STM JOURNALS

Research & Reviews: A Journal of
Medical Science and Technology

ISSN: 2319-3417 (Online)
ISSN: 2349-1272 (Print)
Volume 14, Issue 1, 2025
January–April
DOI (Journal): 10.37591/RRJoMST

https://journals.stmjournals.com/rrjomst/

Research RRJoMST

Impact of in-Home PT on Mobility and Independence in Geriatric Patients with OA

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Abstract

Osteoarthritis (OA) is a leading source of pain and functional challenges in older adults, significantly impacting their mobility and independence. In-home physical therapy (PT) offers a personalized, patient-focused approach to managing OA in a comfortable setting, providing targeted treatments tailored to the specific needs of elderly patients. This study explores how in-home PT can enhance joint function, alleviate pain, and boost the overall quality of life for older adults living with OA. Key components of in-home PT include personalized exercise programs, gait training, pain management strategies, and functional task practice tailored to daily challenges within the home environment. Emphasis is placed on strengthening surrounding musculature, improving range of motion, and implementing fall prevention strategies. Additional benefits include increased adherence to prescribed regimens, enhanced patient confidence, and reduced barriers to care, such as transportation limitations. Preliminary findings suggest that in-home PT significantly improves mobility, reduces reliance on assistive devices, and promotes independence in activities of daily living, delaying or preventing the need for surgical intervention. This model of care empowers geriatric patients to maintain active, independent lifestyles while alleviating the physical and emotional burdens of OA. Further research is warranted to explore the long-term effects of in-home PT on functional outcomes and healthcare utilization in this population.

Keywords: Osteoarthritis, physical therapy, rehabilitation, home health PT, fall prevention

INTRODUCTION

Arthritis refers to joint inflammation and comes in various forms, both inflammatory and noninflammatory, affecting the joints and connective tissues. Among these, osteoarthritis (OA) and rheumatoid arthritis are the conditions most commonly managed by physical therapists [1–3].

OA is one of the most common joint diseases, with a prevalence ranging from 22% to 39% in India. In the United States, knee OA has become a significant cause of disability and a growing healthcare burden, with cases nearly doubling from 9 million in 2005 to 15 million in 2012 [4–6]. Symptomatic OA is typically diagnosed when individuals experience frequent joint pain alongside radiographic evidence of arthritis, although the pain may not always originate from the arthritis visible on imaging [7].

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Received Date: December 07, 2024
Accepted Date: December 16, 2024
Published Date: January 04, 2025

Citation: Shivangi Chaughule. Impact of in-Home PT on Mobility and Independence in Geriatric Patients with OA. Research & Reviews: A Journal of Medical Science and Technology. 2025; 14(1): 65–72p.

The condition primarily affects the articular cartilage of synovial joints, leading to bony remodeling and overgrowth at the joint margins. Over time, synovial and capsular thickening, along with joint effusion, occurs. Degeneration may result in capsular laxity due to bone remodeling and capsule distension, causing hypermobility or instability in certain joint movements. As the disease advances, pain and reduced movement contribute to contractures in the joint capsule and

surrounding muscles, progressively limiting motion. Additional factors, such as weakened quadriceps, decreased mobility, and loss of functional ability further impair proprioception, compounding the challenges associated with OA [8, 9].

The exact cause of OA remains unclear, but potential factors include mechanical joint injuries from significant stress or repeated minor stresses, as well as inadequate movement of synovial fluid when joints are immobilized. Immobilization can lead to the rapid deterioration of articular cartilage, as the lack of moving synovial fluid deprives cartilage of essential nutrients.

OA has a genetic component, particularly in the hands and hips, and to a lesser extent in the knees. Other key risk factors include obesity, weakened quadriceps muscles, repetitive joint impact and twisting, and occupational activities involving kneeling, squatting, or heavy lifting. Over time, the cartilage begins to split and thin, losing its ability to handle stress, which can lead to crepitus or loose fragments within the joint. Eventually, the subchondral bone becomes exposed, with increased bone density along the joint line, cystic bone loss, and osteoporosis in the surrounding metaphysis.

In the early stages, OA is often asymptomatic because cartilage lacks blood vessels and nerves. However, pain becomes persistent as the condition progresses. Affected joints may appear enlarged, and features like Heberden's and Bouchard's nodes are commonly observed. Most involved are weight bearing joints. Pain is the main presenting complaints. Joints become swollen due to synovitis. Stiffness gradually sets in followed by severe pain and capsular contractures.

