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Effect of mobilization and rotator cuff strengthening in frozen shoulder: A review of literature

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Abstract

The term frozen shoulder refers to a painful and worsening shoulder condition characterized by stiffness and limited range of motion. Adhesive capsulitis, also known as this ailment, is a condition characterized by glenohumeral joint restriction, pain, and limited range of motion. The presence of intracapsular fibrosis complicates this condition by affecting range of motion (ROM), pain, and inflammation. This review evaluated joint mobilization with strengthening exercise interventions for adhesive capsulitis, focusing on ROM, discomfort, and function. The review used peer-reviewed papers, randomized controlled trials, quasi-experimental research, and clinical trials adapted from multiple databases. The movement with mobilization (MWM) approach is a potential intervention that improves outcomes related to frozen shoulder, especially when combined with rotator cuff strengthening interventions. The analysis concludes by highlighting the advantages and efficacy of mobilization in conjunction with rotator cuff strengthening for enhancing muscle strength and the overall results in cases of frozen shoulder. The evidence-based conclusions highlight the promising results of this combination strategy in effectively managing and treating frozen shoulder, addressing the study limitations, and offering suggestions for future research.

Keywords: Frozen shoulder; Rotator cuff strengthening; Mobilization; Strengthening; Adhesive capsulitis

1. Introduction

Codman used the phrase "Frozen shoulder" For the first time in 1934.[1] He spoke of a painful, slowly progressing shoulder ailment that was accompanied by stiffness and trouble sleeping on the afflicted side. [1,2] The symptoms of a frozen shoulder include glenohumeral joint limitation, stiffness, abrupt onset of discomfort, and restricted range of motion. It is a condition with an unclear origin that is also known as adhesive capsulitis (primary or idiopathic frozen shoulder).[3] Secondary frozen shoulder is the term used to describe it when it is linked to tumors or systemic disorders such as rheumatoid arthritis, diabetes mellitus ii type, thyroid conditions, etc.[4] With a high prevalence in the 40–60 age group and an incidence of 20% in those with diabetes mellitus, it is believed to have an incidence of 3% to 5%, especially in females.[5,6] Some of the symptoms associated with rotator interval fibrosis include increased cytokine concentrations, neovascularity, contraction of the anterior and inferior capsule (axillary recess), reduced joint volume, contraction, and fibrosis of the coracohumeral ligament, proliferation of fibroblasts and myofibroblasts, presence of contractile proteins, and uncertainty regarding inflammatory changes.[6-7,8-10] There were no capsule adhesions to the humeral head. In the first phases of the disease, neovascularity can be seen in the rotator interval, superior capsule, posterior capsule, and infra-glenoid recess. Ways of moving passively that aid in a joint's recovery to its normal range of motion. [11,12] Manipulation is defined as a small-amplitude, high-velocity push (grade v) applied close to the limit of the possible range of motion (ROM). [12] The term mobilization refers to a passive movement that is often rhythmic and varies in amplitude (Grade 4) mulligan pioneered the use of MWM for peripheral joints.[13] This method

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simultaneously combines physical (osteo-kinematic) joint mobility, either actively by the patient or passively by the therapist, with the prolonged application of a manual technique called "Gliding" force to a joint. Theoretically, the manual force, or mobilization, is meant to cause positional defects in the bones to realign.[14] MWM aims to relieve painful range-of-motion limitations at the joints by restoring pain-free mobility. This research is done on the interaction between mobilization and rotator cuff strengthening in the context of managing frozen shoulders.[15,16] The ideal mix, timing, and duration of various treatment techniques are still being determined, even if individual studies have demonstrated the potential efficacy of these therapies.[17] Furthermore, the need for individualized and patient-centered therapy is highlighted by the diversity of frozen shoulder presentations and inconsistent responses to treatment.

2. Methodology

The search was performed using Google Scholar, ResearchGate, and PubMed. Articles in any language using MeSH terms, rotator cuff strengthening, conventional physiotherapy, mobilization, and mobilization. Free-full-text articles were obtained from each database. The search time was limited from 2015 to 2023.

