PJPT PAKISTAN JOURNAL OF PHYSICAL THERAPY
ISSN NO: 2663-0796 (Print) | ISSN NO: 2663-080X (Online)

Original Article

COMPARISON OF SHOULDER BLADE MOBILIZATION COMBINED WITH GLENOHUMERAL JOINT MOBILIZATION VERSUS GLENOHUMERAL JOINT MOBILIZATION ALONE ON PAIN, DISABILITY AND QUALITY OF LIFE IN PATIENTS WITH FROZEN SHOULDER

Areeba Manzoor[1]*, Hira Faisal[2], Muhammad Younas[1]

[1]Department of Epidemiology and Evidence-based Medicine, I.M. Sechenov First Moscow State Medical University, Moscow, Russia
[2]College of Physical Therapy, Government College University Faisalabad, Faisalabad, Pakistan

ABSTRACT

The onset of shoulder pain without a known etiology identifies an idiopathic condition known as frozen shoulder. It is a long-term condition characterized by pain, muscle weakness, and limited scope for movement. **Objectives:** The purpose of this study was to look at the impact of mobilization of the scapula together with glenohumeral mobilization as compared to glenohumeral mobilization only on shoulder pain, shoulder-related disability, and overall quality of life in individuals with the condition of adhesive capsulitis. **Methods:** In this quasi-experimental study, we purposively sampled frozen shoulder patients from the physiotherapy department of public hospitals in Faisalabad, adhering to the inclusion and exclusion parameters. Thirty individuals with this condition were separated into two distinct groups. For four weeks, one group received both scapula and glenohumeral joint mobilization, while group 2 only received glenohumeral mobilization. **Results:** Both groups showed improvement, with statistically significant findings ($p<0.01$). The study compared the effects of two interventions: shoulder blade and glenohumeral joint mobilization in group 1 and glenohumeral joint mobilization alone in group 2. Group 1 patients showed statistically significant results ($p\leq 0.05$), indicating that group 1 intervention was more successful than group 2 treatment. **Conclusion:** Both techniques showed improvement in pain, discomfort and overall health-related quality of life in patients with adhesive capsulitis. However, shoulder blade mobilization in conjunction with glenohumeral joint mobilization proved more efficient.

Keywords: Adhesive capsulitis, Frozen shoulder, Glenoid mobilization, NPRS, Pain, Quality of life, Scapular mobilization, SPADI

INTRODUCTION

An idiopathic condition known as frozen shoulder is defined as the onset of shoulder pain without a known etiology. It is a disorder that causes pain, muscle weakness, and constrained movement for a number of years or months[1]. In 1934, Codman was the first to use the term "frozen shoulder." He described a frozen shoulder as a painful condition that gradually worsens, leading to stiffness and difficulties. Sleeping on the affected side is difficult. In addition, Codman noticed a significant decrease in forwarding. The most significant aspects are elevation and external rotation[2]. The initial stage typically lasts between 3 and 6 months, followed by the second stage, which lasts 3 to 18 months, and then the final stage, a total of 3 to 6 months. Doctors recognize adhesive capsulitis as a gradual, aggravating decrease in both active and passive shoulder mobility. It primarily affects women in their forties and fifties, and it frequently manifests bilaterally. Mechanical stress, neuroinnervation, neovascularization, and several chemical mediators may all play a part in the underlying pathophysiology[3].

The exact origin of adhesive capsulitis is unknown; however, research has suggested that inflammatory cytokines, a hereditary predisposition to fibrosis, and the hormonal effects of estrogen and thyroid-stimulating hormones play an impact. Researchers

***Corresponding Author:** Areeba Manzoor, **Email:** areebamanzoor14@gmail.com
Received: February 10, 2024 | **Revised:** April 04, 2024 | **Accepted:** June 16, 2024

estimate that between two and five percent of the population suffers from adhesive capsulitis, primarily in middle-aged women, affecting the non-dominant arm. Diabetes, thyroid disease, and a familial predisposition, such as Dupuytren's disease, are also indicators of risk[4].

