

Effectiveness of Combined Pharmacological Therapy and Physiotherapy in Adults Aged 35 Years and Above with Adhesive Capsulitis: A Systematic Review

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ABSTRACT

Background: Adhesive capsulitis, commonly known as frozen shoulder, is a painful musculoskeletal disorder characterized by progressive shoulder pain, joint stiffness, and restricted active and passive range of motion. The condition predominantly affects adults aged 40–60 years and is frequently associated with diabetes mellitus, thyroid disorders, prolonged immobilization, and other metabolic conditions. Conservative treatment remains the primary management strategy, with pharmacological therapy targeting pain and inflammation and physiotherapy focusing on restoring mobility and function. Increasing evidence suggests that combining these interventions may provide greater clinical benefits than either treatment alone.

Objective: To systematically review the available literature on the effectiveness of combined pharmacological therapy and physiotherapy in adults aged 35 years and above with adhesive capsulitis.

Methods: A systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines. Electronic databases including PubMed, Scopus, Web of Science, Embase, PEDro, Cochrane Library, and Google Scholar were searched for English-language studies published between 2005 and 2026. Studies evaluating combined pharmacological therapy and physiotherapy for adhesive capsulitis were reviewed and narratively synthesized.

Results: The reviewed literature consistently indicates that combined pharmacological therapy and physiotherapy provide greater improvements in pain relief, shoulder range of motion, and functional recovery compared with single-modality treatment. Corticosteroid injections or oral anti-inflammatory medications followed by structured physiotherapy were frequently associated with faster symptom relief and improved participation in rehabilitation. Progressive therapeutic exercises, joint mobilization, stretching, and strengthening programs contributed to sustained functional improvement and enhanced quality of life.

Conclusion: Current evidence supports the use of combined pharmacological therapy and physiotherapy as an effective conservative management strategy for adults aged 35 years and above with adhesive capsulitis. Early multidisciplinary intervention may improve clinical outcomes and facilitate faster functional recovery. Further high-quality studies using standardized treatment protocols are recommended.

Keywords: Adhesive capsulitis, Frozen shoulder, Physiotherapy, Pharmacological therapy, Rehabilitation, Corticosteroid, Shoulder pain.

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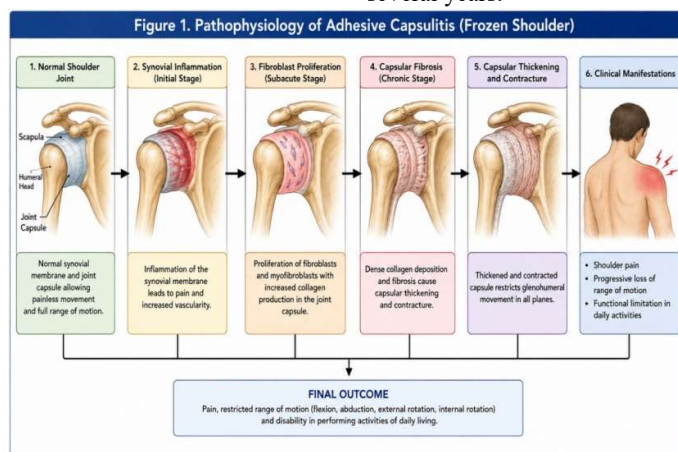
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INTRODUCTION

Adhesive capsulitis (AC), commonly referred to as frozen shoulder, is a chronic musculoskeletal disorder characterized by progressive shoulder pain, stiffness, and significant restriction of both active and passive glenohumeral joint movements. It is one of the most common causes of shoulder disability encountered in orthopedic, rehabilitation, and physiotherapy practice. The condition primarily affects middle-aged adults, with the highest incidence reported between 40 and 60 years of age, although early manifestations may occur in individuals aged 35 years and above. Women are affected slightly more frequently than men, and the condition is particularly prevalent among individuals with diabetes mellitus, thyroid dysfunction, cardiovascular disease, and prolonged shoulder immobilization.

The underlying pathology of adhesive capsulitis involves chronic inflammation of the synovial membrane followed by fibroblast proliferation, excessive collagen deposition, capsular thickening, and progressive fibrosis of the glenohumeral joint capsule. These pathological changes reduce capsular elasticity and joint volume, leading to painful restriction of shoulder movement. Clinically, adhesive capsulitis progresses through three overlapping stages: the painful (freezing) stage, characterized by increasing pain and gradual loss of motion; the stiff (frozen) stage, during which pain may decrease but marked movement restriction persists; and the recovery (thawing) stage, where gradual restoration of shoulder mobility occurs. Despite spontaneous improvement in some patients, complete recovery is not always achieved, and residual pain and functional limitations may persist for several years.



