

Comparative Effect of Maitland Glenohumeral Mobilization and Mulligan Glenohumeral Mobilization in Combination With Scapular Mobilization in Patients with Frozen Shoulder

Effect of
Different
Techniques of
Mobilization in
Frozen Shoulder

Adeera Azam¹, Esha Dilawar², Ammarah Ikram², Aabroo Zafar², Nowal Nasir² and Nazia Sarfraz¹

ABSTRACT

Objective: The current study is aimed to investigate the comparison of the effect of Maitland glenohumeral mobilization and Mulligan glenohumeral mobilization in combination with scapular mobilization in frozen shoulder patients.

Study Design: Randomized clinical trial study

Place and Duration of Study: This study was conducted at the University of Faisalabad from Feb 2023-Jun 2023.

Methods: The study is conducted on idiopathic or primary adhesive capsulitis, aged between 35 to 55 years on 39 female patients. A convenient sampling technique is used. This is a randomized clinical trial. Randomization is performed by lottery method. Patients are divided into two groups, Group A received Mulligan technique with scapular mobilization and Group B received Maitland Technique with scapular mobilization.

Results: The pain and disability score analysis shows significant statistical results in Group A subjects in comparison to Group B. The mean of abduction range, external rotation, internal rotation, and flexion showed significant results ($p < 0.05$) in Group A as compared to (Maitland group) group B. The mean score of SPADI reduced to 31.6842 ± 6.89648 in Group A (Mulligan mobilization with scapular mobilization), whereas in Group B (Maitland mobilization with scapular mobilization) the mean has improved to 39.6500 ± 2.23077 . The range of motion score analysis for intergroup comparison showed the strength significantly improved in Group A subjects in comparison to Group B subjects.

Conclusion: Results of this study demonstrate that the Mulligan method with scapular mobilization is an effective treatment approach compared to the Maitland method with scapular mobilization in managing a frozen shoulder.

Key Words: Frozen shoulder, Mulligan mobilization, Maitland mobilization, scapular mobilization, Shoulder joint.

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INTRODUCTION

Frozen shoulder (FS) is defined as a painful and limited musculoskeletal disease with passive and active range of glenohumeral joint movement limitation, mostly external rotation and abduction of shoulder joint removal⁽¹⁾.

¹. The University of Faisalabad.

². Clinical Physiotherapist, Allied hospital, Faisalabad.

³. Superior University Faisalabad.

Correspondence: Adeera Azam, Lecturer, The University of Faisalabad.

Contact No: 03354802922

Email: adeera.azam@tuf.edu.pk

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Frozen shoulder is a musculoskeletal disorder where the capsule of the connective tissue becomes steep and stiff, inflamed and shortened.

Frozen shoulder is a prevalent shoulder disorder that is treated by a variety of medical professionals including orthopedic surgeons, rheumatologists, and physiatrists. However, it is also one of the most misunderstood conditions of the shoulder. A 1966-2008 National Library of Medicine Citations Medline search indicates 3,586 references when using the search term frozen shoulder. Codman was the first who introduce and use the term, "Frozen shoulder." It is one of the few conditions that affect the connective tissue forming the capsule of the glenohumeral joint of the shoulder⁽²⁾.

Usually self-limiting, adhesive capsulitis. Many recent investigations have shown that adhesive capsulitis can cause long-term function and disability⁽²⁾. Shoulder discomfort and stiffness early on are unusual symptoms. Movement, especially abduction and

external or internal rotation, causes scapulohumeral joint discomfort⁽³⁾.

Moving the scapula and humerus interrupts rhythm. Diseases can disturb scapulohumeral rhythm and produce dysfunction⁽⁴⁾.

Physiotherapy is used in most frozen shoulder treatments. Exercise, massage, electrotherapy, and manual therapy are common therapies. Clinical shoulder mobilisation uses Kaltenborn, Maitland, and Mulligan manual therapy⁽¹⁾ Angular and translational mobilisations increase ROM. After introducing Maitland, the International Maitland Teachers Association developed manipulation techniques for neuromuscular analysis and treatment⁽⁴⁾.

Mulligan Mobilization with Motion (MWM) is a set of manual therapy techniques that are use in musculoskeletal pain treatment. It involves manually applying a sustained glide to the joint by a therapist while actively performing a concurrent joint movement by the patient⁽⁵⁾.