In later stages of the disease, the joints become deformed, genu varum is the most common deformity caused because of OA. It may be caused by ligamentous instability, capsular contracture, or muscle imbalances. Crepitus is felt on joint movement [10].

Radiographic examination reveals the following features:

- Narrowing of joint spaces.
- Osteophytes at the margins of articular cartilage.
- Sclerosis and cysts in the subchondral bone.

The prevalence of knee OA has significantly increased in recent years, driven by rising life expectancy and global obesity rates. The primary approach to managing OA includes patient education, regular physical exercise, and weight loss for those who are overweight or obese. Despite this, less than 40% of individuals with knee OA receive these recommended interventions [1, 11].

How OA Affects Daily Routine?

OA significantly impacts a person's daily routine due to joint pain, stiffness, and decreased mobility. These effects can vary in severity, but they often make common activities more difficult and can lead to reduced independence, particularly in older adults. Here's how OA can affect daily life:

- *Morning Stiffness:* Stiff joints make it hard to get out of bed or move comfortably in the morning affecting dressing, grooming, and preparing breakfast may take longer.
- *Reduced Mobility:* Pain and stiffness in affected joints reduce their range of motion, making activities like walking, climbing stairs, or standing for long periods challenging. It can affect Grocery shopping, attending social events, or even moving around the house.
- *Difficulty with Basic Tasks:* OA in the hands can reduce grip strength and dexterity, causing challenges in handling objects or performing fine motor tasks like opening jars, using utensils, buttoning clothes, writing, or typing.
- *Pain and Fatigue*: Chronic pain can lead to fatigue and reduced endurance, making it hard to stay active throughout the day. Prolonged activities like cooking, gardening, or cleaning become burdensome.

- *Increased Risk of Falls*: OA in the knees, hips, or spine can lead to instability, increasing the risk of falls and injuries making walking on uneven surfaces, climbing stairs, or reaching for items difficult.
- *Reduced Participation in Hobbies*: Pain and limited movement can make recreational activities less enjoyable or impossible.
- *Sleep Disruption*: Pain may worsen at night, interfering with sleep and leading to daytime tiredness. Overall energy levels and productivity during the day are impacted.
- *Emotional and Social Impact*: Chronic pain and functional limitations can lead to frustration, anxiety, or depression like avoidance of social interactions, reluctance to travel, or fear of participating in group activities.

How Can OA Be Treated?

Lifestyle Modifications and Self-Care

- *Weight Management:* Reducing body weight helps decrease stress on weight-bearing joints like the knees and hips.
- *Exercise:* Regular low-impact activities, such as swimming, walking, or yoga improve strength, flexibility, and joint function.
- *Assistive Devices:* Braces, orthotics, or canes provide joint support and reduce pain.

Medications

Pain Relievers

- *Acetaminophen (Tylenol):* Often used for mild to moderate pain.
- *Nonsteroidal Anti-Inflammatory Drugs (NSAIDs):* such as ibuprofen (Advil) or naproxen (Aleve), help alleviate pain and reduce inflammation.
- *Topical NSAIDs:* Creams or gels, such as diclofenac, applied directly to the joint can minimize side effects compared to oral medications.

Steroid Injections

- Corticosteroids can be injected directly into the affected joint to decrease inflammation and offer temporary pain relief.
- Typically used sparingly due to potential side effects like cartilage damage with overuse.
- *Hyaluronic Acid Injections:* Injected into the joint to provide lubrication and cushioning, although the effectiveness varies by patient.
- *Duloxetine (Cymbalta):* An antidepressant that can also help manage chronic pain in OA.

Physical Therapy (PT) and Rehabilitation

- A physical therapist can create a personalized exercise plan to strengthen the muscles surrounding the affected joint, improve its range of motion, and boost overall mobility.

Alternative Therapies

- *Acupuncture:* Some studies suggest that acupuncture may help alleviate pain and improve function in individuals with knee OA.
- *Glucosamine and Chondroitin Supplements:* Research on these supplements has yielded mixed results. While some studies indicate potential benefits, others show no clear effects. It's important to consult with a healthcare provider before using these supplements, as they can interact with medications and may not be suitable for everyone.
- *Capsaicin Cream:* Derived from chili peppers, capsaicin cream can be applied topically to the skin over an arthritic joint. It may help reduce localized pain by blocking pain signals. However, it may take several weeks of consistent application to experience benefits, and some individuals may find the sensation uncomfortable.

Before starting any alternative treatment, it is essential to discuss it with a healthcare professional to ensure it's appropriate for your specific condition and to avoid potential interactions with other medications or treatments.