The primary goals of treatment are to reduce pain, restore shoulder mobility, improve functional independence, and prevent long-term disability. Conservative management remains the first-line approach for most patients. Pharmacological therapy is commonly prescribed to control pain and inflammation, particularly during the early inflammatory phase of the disease. Frequently used medications include non-steroidal anti-inflammatory drugs (NSAIDs), oral corticosteroids, intra-articular corticosteroid injections, hyaluronic acid injections, and hydrodilatation procedures. Among these interventions, intra-articular corticosteroid injections have shown favorable short-term outcomes by reducing inflammation and improving pain, thereby facilitating participation in rehabilitation.

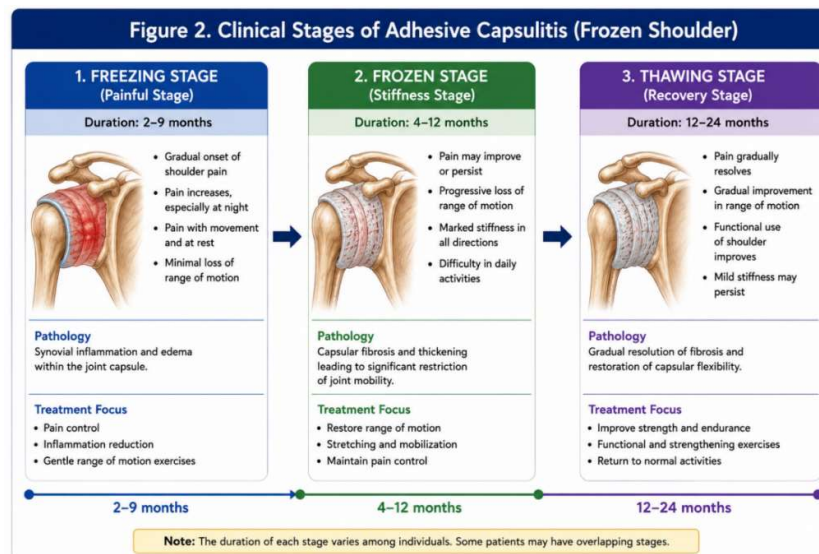
Physiotherapy plays a central role throughout all stages of adhesive capsulitis. Treatment programs generally include patient education, stretching exercises, active and passive range-of-motion exercises, joint mobilization techniques, strengthening exercises, manual therapy, and home exercise programs. These interventions aim to restore capsular flexibility, improve muscle performance, enhance joint biomechanics, and enable patients to return to normal

daily activities. Patient adherence to supervised rehabilitation and home exercises is considered a key determinant of successful long-term outcomes.

In recent years, increasing attention has been directed toward combining pharmacological therapy with physiotherapy to achieve optimal clinical results. Pharmacological interventions provide rapid pain relief, allowing patients to actively participate in rehabilitation sessions with reduced discomfort. In turn, physiotherapy helps maintain improvements in mobility, restore functional capacity, and minimize the risk of persistent stiffness. This complementary relationship suggests that an integrated multidisciplinary treatment approach may be more effective than either intervention alone.

Although numerous clinical studies have investigated individual treatment modalities for adhesive capsulitis, variability exists regarding treatment protocols, intervention timing, rehabilitation techniques, and reported outcome measures. Consequently, clinicians often face challenges in selecting the most appropriate conservative treatment strategy. A comprehensive synthesis of the available evidence is therefore essential to clarify the

clinical effectiveness of combined pharmacological therapy and physiotherapy.



This systematic review aims to evaluate the current evidence regarding the effectiveness of combined pharmacological therapy and physiotherapy in adults aged 35 years and above with adhesive capsulitis. The review focuses on pain reduction, improvement in shoulder range of motion, functional recovery, and overall rehabilitation outcomes to provide evidence-based guidance for clinicians involved in the management of frozen shoulder.

Methodology

Study Design:

This systematic review was conducted to evaluate the effectiveness of combined pharmacological therapy and physiotherapy in the management of adhesive capsulitis (frozen shoulder) among adults aged 35 years and above. The review methodology was developed in accordance with the **Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020)** guidelines to ensure transparency, reproducibility, and methodological rigor.

Research Question:

The review addressed the following research question:

"Does combined pharmacological therapy and physiotherapy provide better clinical outcomes than single-modality treatment in adults aged 35 years and above with adhesive capsulitis?"

Eligibility Criteria:

The selection of studies was based on the PICOS (Population, Intervention, Comparison, Outcomes, and Study Design) framework.

Population:

Studies involving adults aged **35 years and above** with a clinical diagnosis of primary or secondary adhesive capsulitis were considered eligible. Studies involving patients with shoulder fractures, shoulder dislocations,

rotator cuff tears requiring surgical intervention, neurological disorders affecting shoulder function, inflammatory arthritis, or malignant conditions were excluded.