Because the scapulo-thoracic (ST) joint is made up of muscles, not similar to synovial joints, inferior shoulder tightness in Adhesive capsulitis may affect shoulder flexion and abduction. Scapular mobilization (SM) can release tightened muscles by breaking the adhesions, which may result in improved scapular movement. Improved shoulder movement may also be associated with increased scapular movements.

The current study aimed to provide a proper treatment plan starting from baseline treatment to selected treatment techniques. It also provided recommendations for other therapists to use these combinations of techniques rather than one technique and provide beneficial effects for patients.

METHODS

A randomized clinical trial was performed using a non-probability convenient sampling technique. The total sample of this study was 40, randomly divided into two groups, 20 patients in each group. One patient was dropped out after 6 sessions. So, the sample size was confined to 39 with the help of the following formula

$$n = 2SD^2(Z_{\alpha/2} + Z_{\beta})^2 / d^2$$

*S.D= Standard Deviation, d= effect size= difference between the mean values,

$$Z_{\alpha/2} = Z$$

$Z_{0.05/2} = 1.96$ (from Z table), $Z_{\beta} = Z_{0.20} = 0.842$ (from Z table) at 80% power.

Patient data collected from Nusrat Abdul Rauf Centre for Enablement and Prime Care Hospital. After research approval committee overview approval, this study was finished four months later. Participants were 35–55-year-old women with limited passive range of motion (PROM) with a 50% reduction in shoulder movements (flexion, external rotation, internal rotation, and abduction), shoulder pain (3-7 on NPRS), pain persisted

for 4-8 months, capsular restriction of ROMs, and frozen shoulder stage II.

Different metrics were used. I assess pain, II disable. Two-way SPADI. A 0-10 pain scale works. 10.5 10-point pain scale questions. It hurts 50. 8 disability 10-point questions. Questions 0-10 discussed difficult everyday duties. Zero means “no difficulty” and 10 meant “so difficult it requires help”. Each incorrect answer lowers SPADI's 130 score by 10. Patients can get 72 function points. Ultimate function score = $72/130 = 0.55 \times 100 = 55$. We assessed pre-treatment, 6th, and 12th session universal goniometer shoulder ER, ABD, and IR.

Both groups received physical therapy for 4 weeks with 6 sessions/ week⁽¹⁰⁾.

Group A received 5 minutes of ultrasound before exercise and 15 minutes of burst TENS after exercise⁽⁶⁾. Exercise stretching 2 sets of 3 reps, 10 sec stretch. Mulligan glenohumeral mobilisation: postero-lateral, inferior glide, lateral distraction. 3 x 5 reps. Rotations, superior and inferior gliding, and scapular distraction. Two sets of three repetitions with 10-second rests. Group B received 5 minutes of ultrasonography before exercise and 15 minutes of burst TENS after exercise. Two 3-rep sets of 10-second stretches. Maitland posterior, anterior, and inferior glide glenohumeral mobilisation. (3) sets (3) repetitions (10). Rotations, superior and inferior gliding, and scapular distraction. Two sets of three repetitions with 10-second rests⁽⁶⁾.

Patients were randomly allocated into one of these two intervention groups: Mulligan and Maitland group. In a total treatment period of four weeks, each group contained 20 patients who received shoulder mobilization three times a week. In addition, patients in the two groups received scapular mobilization and shoulder stretching exercises. Data was analyzed using windows software SPSS version 22.0. independent sample t-test was applied to measure difference between two groups. The significance level was set to 0.05.

RESULTS

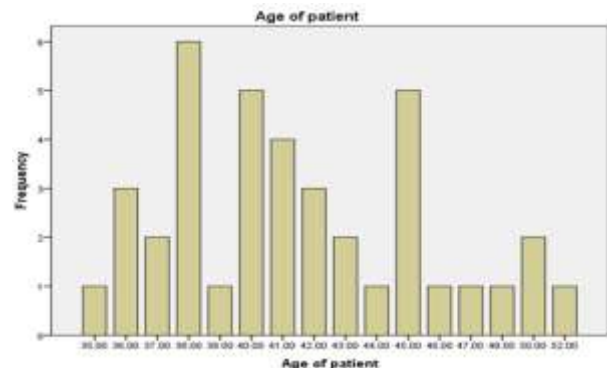


Figure No. 1: Demographics of age depicted

Forty participants were assessed for eligibility. one subject was dropped out from group A after completion of 6 sessions due to health issues.