Primary adhesive capsulitis is characterized by a progressive onset of soreness and stiffness at the glenohumeral joint with no identifiable cause. Researchers have identified multiple risk factors for subsequent adhesive capsulitis. Several investigations classified these secondary factors as systemic, intrinsic, or extrinsic components according to their nature. Diabetes, thyroid problems, and low adrenaline levels are examples of systemic factors. Intrinsic factors include problems with tendons and ligaments, biceps tendinitis, calcific tendon inflammation, and acromioclavicular joint arthritis. Extrinsic factors include heart and lung diseases, cervical disc disease, ischemic stroke, Parkinson's disease, and humeral fractures[5].

The sequence of occurrences in frozen shoulder includes: the supraspinatus degenerates erratically and extensively, causing regional necrosis, and the tendon responds with inflammation, similar to foreign material; the inflammatory response is uncomfortable, affects the bursa, and impairs supraspinatus function; the limb is in a sling due to ongoing injury from the acromion process; and the caraco-clavicular ligament. Local inflammation and lack of usage can cause the capsule and cuff to become inelastic, leading to a reduction of mobility in every direction from the sling position. If necrotic portions of the tendon are taken up and revascularized, a response of inflammation is no longer activated, and a painless, stiff shoulder appears, gradually restoring mobility[6].

Exercises for strengthening and stretching, proprioceptive neuromuscular facilitation (PNF), and mobilizations can all help reduce pain and improve glenohumeral joint range of motion while treating adhesive capsulitis. Electrotherapy techniques such as ultrasound (US), interferential therapy, transcutaneous electrical nerve stimulation (TENS), short-wave diathermy, and LASER are also used to restore function by reducing inflammation and discomfort, allowing normal shoulder mechanics to resume. Scapular-mobility exercises such as shoulder blade mobilizations are routinely used to treat musculoskeletal problems. A therapist manually applies continuous mobilization (in anterior and posterior directions) to the shoulder joints[7]. The study was significant because there is little literature comparing the effectiveness of shoulder blade mobilization paired with glenohumeral joint mobilization versus glenohumeral joint mobilization solely to reduce discomfort and improve overall quality of life in frozen shoulder individuals.

MATERIALS AND METHODS

A quasi-experimental study was conducted to compare the impact of shoulder blade mobilization in conjunction with glenohumeral joint mobilization versus glenohumeral joint mobilization solely in frozen shoulder patients. Thirty patients between the ages of 40 and 60 were selected using criteria for inclusion and exclusion from various physiotherapy departments of public hospitals in Faisalabad and divided into two groups of 15 individuals[8]. The study's purpose was clarified to all individuals, and they provided consent in writing and demographic information before participating.

Participants in this study were chosen based on their age (40 years to 60 years), gender, shoulder pain, limited degree of movement in the shoulder during flexion, abduction, and outward rotation movements, and difficulty performing activities of daily living (ADLs). Participants were eliminated based on invasive stabilization of the shoulder, additional medical conditions involving rotator cuff tear, tendon inflammation, shoulder and neck area malignancies, trauma history or injuries of the upper limb during road accidents, past stroke, past surgical history of breast cancer and bypass grafting for coronary artery disease (CABG), individuals with disorders in the cervical region (spine, elbow, wrist, or hand), autoimmune arthritis, and weak bones[2].

One group (n = 15) got shoulder blade mobilization along with glenohumeral mobilization for four weeks. This included moving the shoulder anteriorly and posteriorly, rotating it up and down, and sliding it forward and backward. Each movement lasted five to ten seconds, and there were ten repetitions of this pattern. The other group (n = 15) received only glenohumeral joint mobilization, which consisted of anterior, posterior, and lateral slides, performed for five to ten seconds per repetition over a period of four weeks[9].

Every group received these interventions three times in a single week. Pain, disabilities, and health-related quality of life were assessed before

and after the four-week intervention. Pain intensity was measured using the Numeric Pain Rating Scale (NPRS). The shoulder-related Pain and Disability Index (SPADI) was used to assess shoulder pain and shoulder-related discomfort in both groups before and after mobilization treatment therapy. Health-related quality of life was measured using the health questionnaire (EQ-5D)[10]. The patients' scores on these scales were analyzed to determine the efficacy of given interventions.