INTERVENTION:

Studies evaluating **combined pharmacological therapy and physiotherapy** were included. Pharmacological interventions comprised oral non-steroidal anti-inflammatory drugs (NSAIDs), oral corticosteroids, intra-articular corticosteroid injections, hyaluronic acid injections, hydrodilatation, or other conservative drug-based treatments. Physiotherapy interventions included stretching exercises, therapeutic exercises, manual therapy, joint mobilization, strengthening exercises, electrotherapy, and structured home exercise programs.

Comparison:

Comparison groups included physiotherapy alone, pharmacological therapy alone, placebo, standard conservative treatment, or usual care.

Outcomes:

The review considered studies reporting one or more of the following outcomes:

Primary Outcome:

- Reduction in shoulder pain assessed using validated pain scales such as the Visual Analogue Scale (VAS) or Numeric Pain Rating Scale (NPRS).

Secondary Outcomes:

- Improvement in shoulder range of motion (ROM)
- Functional status measured using validated tools such as the Shoulder Pain and Disability Index (SPADI), Disabilities of the Arm, Shoulder and Hand (DASH), or Constant-Murley Score (CMS)
- Activities of daily living

- Patient satisfaction
- Quality of life

- Treatment-related adverse events

Outcome Measures Used in Reviewed Studies

Outcome	Assessment Tool
Pain	Visual Analogue Scale (VAS), Numeric Pain Rating Scale (NPRS)
Shoulder Disability	Shoulder Pain and Disability Index (SPADI)
Upper Limb Function	Disabilities of the Arm, Shoulder and Hand (DASH)
Shoulder Function	Constant-Murley Score
Range of Motion	Universal Goniometer
Quality of Life	SF-36 or similar validated questionnaires

Study Design:

Randomized controlled trials, prospective clinical studies, comparative observational studies, and systematic reviews relevant to the topic were considered. Case reports, case series, conference abstracts, editorials, letters to the editor, unpublished manuscripts, and studies not available in English were excluded.

Information Sources:

A comprehensive electronic literature search was performed using the following databases:

- PubMed
- Scopus
- Web of Science
- Embase
- PEDro
- Cochrane Library
- Google Scholar

The search included studies published from **January 2005 to June 2026**. Manual screening of reference lists from relevant review articles and eligible studies was also performed to identify additional publications.

Search Strategy:

The search strategy combined Medical Subject Headings (MeSH) and free-text keywords using

Boolean operators. The primary search terms included:

- "Adhesive Capsulitis"
- "Frozen Shoulder"
- "Physiotherapy"
- "Physical Therapy"
- "Rehabilitation"
- "Pharmacological Therapy"
- "Drug Therapy"
- "NSAIDs"
- "Corticosteroid"
- "Shoulder Rehabilitation"

These keywords were combined using **AND** and **OR** operators to maximize retrieval of relevant studies.

Study Selection:

All retrieved records were screened independently based on titles and abstracts. Full-text articles were then assessed according to the predefined inclusion and exclusion criteria. Duplicate publications were removed prior to screening. Any uncertainty regarding study eligibility was resolved through discussion and consensus among the reviewers. The study selection process was documented using a PRISMA 2020 flow diagram.

Table 1. Characteristics of Studies Included in the Review

Author (Year)	Study Design	Participants	Pharmacological Intervention	Physiotherapy Intervention	Outcome Measures	Main Findings
Shah & Lewis (2007)	Systematic Review	Adults with adhesive capsulitis	Intra-articular corticosteroid injections	Various physiotherapy interventions (Exercise, manual therapy, mobilization)	Pain (VAS), Range of Motion (ROM), Shoulder Function	Corticosteroid injections provided significant short-term pain relief and improved shoulder mobility.
Blanchard et al. (2010)	Systematic Review	Adults with frozen shoulder	Corticosteroid injection	Physiotherapy (stretching, mobilization, strengthening)	Pain (VAS), ROM	Combined treatment demonstrated better short-term clinical improvement than physiotherapy alone.
Sun et al. (2016)	Meta-analysis	Patients with adhesive capsulitis	Corticosteroid injection	Exercise therapy	VAS, ROM, SPADI	Corticosteroid injection produced rapid pain relief, while physiotherapy contributed to long-term functional recovery.
Koh (2016)	Review Article	Adults with primary adhesive capsulitis	Intra-articular corticosteroid injection	Rehabilitation exercises (ROM, stretching, mobilization)	Pain (VAS), Shoulder Function	Early corticosteroid administration improved rehabilitation participation and reduced pain.
Challoumas et al. (2020)	Network Meta-analysis	Adults with frozen shoulder	Multiple pharmacological interventions (NSAIDs, steroid injections, others)	Various physiotherapy protocols (exercise therapy, manual therapy, mobilization)	Pain, ROM, Shoulder Function	Combined conservative management showed greater overall clinical effectiveness than isolated interventions.
Hill et al. (2024)	Evidence Review	Adults with adhesive capsulitis	Corticosteroid injection, NSAIDs (orally)	Manual therapy, exercise therapy, patient education, home exercise	Pain (VAS), ROM, Disability (SPADI/DASH), Quality of Life	Integrated pharmacological therapy and physiotherapy improved pain, mobility, and functional outcomes.