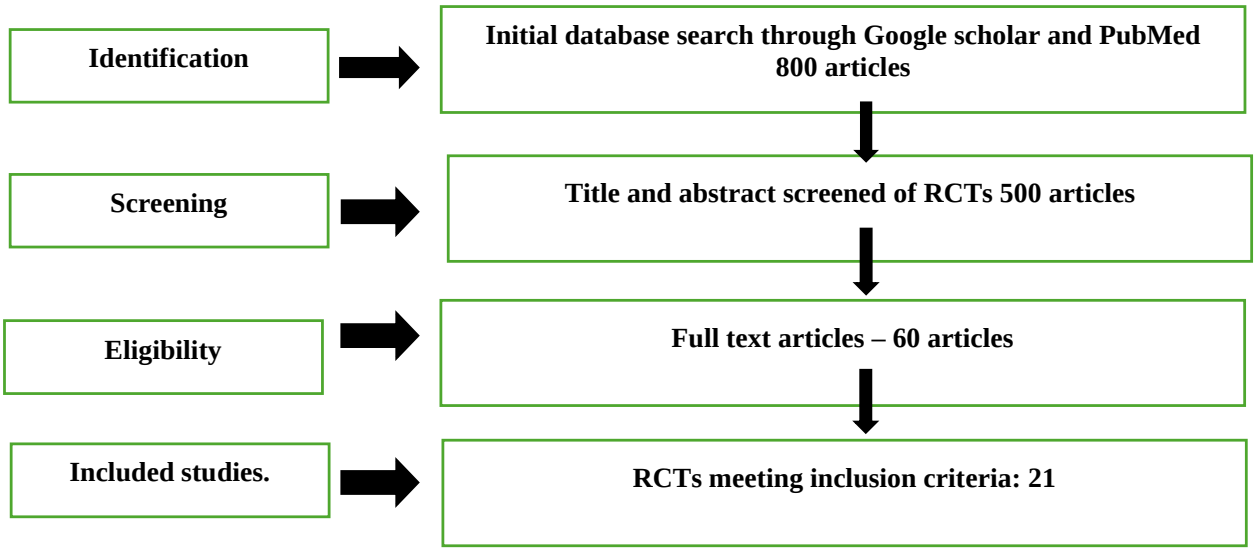

Figure 1 Flow of methodology

3. Result and discussion

21 studies were included in this review, all were randomized controlled trials; thus, these studies had a low risk of performance bias and low detection bias, 1 single-blind study; these studies avoided any potentially biased reactions or responses, and the following details were extracted: type of study, design, number of patients, outcome measure, and intervention used and results ***(Table 1).***

Outcome Measures Pain was assessed using the visual analog scale (VAS) in four studies, Shoulder Pain, and Disability Index (SPADI) in several studies, and ROM mainly for external rotation as the primary outcome measure in most of the studies reviewed in this article.

Table 1 Randomized controlled trials

S.no	Author	Title	Methods	Outcome measures	Conclusions
1.	Rawat p. et.al (2017)	Care in subjects with adhesive capsulitis	A total of 42 subjects were taken. One group (1) got tens and mobilization. One group (2) got tens +mobilization+ rotator cuff strengthening.	Range of motion Pain intensity	Group 2 shows better results. Improve in range of motion. Reduce pain and discomfort
2.	Mertens et. al (2022)	Exercise therapy is effective for improvement in range of motion in frozen shoulder	A total of 42 patients were selected. 23 males and 23 females One group got the exercise-based program. The second group got a non-exercise-based program.	Pain intensity Function and range of motion.	There was little difference in pain and function results. However, adding exercise improves the range of motion and muscle energy.
	Karnawat et. al (2023)	Effect of scapular stabilization and rotator cuff strengthening in frozen shoulder.	86 people with frozen shoulder were selected. Applied interventions are scapular stabilization and rotator cuff strengthening.	Pain reduction Function Range of motion	Improve in range of motion, reduce. Discomfort and pain. Improves function
4.	Kim et.al (2021)	Different types of contraction exercises on shoulder function and muscle strength in patients with adhesive capsulitis.	30 patients were taken with frozen shoulder were taken. Applied intervention of different types of contraction exercises in one group. And others got regular physiotherapy.	Pain reduction Function Range of motion	The group that got different contraction exercises showed improvement in shoulder range of motion, reduced pain, and improved function.
5.	Nakandla et. al (2021)	The efficacy of physiotherapy interventions in the treatment of adhesive capsulitis	Female patients with adhesive capsulitis were selected. Divided into two groups eccentric and concentric. Grading scores according to constant murley score	Pain intensity Muscular strength Range of motion	The group that got eccentric exercises showed better results in muscular strength, less pain, and an increase in range of motion
6.	Nicholson et. al (2018)	The effects of passive joint mobilization on pain and hypomobility associated with adhesive capsulitis of the shoulder	30 patients were affected with frozen shoulder and divided into a and b groups. Selected based on the thickening of the glenohumeral joint. One group got passive mobilization and the other got regular physiotherapy.	Pain management Functional status Range of motion	Group A which got mobilization their pain reduced, functional status improved, and increase in range of motion compared to group B.