Statistical analysis

Data analysis is done using the SPSS 16.00 version. The subjects, comprising 14 men and 16 women, ranged in age from 40 to 60. The severity of pain (NPRS), shoulder-related pain and disability index (SPADI), and overall quality of life were all measured separately in the two groups before and after mobilization therapy. Wilcoxon's sign rank test has been employed for intragroup analysis of data that is distributed non-normally, and the Mann-Whitney U test has been employed to compare the effectiveness of both groups.

RESULTS

Table 1 displays the study's demographic data. The table displays the demographics of both males and females aged 40-60 years, with a primary focus on males with side frozen shoulders and a pain duration of 4-12 months.

Table 1. Demographic Data

Variables	Categories	Frequency (%)	Categories	Frequency (%)
Age	40-50 years	53.3	51-60 years	46.7
Gender	Male	46.7	Female	53.3
Affected side	Left shoulder	60	Right shoulder	40
Pain Duration	4-6 months	43.3	10-12 months	13.3
	7-9 months	43.3		

The majority of participants were between the ages of 40 and 50. 14 (46.7%) people were male, while 16 (53.3%) were female. There were 18 participants (60%) with a frozen shoulder on the left side and 12 (40%) on the right. The frequency of duration time of all participants with frozen shoulders for which they were feeling painful symptoms in their shoulder was 43.3% for 4-6 months and 7-9 months and 13.3% for 10-12 months of the period, as shown in Figure 1.

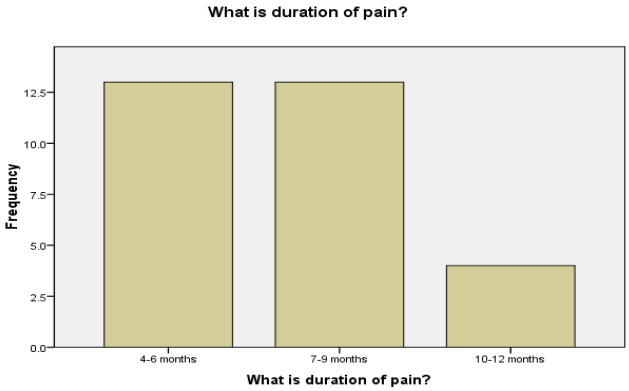

Figure 1. Duration of Pain of all participants

Table 2 shows a Wilcoxon signed rank test in which, after treatment, the NPRS, total SPADI, and total health scores were significantly higher than before treatment ($p<0.01$, Z-values of -3.508, -3.690, and -3.690, respectively).

Table 2. Wilcoxon's signed rank test for group A

Variables		Mean ranks	Sum of ranks	p value
NPRS; before-after	Negative Ranks	8.00	120.00	>0.01
	Positive Ranks	0.00	0.00	
SPADI; before-after	Negative Ranks	8.00	120.00	<0.01
	Positive Ranks	0.00	0.00	
Total health score; before-after	Positive Ranks	8.00	120.00	<0.01
	Negative Ranks	0.00	0.00	

Table 3 shows the Wilcoxon signed rank test in which the treatment resulted in significantly higher NPRS, total SPADI, and total health scores ($p<0.01$, Z = -3.448, -3.520, and -3.358, respectively).

Table 3. Wilcoxon's signed rank test for group B

Variables		Mean ranks	Sum of ranks	p value
NPRS; before-after	Negative Ranks	7.50	105.00	>0.01
	Positive Ranks	0.00	0.00	
SPADI; before-after	Negative Ranks	8.00	120.00	<0.01
	Positive Ranks	0.00	0.00	
Total health score; before-after	Positive Ranks	7.00	91.00	<0.01
	Negative Ranks	0.00	0.00	

Mann-Whitney Test, in Table 4, revealed that the significance values were statistically significant in Group 1 patients for all types of assessment methods with p = 0.05, 0.01, 0.05 for NPRS, total SPADI and total health score, respectively, so according to the rule, if the significance value is less than or equal to 0.05, the null hypothesis is rejected and the alternate hypothesis is accepted.