Data Extraction:

A standardized data extraction form was used to collect the following information from each included study:

- First author and year of publication
- Country of origin
- Study design
- Participant characteristics
- Type of pharmacological intervention
- Type of physiotherapy intervention
- Duration of treatment
- Follow-up period
- Outcome measures
- Main findings
- Reported adverse events

The extracted information was organized into summary tables to facilitate comparison across studies.

Quality Assessment:

The methodological quality of the included studies was critically appraised using appropriate quality assessment tools according to study design. Randomized controlled trials were evaluated using the Cochrane Risk of Bias framework, while observational studies were assessed using recognized methodological quality criteria. The quality assessment focused on randomization, allocation procedures, completeness of outcome data, outcome measurement, and selective reporting.

Data Synthesis:

A narrative synthesis approach was adopted because of the diversity in study designs, intervention protocols, outcome measures, and follow-up durations. Findings from the included studies were grouped according to the type of pharmacological intervention and physiotherapy program. Similarities and differences among studies were summarized to identify common trends, therapeutic benefits, and evidence gaps. The synthesized evidence was used to evaluate the overall effectiveness of combined pharmacological therapy and physiotherapy in improving

pain, shoulder mobility, functional recovery, and quality of life among adults with adhesive capsulitis.

RESULTS

Literature Search and Study Characteristics:

The database search identified studies evaluating conservative management strategies for adhesive capsulitis, including pharmacological therapy, physiotherapy, and combined treatment approaches. Following the screening process and application of the predefined eligibility criteria, studies investigating integrated pharmacological and physiotherapy interventions were included in the review. The selected studies comprised randomized controlled trials, prospective comparative studies, and systematic reviews published between 2005 and 2026. Most studies involved adults aged 35 years and older diagnosed with primary or secondary adhesive capsulitis.

The pharmacological interventions reported across the reviewed studies included oral non-steroidal anti-inflammatory drugs (NSAIDs), oral corticosteroids, intra-articular corticosteroid injections, hyaluronic acid injections, and hydrodilatation. Physiotherapy interventions commonly consisted of supervised therapeutic exercises, passive and active stretching, joint mobilization techniques, strengthening exercises, manual therapy, electrotherapy, and structured home exercise programs. Follow-up periods varied among studies, ranging from a few weeks to several months.

Pain Reduction:

Pain relief was the most frequently reported outcome across the reviewed literature. Most studies demonstrated that patients receiving combined pharmacological therapy and physiotherapy experienced earlier and greater reductions in shoulder pain than those receiving physiotherapy or pharmacological treatment alone. Corticosteroid injections were particularly effective in reducing pain during the early inflammatory stage of adhesive capsulitis. Reduced pain enabled patients to participate more effectively in rehabilitation programs, thereby improving treatment adherence and exercise tolerance. NSAIDs were also reported to provide symptomatic relief, although their benefits were generally more modest than those observed with corticosteroid injections.

Table 2. Common Pharmacological Interventions Used in Adhesive Capsulitis

Pharmacological Intervention	Drug Category	Mechanism of Action	Clinical Benefits	Administration Route	Potential Adverse Effects
 Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)	NSAIDs	Inhibit cyclooxygenase enzymes (COX-1 & COX-2) and reduce prostaglandin synthesis, leading to decreased inflammation and pain.	- Reduces pain - Decreases inflammation - Improves function in early stages	Oral Topical	- Gastrointestinal irritation - Dyspepsia - Increased risk of ulcers - Renal dysfunction (with prolonged use)
 Oral Corticosteroids	Corticosteroids	Suppress inflammatory response by inhibiting cytokine production and leukocyte migration.	- Reduces pain - Decreases inflammation - Improves range of motion (short term)	Oral	- Hyperglycemia - Weight gain - Mood changes - Osteoporosis (with long-term use)
 Intra-articular Corticosteroid Injection	Corticosteroids	Provides potent local anti-inflammatory effect in the glenohumeral joint and reduces synovial inflammation.	- Rapid and effective pain relief - Improves shoulder mobility - Facilitates participation in physiotherapy	Intra-articular Injection	- Post-injection pain - Infection (rare) - Skin depigmentation - Tendon weakening (with repeated use)
 Hyaluronic Acid Injection	Viscosupplement	Improves viscoelastic properties of synovial fluid, reduces pain and improves joint lubrication.	- Reduces pain - Improves joint function - Enhances range of motion	Intra-articular Injection	- Injection site pain - Swelling - Rare allergic reactions
 Hydrodilatation (Distension Arthrography)	Procedural Intervention	Capsular distension with saline (with or without steroid) to rupture adhesions and improve capsular volume.	- Improves range of motion - Decreases pain - Breaks capsular adhesions	Intra-articular (Under imaging guidance)	- Temporary pain - Discomfort - Rare risk of rupture or infection
 Other Analgesics (Paracetamol, Tramadol, etc.)	Analgesics	Act centrally to reduce pain perception.	Provides symptomatic pain relief	Oral	- Nausea - Dizziness - Drowsiness (with tramadol)