7.	Noten et. al (2016)	Efficacy of different types of mobilization techniques in patients with primary adhesive capsulitis of the shoulder.	810 patients were included. 12 groups of people were selected. Some groups got translation (posterior)mobilization and some groups got high-intensity mobilization.	External rotation Range of motion	The groups that got translation mobilization showed complete restoration of external rotation and the group that got high-intensity mobilization did not show much effectiveness.
8.	Sathe et.al (2020)	To compare the effects of Maitland mobilization with conventional physiotherapy in adhesive capsulitis	30 patients are selected for this research. Divided into 2 groups. One group got conventional physiotherapy. Other groups got mobilization	SPADI score Range of motion Pain intensity	The group that got only conventional physiotherapy showed not much more improvement than the group that got conventional physiotherapy with mobilizations
9.	Lin et.al (2018)	Reliability of stiffness measured in glenohumeral joint its application to assess the effect of end range mobilization	6 patients with frozen shoulder were taken. 15 healthy volunteers for taken to compare the following parameters after the treatment. Stiffness Rom Pain intensity	Range of motion Pain intensity Stiffness	When the mobilization is applied to patients. It shows almost similar functions to healthy patients
10.	Agarwal et.al (2016)	Effects of two different mobilization techniques on pain, range of motion, and functional disability in patients with adhesive capsulitis	43 patients were selected with frozen shoulder. Interventions reverse distraction and Kaldenberg's End-range caudal and posterior glides with lateral distraction. Duration 6 weeks (18 sessions)	Range of motion Pain intensity (VAS) scale	The result shows for individuals with adhesive capsulitis, the reverse distraction technique is a different and useful mobilization treatment that improves pain, range of motion, and functional scores.
11.	Gopinath et. al (2018)	Effect of gong's mobilizations versus muscle energy technique on pain and function ability of shoulder in phase 2 adhesive capsulitis	Compare between gongs mobilization and muscle energy methods in phase 2 frozen shoulder patients	Pain intensity Muscle function Range of motion	Gong's mobilization shows better results than muscle energy methods.
12.	S.h.a.q. et.al (2021)	Effects of end-range mobilization technique on pain and disability in patients with adhesive capsulitis	40 patients were selected. (age 40-70) Duration 30 min session twice a week (for 4 weeks) Effects of end-range Mobilization Technique on Pain and Disability in patients with Adhesive Capsulitis	Pain intensity Range of motion Shoulder impairment	End end-range mobilization technique shows a reduction in shoulder pain and impairment

