An Evaluation of the Efficacy of Conventional Physiotherapy Versus Grade-Iii Maitland's Mobilization in Individuals Suffering from Persistent Adhesive Capsulitis: A Comparative Study

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Abstract:
Objective: The present study compared the effectiveness of the conventional physiotherapy technique and Grade-III Maitland's mobilization for treating persistent adhesive capsulitis.
Methods: The study included forty patients with adhesive capsulitis of the shoulder, divided into two groups. Group A Received Grade III Maitland mobilization along with supervised exercises five days a week for four weeks, while Group B underwent conventional physiotherapy. The outcome was measured using the shoulder range of motion (ROM), shoulder discomfort, and the disability Index.
Results: There was significant improvement in the patient's ROM, and pain and disability were reduced significantly. The results of Grade-III Maitland mobilization were significantly better than conventional physiotherapy in improving movement and decreasing pain and disability.
Conclusion: This study concludes that grade-III Maitland mobilization in addition to exercise is effective in increasing range and decreasing pain and disability.

Keywords: Adhesive Capsulitis, Maitland Mobilization, Physical Therapy Modality, Glenohumeral Join

Introduction

Adhesive capsulitis commonly known as frozen shoulder, is a disorder characterized by progressive pain and loss of active and passive mobility of the Glenohumeral joint. [1] Among different causes of musculoskeletal conditions, shoulder pain ranks as third most commonly experienced condition. [2] This condition is common in patients of age group 40-60 years, mostly seen in females.[3] In adhesive capsulitis, axillary recess becomes adherent, biceps tendon's sheath loses flexibility and capsular extensibility is diminished. This severely restricts the external rotation of humeral head and pass under the acromion during abduction. Restoring this mechanism is primary goal of various treatment strategies for adhesive capsulitis.[4] Adhesive capsulitis occurs in three distinct stages. The freezing stage, frozen stages and thawing stage.[5] The prevalence of shoulder adhesive capsulitis is estimated at 2–5% in the general population and rises to 10–20% among people with diabetes. Bilateral involvement is seen in roughly 12% of cases.[6]

Despite its prevalence and impact, optimal management strategies for adhesive capsulitis remain a topic of debate within the healthcare community. Currently, different conservative and surgical interventions are available for the management of frozen shoulders in which surgical interventions include the manipulation and arthroscopic approach or open capsular release under general anaesthesia.[7] Conservative treatment includes the therapeutic intervention of physiotherapy for the management of pain and stiffness. For the management of pain, application of heat or ice, Ultrasound, Inferential Therapy (IFT), Transcutaneous electrical nerve stimulation (TENS) and Pulsed Electromagnetic Field (PEMF) therapy whereas for stiffness, active and passive range of motion exercises, mobilization and manipulation techniques are employed.[3, 7, 8]

This study aims to address the gap in the existing literature by conducting a comparative evaluation of the effectiveness of conventional physiotherapy versus Grade-III Maitland's Mobilization in individuals suffering from persistent adhesive capsulitis.

Methods

A prospective and comparative study was conducted from November 2022 to April 2023 in the physiotherapy center at Acharya Institute of Health Sciences, Bangalore. The study was reviewed and approved by the Institute as per the regulations of the Helsinki Declaration 1975, as revised in 1983. The study included 40 patients aged 40 to 65 years, diagnosed with adhesive capsulitis and presenting with restricted shoulder mobility for more than three months, who visited the centre for treatment. Patients having a history of trauma, cancer, neurological diseases, severe osteoporosis, cardiac or psychiatric conditions, and participants who refused to participate were excluded from the study. Prior to inclusion, patients signed a written informed consent form confirming their willingness to participate.

The patients agreeing to participate in the study were randomly divided into two groups, Group A (n=20) receiving Grade-III Maitland mobilization, and Group B (n=20) receiving conventional physiotherapy. During the first and final visits, the physiotherapist recorded the patient’s shoulder range of motion (ROM), pain level, and Shoulder Pain and Disability Index (SPADI). ROM was measured using a Universal Goniometer following standard procedures.[9] The pain and disability index were noted using the validated questionnaire tool and obtained data were interpreted in percentage (%).[10] After the initial assessment, the patient was given therapeutic intervention according to their groups. Patients were assessed at the first and last visit by the trained physiotherapist.

Group A was treated with Grade-III Maitland’s immobilization along with supervised exercises, which included Glenohumeral caudal mobilization, posterior glide mobilization, and anterior glide mobilization using the standard protocols.