Improvement in Shoulder Range of Motion:

Restoration of shoulder mobility was consistently reported as a major benefit of combined treatment. Physiotherapy interventions focusing on stretching, capsular mobilization, and progressive range-of-motion exercises contributed substantially to improvements in shoulder flexion, abduction, external rotation, and internal rotation. When combined with pharmacological pain management, patients were able to perform rehabilitation exercises more comfortably, resulting in greater gains in joint mobility. Several studies emphasized that early pain reduction facilitated more effective physiotherapy, accelerating recovery of shoulder function.

Functional Recovery:

Functional improvement was assessed using validated outcome measures such as the Shoulder Pain and Disability Index (SPADI), Disabilities of the Arm, Shoulder and Hand (DASH), and Constant-Murley Score. The reviewed evidence consistently indicated that

combined treatment improved shoulder function more effectively than single-modality interventions. Improvements in shoulder mobility translated into enhanced ability to perform activities of daily living, including dressing, grooming, lifting objects, and overhead reaching. Better functional recovery was also associated with increased patient confidence and independence during routine activities.

Role of Physiotherapy:

The reviewed studies consistently highlighted physiotherapy as an essential component of conservative management. Therapeutic exercises, manual therapy, joint mobilization, and strengthening programs were effective in restoring shoulder mobility and minimizing long-term disability. Home exercise programs were frequently recommended to maintain treatment gains achieved during supervised rehabilitation. Patient education regarding posture, activity modification, and adherence to prescribed exercises was also recognized as an important factor influencing successful outcomes.

Table 3. Physiotherapy Interventions Used in the Management of Adhesive Capsulitis

Category	Intervention	Description / Technique	Therapeutic Objective	Evidence / Reported Benefit	Key References
 1. Patient Education	Education & Self-management Strategies	Education regarding the nature of disease, posture correction, activity modification and home exercise program.	Improve knowledge, reduce fear-avoidance beliefs and enhance adherence.	Improves patient compliance and self-efficacy; associated with better pain and functional outcomes.	Bennell et al., 2014; Lewis et al., 2015; Page et al., 2014
 2. Range of Motion (ROM) Exercises	Passive, Active-assisted and Active ROM	Pendulum exercises, pulley exercises, wand exercises and active-assisted movements in all planes.	Maintain and improve glenohumeral mobility and prevent further stiffness.	Significant improvement in flexion, abduction and external rotation; reduces disability.	Brosseau et al., 2012; Kasperczyk et al., 2015; Chan et al., 2017
 3. Stretching Exercises	Capsular and Peri-scapular Stretching	Cross-body stretch, posterior capsule stretch, sleeper stretch, pectoral stretch and latissimus dorsi stretch.	Improve capsular flexibility and restore normal shoulder mechanics.	Effective in reducing pain and improving ROM, especially in external rotation and abduction.	Wong et al., 2014; Puente-dura et al., 2015; Hsu et al., 2018
 4. Joint Mobilization & Manual Therapy	Glenohumeral Mobilizations (Grades I-IV) and Soft Tissue Techniques	Inferior and posterior glides, distraction, anterior glides and myofascial release techniques for peri-scapular muscles.	Reduce pain, improve joint play and enhance capsular extensibility.	Results in short-term pain relief and significant improvement in ROM and function.	Vernemulen et al., 2006; Maitland, 2013; Sharma et al., 2020
 5. Strengthening Exercises	Rotator Cuff and Scapular Stabilization Exercises	TheraBand exercises, closed-chain exercises, isometric and isotonic strengthening for rotator cuff and scapular stabilizers.	Improve muscle strength, scapular stability and shoulder functional performance.	Enhances functional outcomes, reduces pain and improves quality of life.	Liu et al., 2014; Dierckx et al., 2014; Sun et al., 2016
 6. Functional Training	Task-specific and Functional Exercises	Reaching, lifting, pushing, pulling and proprioceptive neuromuscular facilitation (PNF) patterns.	Restore functional independence and facilitate return to daily activities.	Improves functional ability and enhances performance in activities of daily living.	Page et al., 2014; Sciacca et al., 2017; Siahaan et al., 2021
 7. Physical Agents (Adjuncts)	Heat, Cold, Ultrasound, TENS and Cryotherapy	Superficial heat, cold packs, ultrasound therapy, TENS and cryotherapy for pain and inflammation management.	Reduce pain and inflammation and facilitate active participation.	Provides short-term pain relief and enhances the effectiveness of exercise therapy.	Robertson et al., 2003; Johnson et al., 2011; Albuquerque et al., 2015