Table 4. Mann-Whitney U test for both groups

Variables	Treatment groups	Mean rank	Sum of ranks	p value
NPRS	Scapular and Glenohumeral mobilization	18.00	270.00	0.05
	Glenohumeral mobilization alone	13.00	195.00	
SPADI	Scapular and Glenohumeral mobilization	19.00	285.00	0.01
	Glenohumeral mobilization alone	12.00	180.00	
Health Score	Scapular and Glenohumeral mobilization	18.00	270.00	0.05
	Glenohumeral mobilization alone	13.00	195.00	

DISCUSSION

Our study aimed to compare the effectiveness of shoulder blade mobilization paired with glenohumeral joint mobilization versus glenohumeral joint mobilization solely on pain, shoulder-related disability, and overall quality of life within frozen shoulder individuals. The study found that both treatments worked in improving pain, disability, and quality of life, but scapular mobilization paired with glenohumeral mobilization outperformed glenohumeral mobilization independently. Combining scapular and glenohumeral mobilization resulted in significant improvements in pain, discomfort, and overall quality of life ($p<0.01$).

This study's results aligned with those of a previous study conducted by Magdy *et al*. (2021)[9]. They compared the effects of end-range mobilization and shoulder blade mobilization versus passive stretching exercises on pain, shoulder-related disability and range of motion in frozen shoulder. The results showed that, although both groups experienced significant improvements, the combination of end-range mobilization and scapular mobilization significantly outperformed passive stretching exercises in terms of improving shoulder pain extent, functional impairment, and range of motion.

Anitha *et al*. (2020) investigated the effects of end-range glenohumeral mobilization and conventional therapy on patients with frozen shoulder[11]. The study, a randomized experimental trial, selected a sample of 30 patients with frozen shoulder. This study included both males and females aged between 35 and 50 years. In this randomized study, 15 patients were assigned to the control group receiving conventional therapy and 15 patients were assigned to the experimental group that received conventional therapy along with end-range mobilization of the shoulder joint. The results revealed that adding end range mobilization technique to standard physical therapy significantly reduced pain, improved joint range, and enhanced functional ability in subjects with frozen shoulder.

Srivastava *et al*. (2017) compared the effectiveness of mobilization with movement and end-range mobilization along with conventional therapy for the treatment of the frozen shoulder[12]. They conducted the evaluation both prior to the treatment's initiation and four months later. They evaluated the outcome scores using both SPADI and ROM. The study's findings suggest that the end-range mobilization

group improved SPADI scores and range of motion. The study found that both the treatment that is mobilization with movement and end-range movement are effective in the management of frozen shoulder but movement with mobilization is found to be slightly more effective[12].

Lemoine *et al*. (2020) examine the pain and range of motion of the glenohumeral joint in people with adhesive capsulitis who receive intra-articular corticosteroid injections, as well as glenohumeral joint mobilization[13]. The study concluded that administering a single intra-articular corticosteroid injection during the early stage of frozen shoulder, along with a joint mobilization program, effectively improves shoulder pain and disability in patients with frozen shoulder. In conjunction with corticosteroid treatment, supervised physiotherapy improves shoulder range of motion more quickly. Joint mobilization, when used alone, offers limited efficacy in the management of adhesive capsulitis due to weak clinical evidence.

Pragassame *et al*. (2019) see the effectiveness of scapular mobilization in the management of patients with adhesive capsulitis[14]. This study selected a sample of 30 subjects with frozen shoulders. The participants were then randomly allocated into two groups. Group A received wax therapy, capsular stretching, scapular mobilization, and home exercise, while Group B also received wax therapy, capsular stretching, and a home exercise program. For two weeks, the two groups received therapy five days a week. The results of this study revealed that both treatment approaches were effective in reducing pain, improving range of motion, and improving functional disability in patients with adhesive capsulitis. However, the patients who received scapular mobilization showed significantly higher improvement than the other group.