Between Group Analysis Independent sample t-tests were applied to analyze the significance between variables of both the treatment and control group.

Table No. 1: Mean Pain– Independent sample group statistics

	Groups of treatment	N	M	SD	P
NPRS baseline	Mulligan Mobilization with Scapular Mobilization	19	6.3684	.76089	.114
	Maitland Mobilization with Scapular Mobilization	20	6.7000	.47016	
NPRS after the 6th session	Mulligan Mobilization with Scapular Mobilization	19	4.4211	.60698	.031
	Maitland Mobilization with Scapular Mobilization	20	4.9000	.71818	
NPRS after the 12th session	Mulligan Mobilization with Scapular Mobilization	19	2.2632	.56195	.064
	Maitland Mobilization with Scapular Mobilization	20	2.7500	.96655	

Using the independent samples t-test, both groups' mean shoulder pain values improved. In the independent sample T-test, both treatment groups exhibited significant differences (P=.114) in pain measures at baseline. After the 6th session, both groups were statistically significant, and after the 12th session, they were not. Patients' pain levels improved

significantly after the 6th session but not after a baseline or 12th session.

Range of Motion (ROM) Pre-treatment, 6th, and 12th sessions are used to assess range improvement between groups using the Independent T-Test. Significance is determined on p-value ≤ 0.05.

Shoulder External Rotation Range

Table No. 2: Mean shoulder ER ROM – Independent sample group statistics

	Groups of treatment	N	M	SD	P
Shoulder external rotation baseline AROM	Mulligan Mobilization with Scapular Mobilization	19	31.3158	2.88776	.731
	Maitland Mobilization with Scapular Mobilization	20	31.6500	3.13344	
Shoulder external rotation AROM after 6th session	Mulligan Mobilization with Scapular Mobilization	19	44.2105	2.89787	.007
	Maitland Mobilization with Scapular Mobilization	20	41.4500	3.17017	
Shoulder external rotation AROM after the 12th session	Mulligan Mobilization with Scapular Mobilization	19	65.1579	3.00487	.000
	Maitland Mobilization with Scapular Mobilization	20	59.8500	4.00362	

Both groups' shoulder ER mean values improved using the independent samples t-test.

An independent sample t-test showed no significant shoulder external ranges pre-treatment differences between Mulligan and Maitland (P=.731). At the end of

treatment, the mulligan group had significantly improved shoulder external range of movement (p=.007, p=.000) after 6 and 12 sessions.

Shoulder Abduction Range

Table No. 3: Mean shoulder ABD ROM – Independent sample group statistics

	Groups of treatment	N	M	SD	P
Shoulder Abduction baseline AROM	Mulligan Mobilization with Scapular Mobilization	19	84.5263	3.45396	.984
	Maitland Mobilization with Scapular Mobilization	20	84.5500	3.69174	
Shoulder abduction AROM after 6th session	Mulligan Mobilization with Scapular Mobilization	19	111.0000	6.63325	.000
	Maitland Mobilization with Scapular Mobilization	20	99.5500	4.72925	

Shoulder abduction AROM after the 12th session	Mulligan Mobilization with Scapular Mobilization	19	141.0526	5.91114	.000
	Maitland Mobilization with Scapular Mobilization	20	131.6000	6.64435	

Independent sample t-test indicated no significant difference (P=.984, P=.079) in shoulder abduction ranges pre- and post-treatment. The mulligan group improved (.007) after the 12th session.

Because $p > 0.05$, independent sample t-test showed no significant difference ($p = .491$, $p = .105$) between groups for shoulder internal ranges pre-treatment and post-6th sessions. The mulligan group exhibited considerable improvement after the 12th session ($p < 0.000$).