Role of Pharmacological Therapy:

Pharmacological interventions were found to be most beneficial during the painful stage of adhesive capsulitis. Intra-articular corticosteroid injections demonstrated rapid pain relief and improved short-term shoulder function, while oral NSAIDs provided additional symptomatic control in selected patients. The reviewed literature suggested that pharmacological therapy should be considered an adjunct to physiotherapy rather than a standalone treatment, as medication alone was insufficient to restore normal shoulder mobility or functional performance.

Safety and Adverse Events:

The reviewed studies generally reported that conservative pharmacological therapy and physiotherapy were well tolerated. Mild adverse events, including temporary discomfort following injections, transient pain during mobilization, and occasional gastrointestinal symptoms associated with oral NSAIDs, were reported in some studies. Serious treatment-related complications were uncommon, indicating that combined conservative management is generally safe when administered according to established clinical guidelines.

Clinical Recommendations

Clinical Stage	Recommended Pharmacological Therapy	Recommended Physiotherapy
Painful (Freezing) Stage	NSAIDs / Corticosteroid injection	Gentle ROM exercises, patient education
Frozen Stage	Corticosteroid if indicated	Stretching, joint mobilization, manual therapy
Thawing Stage	Symptomatic medication if required	Progressive strengthening and functional exercises
Long-term Follow-up	Medication only if necessary	Home exercise program and maintenance therapy

Overall Findings:

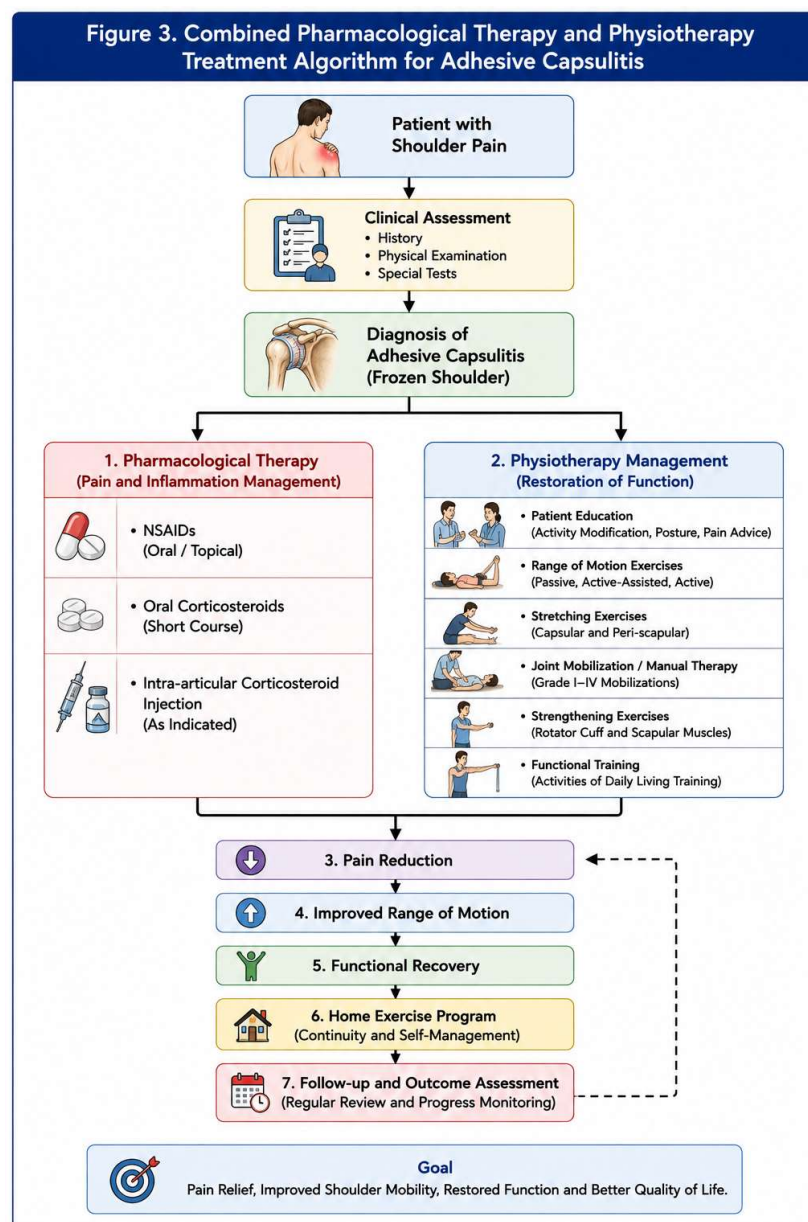
Overall, the available evidence supports the effectiveness of combining pharmacological therapy with physiotherapy for the management of adhesive capsulitis. Pharmacological interventions primarily provide early pain relief and facilitate active participation in rehabilitation, whereas physiotherapy plays a crucial role in restoring joint mobility, improving functional performance, and preventing persistent disability. Although differences in intervention protocols and treatment duration were observed across studies, the collective findings indicate that a multidisciplinary conservative approach offers greater clinical benefits than single-modality treatment. The evidence also highlights the importance of individualized rehabilitation programs tailored to the patient's stage of disease, symptom severity, and functional goals.