- Glenohumeral caudal mobilization was administered to improve abduction and flexion. The patient was positioned in a supine posture with the arm abducted to 30 degrees. The physiotherapist grasped the distal part of arm with one hand for mobilization and used another hand to stabilize the scapula in the axilla. Subsequently, Glenohumeral caudal mobilization was applied.
- Posterior glide mobilization was administered to improve shoulder flexion and internal rotation. The patient was positioned supine with the shoulder abducted to 45 degrees and the elbow slightly flexed. The mobilizing hand was positioned on the anterior humeral head, while the stabilizing hand supported

the elbow. The mobilizing hand then applied the posterior force and posterior glide mobilization was applied.
- Anterior glide mobilization was applied to improve external rotation and extension of the shoulder. The patient was positioned prone with the shoulder at the edge of the table, abducted to 90 degrees, and the elbow flexed to 90 degrees. The mobilizing hand was placed on the posterior humeral head, while the stabilizing hand held the mid-humerus. Anterior force was then applied by the mobilizing hand and Anterior glide mobilization was applied.[11]

Each mobilization was performed at rate of 2-3 glides per second, for 30 seconds, repeated in three sets. Group B was treated with conventional physiotherapy, which included ultrasound therapy and IFT.
- The patients received Ultrasound therapy in continuous mode for 6 minutes at a frequency of 1 MHz and an intensity of 1 W/cm^2.
- IFT was administered to the patient for 12 minutes in triangular mode at a frequency of 4 MHz and the IFT intensity was kept constant based on the patient's tolerance levels.

In both groups (A and B) exercises like overhead pulley, shoulder wheel, and finger ladder exercises were taught and patients were asked to perform these exercises with ten repetitions under the supervision of a physiotherapist.

Statistical Analysis

The statistical analysis was performed using the IBM Corp. Released 2019. IBM SPSS Statistics, Version 26.0. Armonk, NY: IBM Corp. The normality of the data for all the variables was checked using the Kolmogorov-Smirnov test. The data distribution was not normal, so a nonparametric test, the Mann-Whitney U test was used to analyze variables (Range of Motion – Flexion, Abduction and External rotation, pain score, and disability index) between Groups A and B.

Results

A total of 40 patients participated in this study, 20 from each group receiving the Grade-III Maitland's immobilization and conventional physiotherapy. Within group A, the average age was 56.20±7.59 years, with 14 females and 6 males. Within subgroup B were 12 female and 8 male participants, with an average age of 56.64±7.32 years.

Flexion		**Mean**	**N**	**Standard Deviation**
Group A	**Pre**	108.10	20	27.19
	Post	151.85	20	7.74
Group B	**Pre**	116.35	20	11.97
	Post	144.25	20	9.49

Table 1: Mean shoulder flexion measurements before and after Intervention in Groups A and B

In Group A, the average flexion increased from 108.10±27.19° before the intervention to 151.85±7.74° after the intervention. Group B's average flexion rose from 116.35±11.97° pre-intervention to 144.25±9.49° post-intervention **[Table 1]**. Group A experienced an average flexion improvement of 43.75° ($p<0.05$), while Group B showed an improvement of 27.9° ($p<0.05$) **[Table 4]**. Both groups demonstrated statistically significant improvements.

Abduction		Mean	N	Standard Deviation
Group A	Pre	100.5	20	10.96
	Post	139.45	20	7.40
Group B	Pre	106.2	20	10.10
	Post	134.2	20	7.09

Table 2: Mean shoulder abduction before and after intervention in Groups A and B

In Group A, the pre-intervention mean abduction was 100.50±10.96°, which increased to 139.45±7.40° post-intervention. For Group B, the mean abduction improved from 106.20±10.10 before the intervention to 134.20±7.09° after the intervention **[Table 2]**. Group A showed an average abduction improvement of 38.95° ($p<0.05$), and Group B showed an improvement of 28° ($p<0.05$) **[Table 4]**, indicating statistically significant improvements.

External rotation		Mean	N	Std. Deviation
Group A	Pre	34.10	20	3.45
	Post	59.60	20	4.77
Group B	Pre	32.90	20	3.29
	Post	51.95	20	4.24

Table 3: Mean shoulder external rotation before and after intervention in Groups A and B

In Group A, the mean external rotation increased from 34.10±3.45° before the intervention to 59.60±4.77° after the intervention. For Group B, the mean external rotation improved from 32.90±3.29° pre-intervention to 51.95±4.24° post-intervention **[Table 3]**. Group A showed an average improvement in external rotation of 25.50° ($p<0.05$), while Group B had an improvement of 19.05° ($p<0.05$) **[Table 4]**. Both groups demonstrated statistically significant improvements.