Advanced Medical Interventions

- *Platelet-Rich Plasma (PRP) Therapy:* PRP injections, made from the patient's own blood, are thought to reduce inflammation, and promote healing.
- *Stem Cell Therapy:* Experimental and aimed at regenerating damaged cartilage.

Surgical Options (for Advanced OA)

- *Arthroscopy:* Minimally invasive surgery to clean out damaged cartilage or remove loose fragments.
- *Osteotomy:* Realignment of bones to reduce stress on the affected joint.

Joint Replacement Surgery

- *Partial Joint Replacement:* Only the damaged part of the joint is replaced.
- *Total Joint Replacement (Arthroplasty):* Replacing the entire joint with a prosthetic one; commonly done for hips and knees.

Pain Management Techniques

- *Transcutaneous Electrical Nerve Stimulation (TENS):* A device that uses electrical currents to reduce pain perception.
- *Cryotherapy or Heat Therapy:* Used to alleviate joint pain and stiffness.

Research and Emerging Therapies

- Ongoing studies on disease-modifying OA drugs aim to slow or halt cartilage degeneration.

Treatment Approach

Treatment is often multi-modal, combining lifestyle changes, medications, PT, and, in severe cases, surgical intervention. The choice of treatment depends on:

- The severity and location of OA.
- The patient's age, activity level, and overall health.
- The impact of symptoms on daily life.

Recent guidelines for managing hip and knee OA emphasize non-pharmacological treatments, highlighting the importance of self-management strategies, including general physical activity and exercise. These programs should be tailored to each patient's specific needs to effectively alleviate symptoms and improve joint function.

PT plays a crucial role in managing OA by addressing the root causes of functional limitations. Through targeted exercises and interventions, PT aims to alleviate pain, enhance joint function, and improve overall quality of life. Unlike medications or surgery, PT focuses on strengthening muscles, restoring mobility, and reducing the burden on affected joints.

Engaging in regular physical activity and exercise therapy not only improves symptoms and impairments associated with OA but also serves as a preventive measure against at least 35 chronic conditions and aids in the management of at least 26 chronic conditions. One of the potential mechanisms behind these benefits is the exercise-induced anti-inflammatory effect.

Incorporating these non-pharmacological approaches into the treatment plan can lead to significant improvements in managing hip and knee OA, enhancing patients' quality of life [3].

Benefits of PT for OA

Pain Reduction

- Strengthening surrounding muscles reduces the load on joints, decreasing pain.
- Modalities like heat, cold, or electrical stimulation (e.g., TENS) used by therapists can alleviate discomfort.

Improved Joint Mobility

- Manual therapy techniques and stretching help restore range of motion.
- Reducing stiffness allows for smoother and more efficient joint movement.

Enhanced Strength and Stability

- Strengthening exercises focus on muscles around the affected joint, improving support and reducing wear and tears.
- For knee OA, strengthening the quadriceps and hamstrings is particularly beneficial.

Better Balance and Reduced Fall Risk

- Balance training improves stability, especially in patients with hip or knee OA.
- Preventing falls is critical in geriatric patients with compromised joint function.

Education on Joint Protection

- Therapists teach proper body mechanics and posture to minimize joint strain during daily activities.
- Techniques like using assistive devices or avoiding high-impact movements reduce further joint damage.

Increased Independence and Functionality

- Functional training focuses on everyday tasks like climbing stairs, walking, or standing up from a chair.
- Patients regain confidence in performing daily activities without excessive pain or fear of injury.

Components of a PT Program for OA

Exercise Therapy

- *Strength Training:* Targets specific muscle groups to stabilize and support joints.
- *Stretching:* Reduces stiffness and improves flexibility.
- *Aerobic Conditioning:* Low-impact activities like cycling, swimming, or walking boost cardiovascular health and joint function.

Manual Therapy

- Hands-on techniques to mobilize joints, reduce pain, and improve movement.
- Soft tissue massage to relieve tension and improve circulation.

Neuromuscular Re-Education

- Techniques to enhance muscle control and coordination, improving joint stability.

Gait Training

- Focuses on correcting walking patterns to reduce stress on joints.
- May include training with assistive devices like canes or walkers.

Pain Management Modalities

- Heat or cold therapy to reduce inflammation and ease discomfort.
- Ultrasound or electrical stimulation to promote healing and pain relief.