However, some previous studies have shown that glenohumeral mobilization is also effective in improving pain, disability, and range of motion in frozen shoulders. Syed *et al.* (2021) performed a quasi-experimental study in 2021 on 40 patients with frozen shoulder[15]. The aim of this study was to see the effect of end-range glenohumeral mobilization on patients with frozen shoulders. The result of this study suggested that the end-range glenohumeral mobilization was effective in reducing pain and disability in subjects with frozen shoulder. For people with frozen shoulders, Espinoza *et al*. (2015) did a randomized clinical study to see how glenohumeral joint posterior mobilization and traditional physical therapy worked in the short term to improve their range of exterior rotation[16]. The purpose of this study was to assess the degree of motion in rotation around the body, pain, and improvement in function. After comparing glenohumeral posterior mobilization to traditional physiotherapy, it was found to be an effective and quick way to treat adhesive capsulitis, lessen pain, and improve joint function.

Islam *et al.* (2015) conducted an RCT to evaluate the effectiveness of end-range mobilization (ERM) with conventional physiotherapy compared to conventional physiotherapy for adhesive capsulitis of the shoulder[17]. To find out how much pain people with adhesive capsulitis felt at rest, when they were lying on the affected side, abducted, rotated laterally, or medially, and when they moved their joints in these ways before and after end range mobilization with conventional physiotherapy and conventional physiotherapy alone, the study looked at these things. After analysis, the study found that the experimental group showed a significant improvement in the cases of resting pain, pain at abduction, pain at lateral rotation, pain at medial rotation, and pain during lying. The study also found significant improvements in ROM in abduction and medial rotation. A small but not statistically significant improvement has been found in the shoulder's lateral rotation. This research showed that end-range mobilization with conventional physiotherapy was more effective than conventional physiotherapy alone for patients with adhesive capsulitis.

Çelik *et al.* (2016) conducted a randomized clinical trial to assess the effectiveness of joint mobilization combined with stretching exercises in patients with frozen shoulder. The researchers randomly assigned thirty patients with adhesive capsulitis into two groups[18]. One group received joint mobilization and stretching exercises. Only stretching exercises were administered to the other group. Both before and after treatment, we assessed the patients. The subjects who received joint mobilization along with stretching exercises demonstrated more improvements compared to the group that only received stretching exercises. So, it was concluded that joint mobilization combined with stretching exercises is better than stretching exercise alone in terms of external rotation, abduction range of motion and function score. Panchal and Eapen *et al.* (2015) compared the effect of end-range mobilization (ERM) and interferential current therapy (IFT) with moist heat and stretching on pain, range of

motions, and disability of the shoulder in the acute stage of frozen shoulder[19]. It included 43 subjects in the acute stage of frozen shoulder with a SPADI score > 30. Group 1 (n = 22) received treatment including moist heat application and shoulder stretching exercises, whereas group 2 (n = 21) received end-range mobilization with interferential current therapy. The results showed that end-range mobilization can significantly improve range of motion in the acute stage of frozen shoulder. Both the treatment strategies can be equally useful for pain management.

The between-group analysis of both groups in our study, i.e., scapular mobilization paired with glenohumeral mobilization and glenohumeral mobilization alone, showed significant improvement. Still, the mean value of scapular mobilization paired with the glenohumeral mobilization group showed more significant improvement in pain, disability and quality of life than the glenohumeral mobilization group. Group 1 showed improvement with a significance value of <0.01, and Group 2 also showed improvement with a significance value of <0.01 for NPRS, SPADI and health score. These results showed that both interventions were effective in improving pain, shoulder-related disability/ discomfort and health-related quality of life in frozen shoulder patients. Finally, when the Mann-Whitney test was conducted to determine which intervention was more effective, the significance value was 0.05, indicating that Group 1 intervention was more effective than Group 2.

CONCLUSION

It was concluded that both techniques improved shoulder pain, shoulder-related disability, as well as overall health-related quality of life in individuals with the ailment of adhesive capsulitis, but shoulder blade mobilization paired with glenohumeral joint mobilization proved more efficient.

DECLARATION

Conflicts of Interest: The author declared no conflict of interest.

Funding support: No funding support was involved

REFERENCES:

1. Kershaw Z, Moran A, Cavallario J. The effectiveness of scapular mobilization combined with end range glenohumeral mobilization as compared to glenohumeral mobilization alone in the treatment of adhesive capsulitis: A critically appraised topic. International Journal of Athletic Therapy and Training. 2017;23(2):62-5.

