured both actively and passively using goniometric measurement. manual muscle testing (MMT) :- the strength of the hamstring, quadriceps, and other lower limb muscles is assessed by MMT. WOMAC (western Ontario and McMaster Universities osteoarthritis index) use to evaluate functional limits, pain, and stiffness during everyday activities.

Result

The Patient's knee joint mobility, muscle strength, discomfort, and functional activities were significantly improved after completing the physiotherapy intervention program. The patient showed Increased muscle strength and decreased knee stiffness. better gait patterns, better heel strikes, enhanced walking tolerance, and easier sit-to-Stand transfers and stair ascending were all signs of improved functional mobility. better weight- bearing when standing and walking was the outcome of the knee flexion deformity's functional progression. pain, stiffness, and functional reduction decreased, according to outcome measures such the WOMAC index. overall, the example shows that a patient with rheumatoid arthritis affecting the knee joint can significantly improve their functional performance and quality of life with a systematic physiotherapy program that combines functional mobility training with muscle strengthening.

Pre and post treatment score:-

VAC	7/10	3/10
ROM Knee Flexion Knee extension	70° 10°	90° 5°
MMT Quadriceps Hamstring	4/5 3/5	5/5 4/5
WOMAC score	69/96	41/96

Discussion

The present case study showed that a structured physiotherapy program including functional mobility and muscle strengthening exercises reduced pain and improved knee range of motion, muscle strength, walking, stair climbing, sit-to-stand performance, and overall functional mobility. These findings are supported by Ahmad Et al., who reported that strengthening exercises improve functional ability and quality of life in patients with rheumatoid arthritis. similar recommendations are provided by Kisner and Colby (therapeutic exercise: Foundations and Techniques, 6th ed., Chapter 21, Pp. 773–774) and O'Sullivan And Schmitz (physical rehabilitation, 5th ed., Chapter 26, Pp. 1073–1081), who recommend strengthening, range of motion, and functional training to promote mobility and independence in patients with rheumatoid arthritis.

Conclusion

This case study concludes that a patient with rheumatoid arthritis of the knee joint can improve Their pain, knee joint mobility, muscle strength, gait, and activities of daily living with a comprehensive physiotherapy program that Emphasizes functional mobility training in adit to muscle strengthening exercises. The patient's quality of life and functional independence were also improved by the intervention. therefore, a fine and able procedure to manage functional limitations related to rheumatoid arthritis of the knee is to admit strengthening and functional mobility exercises in the rehabilitation program.

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