Education and Behavioral Strategies

- Guidance on weight management, joint-friendly activities, and ergonomic modifications to daily routines.
- *Kinesio Taping:* (KT) is a therapeutic technique commonly used to treat knee OA [10]. KT is a high-stretch elastic adhesive material that allows the treated area to have free mobility [11].

Long-Term Impact of PT on OA

- Delays or prevents the need for surgery by improving joint function.
- Enhances mobility, independence, and quality of life.
- Empowers patients with tools and knowledge to self-manage symptoms.

Integrating PT with other treatments – such as medications, weight management, and lifestyle modifications – often yields the most effective outcomes in managing OA. This comprehensive approach addresses various aspects of the condition, enhancing overall joint function and quality of life.

How Will Home Health PT Help with OA?

Home PT is an effective way to help patients with OA maintain mobility and independence. By addressing individual needs in a familiar environment, home PT can overcome barriers to care and provide targeted interventions that improve joint function, reduce pain, and enhance overall quality of life. It's crucial to incorporate home exercise routines that focus on enhancing both muscle strength and joint flexibility, rather than solely targeting knee extension muscle power [4]. Here's how it works:

Personalized Care in a Real-World Setting

- *Tailored Exercises:* Therapists can design exercises that incorporate the patient's actual home environment (e.g., practicing on stairs, improving safety in kitchens or bathrooms).
- *Addressing Daily Challenges:* Therapists help patients navigate specific obstacles, such as rising from a favorite chair or walking safely on uneven floors.

Reduced Pain and Improved Joint Function

- *Pain Management Techniques:* Heat or cold therapy, manual techniques, and specific exercises reduce pain and stiffness in the joints, enhancing comfort during daily activities.
- *Targeted Strengthening:* Strengthening muscles around the affected joint (e.g., quadriceps for knee OA) reduces stress on the joint and improves function.

Enhanced Mobility

- *Gait Training:* Therapists work on walking techniques to improve stride, reduce limping, and build confidence.
- *Range of Motion (ROM) Exercises:* Regular ROM exercises keep joints flexible, allowing patients to move more freely.
- *Fall Prevention:* Balance training helps improve stability, reducing the risk of falls.

Functional Independence

- *Functional Task Practice:* Therapists help patients regain independence by focusing on tasks like getting in and out of bed, using stairs, or preparing meals.
- *Energy Conservation Strategies:* Patients learn how to pace activities and avoid joint overuse, prolonging their ability to remain active.

Safety and Comfort

- *Home Assessments:* Therapists can identify and modify hazards (e.g., removing rugs, recommending grab bars) to create a safer environment for mobility.

- *Assistive Device Training:* Patients learn to use canes, walkers, or braces effectively, enhancing stability without compromising independence.

Convenience and Accessibility

- *Eliminating Travel:* Patients with severe OA may find traveling to a clinic challenging. Home PT removes this barrier, ensuring consistent care.
- *Support System Involvement:* Family members or caregivers can observe sessions and assist in maintaining exercises, creating a team approach to recovery.

Building Confidence and Consistency

- *Encouragement in Familiar Surroundings:* Patients often feel more comfortable and confident practicing exercises at home.
- *Daily Integration:* Therapists demonstrate how to integrate therapeutic movements into everyday activities, ensuring consistency and long-term adherence.

Long-Term Benefits

- *Delays the Need for Surgery:* By maintaining joint health, home PT can help patients avoid or delay surgical interventions.
- *Improved Quality of Life:* Remaining mobile and independent contributes to better mental health, social engagement, and overall well-being.

CONCLUSIONS

Home PT empowers patients with OA to remain mobile and independent by delivering individualized care in their living space. It provides not only physical benefits but also the confidence to manage daily challenges effectively, helping them live a fuller, more active life. OA greatly affects mobility, independence, and overall quality of life, especially among older adults. In-home PT provides a personalized and effective approach to managing OA by delivering targeted interventions within a patient's home environment. By focusing on strengthening exercises, gait training, pain management, and fall prevention strategies, in-home PT can alleviate pain, improve joint function, and promote independence in daily activities.

This model of care overcomes common barriers, such as transportation limitations and increases patient adherence, leading to better functional outcomes. Preliminary evidence shows that in-home PT reduces reliance on assistive devices and delays the need for surgical interventions, empowering older adults to maintain active, fulfilling lives. However, further research is essential to understand the long-term impact of in-home PT on healthcare utilization and functional outcomes. Integrating in-home PT with lifestyle modifications, medications, and patient education can provide a comprehensive strategy for managing OA, ultimately enhancing the quality of life for affected individuals.

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