13.	Neamah et. al(2022)	Effect of Maitland mobilization techniques with and without Kinesio taping in patients with shoulder sub-acute with adhesive capsulitis	26 samples were taken. 13 males and 13 females with adhesive capsulitis Intervention in both groups (Maitland mobilizations) Duration 10 sessions	VAS scale, pain intensity, Range of motion	All patients who got Maitland mobilization show a reduction in pain, VAS scale, and improved range of motion
14.	Biradi et.al (2020)	Effects of anterior versus posterior end range mobilizations on shoulder rotations range of motion in adhesive capsulitis stage 2	56 patients with adhesive capsulitis (stage2) Age 40 -60 Intervention mobilization	Range of motion	As a result, while recovering rotations from adhesive capsulitis stage II of the shoulder, posterior end range mobilization may be preferable over anterior end range mobilization.
15.	Yeole et. al (2017)	End-range mobilization techniques in adhesive capsulitis of the shoulder joint	7 patients with frozen shoulder are selected. Age between 45-65 Intervention end-range mobilization technique	Joint capsule capacity. Range of motion	Patients are treated with end-range mobilization techniques. Increased joint capsule capacity and improved range of motion were observed
16.	Youssef et.al (2015)	Mulligan mobilization is more effective in treating diabetic frozen shoulder than the Maitland technique	30 patients are selected with frozen shoulder. One group got mulligan mobilization with movement. One group got Maitland end-range mobilization. Duration 3 times/week(6 weeks)	Pain intensity SPADI score Range of motion	The result Mulligan mobilization intervention shows good results in frozen shoulder diabetic patients.
17.	Zhang et.al (2019)	Management of concomitant preoperative rotator cuff pathology and adhesive capsulitis	662 shoulders with a mean age of 59.6 years Interventions passive instances, capsular release Manipulation under anesthesia	Pain intensity Range of motion	Reduction in pain intensity Increase in range of motion. Increase muscle function
18.	Jeony et.al (2020)	Effect of preoperative frozen shoulder on clinical outcomes after arthroscopic rotator cuff repair	A total of 696 patients are selected. Intervention passive range of motion and adduction braces	Pain intensity Muscle recovery Range of motion	Combination surgery and frozen shoulder may yield improved function and reduce and restore range of motion.
19.	Cho ch et.al (2019)	Treatment strategy for frozen shoulder	Comparison between NSAIDS in the treatment of frozen shoulder. Patients are selected randomly with frozen shoulder. Interventions applied. NSAIDS and regular physiotherapy (conventional)	Pain intensity (VAS scale) Range of motion	The result is found that regular NSAIDS are effective for pain only take too much time to heal and have very little impact on the range of motion of frozen shoulder, but physiotherapy has a very good effect on frozen shoulder range of motion and pain intensity

			Duration 6 weeks		
20.	Wada et.al (2020)	Rotator cuff tendons in frozen shoulder on shear wave elastography	Some patients are selected with frozen shoulder. Duration (4 weeks daily) Applied intervention. Mobilization, rotator cuff strengthening, ROM exercises	Range of motion Muscle strength	After 4 weeks of applying this intervention, the result is an increase in range of motion and an increase in muscle strength
21.	Celik et.al (2016)	Does adding mobilization to stretching improve outcomes for people with frozen shoulder	Two groups are selected with frozen shoulder. One group got stretching exercises and mobilization. One group got only stretching exercise. Duration (6 weeks) 18 sessions	Range of motion Functional score	In terms of external rotation, abduction range of motion, and function score, joint. Mobilization in conjunction with stretching exercises is more effective than stretching exercises alone in treating patients with frozen shoulders. Also reduced pain intensity

4. Conclusion

With reference to the literature search mentioned above, the combination of mobilization and rotator cuff strengthening interventions has a positive impact on frozen shoulder. It can increase range of motion and reduce pain by increasing muscle strength. This study concluded that mobilization with rotator cuff strengthening is effective and beneficial for improving muscle strength and overall functionality in frozen shoulder cases. Positive outcomes require mobilization techniques to lengthen the restricted soft tissues and return the normal flexibility of the shoulder capsule. Physiology of behind these effects are Debris removal and scar tissue disintegration, soft tissue elongation and stretching, pain management, return of normal joint mechanics, and promotion of tissue remodeling and healing are all components of mobilization treatments for frozen shoulder. These therapies encourage appropriate shoulder joint alignment and mobility, which should enhance shoulder function and range of motion. Based on each patient's unique symptoms and disease stage, different strategies for mobilization and range-of-motion exercises may be adopted. These therapies aim to enhance shoulder function and mobility by addressing underlying tissue abnormalities, increasing tissue flexibility, easing discomfort, and reestablishing normal joint mechanics.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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