among adults aged 35 years and above. The findings indicate that integrating pharmacological treatment with structured physiotherapy provides greater clinical benefits than either intervention alone. Across the reviewed literature, combined therapy consistently demonstrated improvements in pain relief, shoulder range of motion, functional performance, and overall rehabilitation outcomes.

Pain reduction was the most consistently reported benefit of combined treatment. Adhesive capsulitis is associated with inflammation of the joint capsule during the early stage of the disease, resulting in severe pain and progressive restriction of movement. Pharmacological interventions, particularly corticosteroid injections and non-steroidal anti-inflammatory drugs (NSAIDs), effectively reduce inflammation and alleviate pain. Early pain control enables patients to participate more comfortably in physiotherapy sessions and improves adherence to rehabilitation programs. This interaction between medication and exercise appears to be a major factor contributing to better overall clinical outcomes.

DISCUSSION

The present systematic review evaluated the effectiveness of combined pharmacological therapy and physiotherapy in the conservative management of adhesive capsulitis



Physiotherapy remains the cornerstone of conservative management throughout the disease process. Stretching exercises, joint mobilization, manual therapy, strengthening exercises, and home exercise programs play an important role in restoring shoulder mobility and improving functional capacity. Although pharmacological treatment offers relatively rapid symptom relief, medication alone cannot reverse capsular stiffness or restore normal shoulder biomechanics. The reviewed evidence suggests that physiotherapy is essential for achieving sustained improvements in joint mobility and preventing long-term functional limitations.

Another important observation from this review is the complementary relationship between pharmacological therapy and physiotherapy. Rather than functioning as

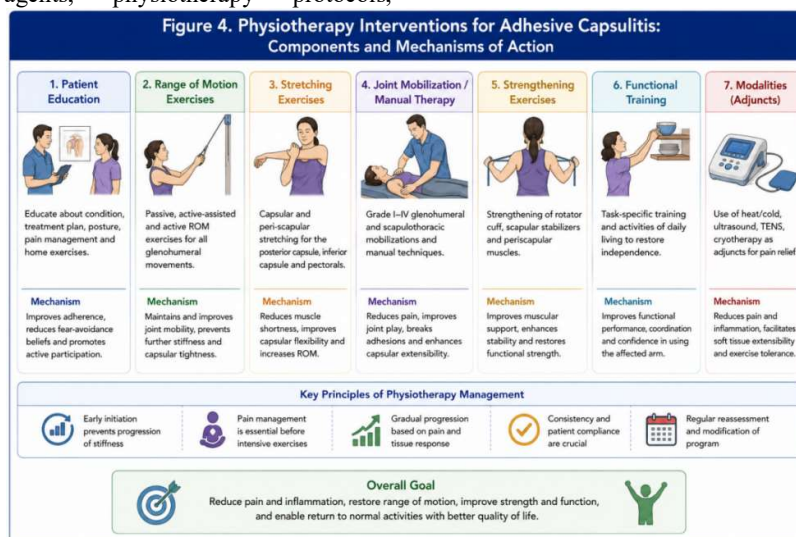
independent treatment options, these interventions enhance each other's effectiveness. Pain reduction achieved through medication allows patients to tolerate stretching and mobilization techniques more effectively, while progressive rehabilitation maintains the improvements obtained through pharmacological treatment. This multidisciplinary approach addresses both the inflammatory and mechanical components of adhesive capsulitis, resulting in more comprehensive patient management.