Table No. 4: Mean shoulder IR ROM – Independent sample group statistic/ Mean SPADI – Independent sample group statistics

Shoulder Internal Rotation Range	Groups of treatment	N	M	SD	P
Shoulder internal rotation baseline AROM	Mulligan Mobilization with Scapular Mobilization	19	30.2632	4.29266	.491
	Maitland Mobilization with Scapular Mobilization	20	29.3500	3.91051	
Shoulder internal rotation AROM after 6th session	Mulligan Mobilization with Scapular Mobilization	19	41.5789	4.79949	.105
	Maitland Mobilization with Scapular Mobilization	20	39.1000	4.50614	
Shoulder internal rotation AROM after the 12th session	Mulligan Mobilization with Scapular Mobilization	19	59.2632	4.70038	.000
	Maitland Mobilization with Scapular Mobilization	20	53.1000	3.59678	
Total SPADI Score	Groups of treatment	N	M	SD	P
SPADI total baseline	Mulligan Mobilization with Scapular Mobilization	19	67.4737	7.19852	.102
	Maitland Mobilization with Scapular Mobilization	20	70.6500	4.38028	
SPADI after 6th session	Mulligan Mobilization with Scapular Mobilization	19	54.7368	8.27206	.042
	Maitland Mobilization with Scapular Mobilization	20	59.0500	3.80408	
SPADI after the 12th session	Mulligan Mobilization with Scapular Mobilization	19	31.6842	6.89648	.000
	Maitland Mobilization with Scapular Mobilization	20	39.6500	2.23077	

After the 12th session of intervention showed significant decline in SPADI score Group A (mulligan group) which showed statistically significant results.

DISCUSSION

The current study includes idiopathic frozen shoulder patients. Stage 2 frozen shoulder patients are 35–55 years old. One study examines primary or idiopathic frozen shoulder. Controlled DM for over 6 months in 30 40–60-year-olds⁽⁷⁾. This study found no significant difference in pain reduction between the Mulligan and Maitland groups after 12 sessions of treatment. Similarly, another study found no significant difference in treatment response (physiotherapy with Maitland mobilization) and control group in shoulder pain patients⁽⁸⁾. Before and after intervention, one study supporting this investigation observed VAS End-range

mobilization and movement group mobilization mean scores were negligible⁽⁹⁾.

The current study showed significant shoulder range of motion improvements in both groups. The shoulder external rotation range improved significantly in Group A (mulligan and scapular mobilization) compared to Group B.

Group B improved flexion, abduction, and external rotation, but not internal rotation or extension, according to one research. Bending, extension, abduction, and external rotation improved significantly in the Mulligan group⁽¹⁰⁾. Comparing anterior and posterior joint mobilizations in frozen shoulder patients to enhance external rotation supported the results of the one research⁽¹¹⁾.

One study found that mulligan and Maitland treatments for adhesive capsulitis provide similar pain alleviation and functional range. Mulligan mobilization and UST

improved all mobility ranges, especially external and internal rotation, better in Group B⁽¹²⁾. In this study, both groups had a substantial decrease in SPADI score, however Group A (mulligan mobilization with scapular mobilization) had a much lower score. The pain threshold and disability subscale score decreased significantly after 1 week of intervention. Mulligan's total SPADI score indicated disability improvement over the control group.

One study measured SPADI and shoulder ROM in all positions individually before and after mobilization therapy. Both before and after treatment, end-range mobilization with scapular mobilization improved ROM and functionality more than individual mobilization. Mulligan mobilization produced statistically significant improvements in this trial, as did both groups, however the Mulligan group improved more than the Maitland group. Compared to stretching, Mulligan's mobilization improved pain, range of motion, physiotherapist and patient satisfaction, and shoulder score. The first study to show that Mulligan's approach outperforms stretching exercises over three months together with immediate therapeutic effects⁽¹³⁾. Scapular mobilization in combination with end-range GH mobilization may be an effective and efficient conservative treatment option to improve the symptoms associated with adhesive capsulitis.

CONCLUSION

Both treatments were concluded to be successful in relieving pain, improving functional status, and increasing ROM in subjects under observation. There was marked improvement in group A (mulligan mobilization with scapular mobilization) related to pain relief. Improvement in ROM as well as SPADI so it is concluded that it is a superior method to deal with frozen shoulder patients as compared to Maitland mobilization.

Author's Contribution:

Concept & Design of Study:	Adeera Azam
Drafting:	Esha Dilawar, Ammarah Ikram
Data Analysis:	Aabroo Zafar, Nowal Nasir, Nazia Sarfraz
Revisiting Critically:	Adeera Azam, Esha Dilawar
Final Approval of version:	Adeera Azam

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