2. Sreenivasu K, Paul Daniel VK, Subramanian MB, Sajeevan T. Effectiveness of end range mobilization with scapular mobilization in frozen shoulder. International Archives of Integrated Medicine. 2016;3(8):53-8.

3. Yeole UL, et al. Effectiveness of movement with mobilization in adhesive capsulitis of the shoulder: a randomized controlled trial. Indian Journal of Medical Research Pharmaceutical Sciences. 2017;4(2):1-8.

4. Cogan CJ, Cevallos N, Freshman RD, Lansdown D, Feeley BT, Zhang AL. Evaluating utilisation trends in adhesive capsulitis of the shoulder: a retrospective cohort analysis of an extensive database. Orthopaedic Journal of Sports Medicine. 2022;10(1):1-8.

5. Nakandala P, et al. The efficacy of physiotherapy interventions in the treatment of adhesive capsulitis: a systematic review. Journal of Back and Musculoskeletal Rehabilitation. 2021;34(2):195-205.

6. Simmonds FA. Shoulder pain with particular reference to the "frozen" shoulder. Journal of Bone and Joint Surgery British Volume. 1949;31(3):426-432.

7. Sinha U. Effectiveness of scapular mobilization versus myofascial release of subscapularis on pain, range of motion, and function in subjects with chronic frozen shoulder: a comparative study. Mechanics. 2019;5:11.

8. Satapathy A, Mnbsp S. A study to compare the effectiveness of capsular stretching versus scapulothoracic exercise in patients with adhesive capsulitis of shoulder. RGUHS Journal of Physiotherapy. 2021;1(2):1-7.

9. Kaddah M, Mohamed A. End-range and scapular mobilization technique versus passive stretching exercises in treatment of shoulder adhesive capsulitis. Medical Journal of Cairo University. 2021;89:91-98.

10. Neilson AR, Craig D, Richardson G, Chuang L-H, McDaid C. Estimating EQ-5D Weights from other Trial Outcome Measures for Use in Cost-Effectiveness Studies: An Example in Patients with Frozen Shoulder. Shoulder & Elbow. 2013;5(2):136-143.

11. Anitha A, Sridevi J, Anusuya S, Avinash VN. Effectiveness of End Range Mobilization along with conventional therapy in patients with Periarthritis Shoulder. Research Journal of Pharmacy and Technology. 2020;13(3):1271-6.

12. Srivastava N, Joshi S. Comparison between the effectiveness of mobilization with movement and end range mobilization along with conventional therapy for management of frozen shoulder. Indian Journal of Physiotherapy and Occupational Therapy. 2017;11(4):1-6.

13. Lemoine J. The effects of glenohumeral joint mobilization interventions vs. intra-articular corticosteroid injections in adult patients with early stage adhesive capsulitis: a meta-analysis [thesis]. California State University, Fresno; 2020.

14. Pragassame SA, Kurup VM, Kifayathunnisa A. Effectiveness of Scapular Mobilisation in the Management of Patients with Frozen Shoulder-A Randomised Control Trial. Journal of Clinical and Diagnostic Research. 2019;13(8):1-9.

15. Syed S. Effects of end-range mobilization technique on pain and disability in patients with adhesive capsulitis: a quasi-experimental study. Pakistan Journal of Rehabilitation. 2021;10(1):42-50.

16. Espinoza HJ, Pavez F, Guajardo C, Acosta M. Glenohumeral posterior mobilization versus conventional physiotherapy for primary adhesive capsulitis: a randomized clinical trial. Medwave. 2015;15(8):1-0.

17. Islam A-Z. Effectiveness of end range mobilization (ERM) in patients with adhesive capsulitis of shoulder joint [dissertation]. Bangladesh Health Professions Institute, Faculty of Medicine, the University; 2015.

18. Çelik D, Kaya Mutlu E. Does adding mobilization to stretching improve outcomes for people with frozen shoulders? A randomised controlled clinical trial. Clinical Rehabilitation. 2016;30(8):786-94.

19. Panchal, D. N. and C. Eapen. Effectiveness of end-range mobilization and interferential current or stretching exercise and moist heat in treatment of frozen shoulder-a randomized clinical trial. International Journal of Current Research and Review. 2015;7(14): 21-26.