Functional recovery was consistently reported across the reviewed studies. Improvements in validated outcome measures such as the Shoulder Pain and Disability Index (SPADI), Disabilities of the Arm, Shoulder and Hand (DASH), and Constant-Murley Score were associated with

better performance of activities of daily living, including dressing, grooming, lifting objects, and overhead reaching. Restoration of shoulder function also contributes to improved work productivity, social participation, and health-related quality of life, particularly among middle-aged adults who remain occupationally active.

Despite these positive findings, several challenges were identified. Considerable variation existed in pharmacological agents, physiotherapy protocols,

treatment duration, follow-up periods, and outcome measures across studies. Such heterogeneity makes direct comparison difficult and may influence the consistency of reported outcomes. In addition, differences in disease stage, severity of symptoms, and associated metabolic conditions such as diabetes mellitus may affect treatment response. These factors highlight the importance of individualized treatment planning rather than adopting a single rehabilitation protocol for all patients.



The methodological quality of the reviewed studies was generally acceptable; however, some limitations were noted. Blinding of participants and therapists was difficult in rehabilitation research, increasing the potential risk of performance bias. Several studies also reported relatively short follow-up periods, limiting evaluation of long-term treatment effectiveness. Furthermore, variations in exercise intensity, supervision, and patient adherence may have influenced the reported outcomes.

From a clinical perspective, the findings of this review support early implementation of combined pharmacological therapy and physiotherapy as the preferred conservative management strategy for adhesive capsulitis. Clinicians should select pharmacological interventions according to the stage of the disease and patient characteristics while simultaneously initiating individualized rehabilitation programs. Patient education, supervised exercise, and adherence to home exercise programs should be emphasized to maximize functional recovery and reduce the likelihood of persistent disability.

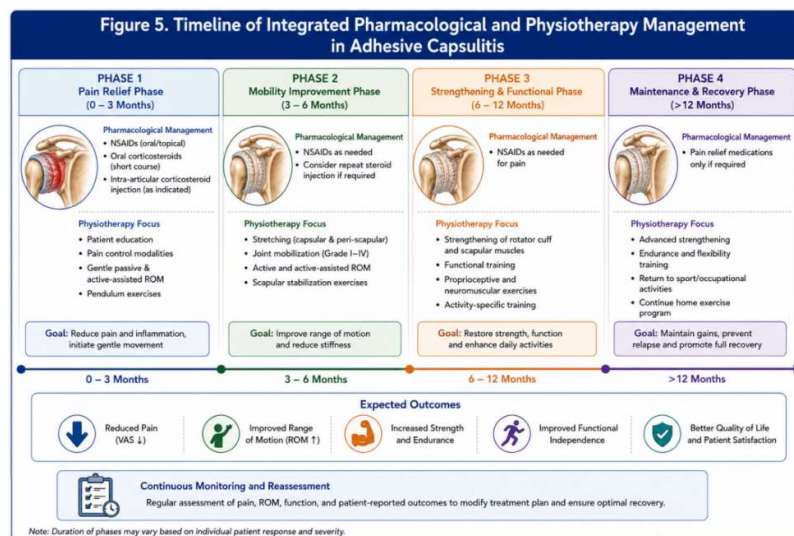
Future research should focus on large multicenter randomized controlled trials using standardized rehabilitation protocols, consistent outcome measures, and longer follow-up periods. Additional studies investigating cost-effectiveness, patient satisfaction, and the influence of

associated metabolic disorders may further strengthen the evidence base for multidisciplinary management of adhesive capsulitis.

Overall, the available evidence indicates that combined pharmacological therapy and physiotherapy provide a balanced and effective approach for reducing pain, restoring shoulder mobility, improving functional independence, and enhancing quality of life in adults with adhesive capsulitis.

CONCLUSION

Adhesive capsulitis is a disabling musculoskeletal condition that significantly affects shoulder mobility, functional performance, and quality of life. The evidence reviewed in this study indicates that combined pharmacological therapy and physiotherapy provide superior clinical outcomes compared with single-modality conservative treatment. Pharmacological interventions effectively reduce pain and inflammation during the early stages of the disease, allowing patients to participate more actively in rehabilitation. Structured physiotherapy, including stretching, joint mobilization, strengthening exercises, and home exercise programs, plays a crucial role in restoring shoulder range of motion, improving functional capacity, and preventing long-term disability.



The findings of this systematic review support a multidisciplinary treatment approach that integrates appropriate pharmacological management with individualized physiotherapy. Such an approach not only improves pain relief and functional recovery but also enhances patient adherence and overall quality of life. Although the current evidence is encouraging, future high-quality studies with standardized treatment protocols and longer follow-up periods are required to further optimize conservative management strategies for adhesive capsulitis.

Overall, combined pharmacological therapy and physiotherapy should be considered an effective first-line conservative treatment option for adults aged 35 years and above with adhesive capsulitis, supporting evidence-based clinical practice and improved patient outcomes.

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