Pain Score

In Group A, the mean pain percentage before the intervention was 92.09±5.09%, which decreased to 23.55±4.11% after the intervention. Similarly, in Group B, the mean pain percentage was 91.40±4.05% pre-intervention and reduced to 28.10±4.80% post-intervention. The average pain reduction was 68.85% in Group A ($p<0.05$) and 63% in Group B ($p<0.05$) **[Table 4]**, indicating statistically significant improvements in both groups.

Disability Index

The pre-intervention mean disability percentage in Group A was 90.72±3.44%, which decreased to 24.91±6.27% post-intervention. Similarly, in Group B, the pre-intervention mean disability percentage was 86.31±5.89%, reducing to 27.97±6.75% post-intervention. Group A showed an average disability improvement of 65.81% ($p<0.05$), while Group B showed an improvement of 58.34% ($p<0.05$) **[Table 4]**. Both groups showed statistically significant improvements following the intervention.

	Group	Average improvement	t-value	p-value
Flexion	**Group A**	43.75	3.034	0.004
	Group B	27.90		
Abduction	**Group A**	38.95	4.112	0.000
	Group B	28		
External Rotation	**Group A**	25.50	4.865	0.000
	Group B	19.05		
Pain	**Group A**	68.85	2.416	0.002
	Group B	63		
Disability	**Group A**	65.81	2.829	0.003
	Group B	58.34		

Table 4: Comparative analysis showed that Group A achieved statistically significant improvements across all parameters, including range of motion (ROM), pain, and disability.

Both groups showed clear improvements in range of motion (flexion, abduction, and external rotation), pain levels and disability after the intervention. However, when comparing the two, Group A achieved significantly better results across all measures, ROM, pain and disability.

Discussion

This study aimed to evaluate the efficacy of grade-III Maitland mobilization with exercise group A and conventional physiotherapy with exercise group B on ROM, pain, and shoulder function in patients with chronic adhesive capsulitis. In this study, participants were evaluated for shoulder pain and functional limitations using the Shoulder Pain and Disability Index, along with measurements of shoulder range of motion, specifically flexion, abduction and external rotation.

Adhesive capsulitis, commonly referred to as frozen shoulder, presents a significant challenge in clinical practice due to its debilitating effect on shoulder function and quality of life. This condition primarily affects individuals aged 40-60 years, with a higher incidence observed among females.[12] It involves gradually increasing pain and stiffness in the shoulder joint, which often results in major restrictions in daily activities and a decline in overall quality of life.[13]

Maitland's mobilization primarily uses rhythmic oscillatory movements that activate type-2 dynamic mechanoreceptors. This activation helps block type-4 nociceptive receptors and also improves blood circulation. Mobilization affects fluid flow as blood flows in the vessels supplying the nerve fibres and synovial fluid flow surrounding the avascular articular cartilage. Mobilization helps break the cycle of ischemia, swelling, and inflammation. It reduces joint effusion and eases pain by lowering pressure on nerve endings.[14] During mobilization, mechanical forces can help break adhesions, realign collagen fibres and improve fibre glide by targeting specific areas of the joint capsule. Additionally, these techniques aim to maintain or enhance joint mobility by promoting biological changes in synovial fluid and improving its exchange.[15]

Nicholson GG (1985) compared pain and range of movement of the shoulder joint in two groups who received mobilization along with exercises, the other group was treated with active exercises only, and the mobilization group had lesser pain and joint stiffness than the control group.[16]

A study conducted by Shruti Naik et al (2015) compared two manual therapy approaches for adhesive capsulitis and found that both McKenzie's Mechanical Diagnosis and Therapy (MDT) and Maitland's mobilization were equally effective in reducing pain, improving shoulder range of motion, and enhancing functional scores in individuals with stage II adhesive capsulitis.[17]

Noten et al. (2016), in a systematic review, highlighted the effectiveness of various mobilization techniques such as Maitland's method spinal mobilizations combined with glenohumeral stretching and both angular and translational mobilizations in improving range of motion and functional outcomes in patients with adhesive capsulitis.[1]

Conversely, studies by Vermeulen et al. (2006) and Isaac et al. (2015) reported better outcomes with high-grade mobilization techniques, showing significant gains in shoulder flexion, abduction, and external rotation.[4-5] Our findings are consistent with previous research, supporting the greater effectiveness of Grade III Maitland mobilization in improving shoulder function and reducing pain in patients with adhesive capsulitis, as observed in Group A.

Conventional physiotherapy modalities used in Group B, such as ultrasound therapy and IFT, have also been studied extensively. Panchal D. et al. (2015) investigated the effectiveness of end-range mobilization combined with IFT versus stretching exercises and moist heat in a randomized clinical trial. They concluded that patients treated with end-range mobilization showed greater improvements than other groups.[2]

The results of our study comparing conventional physiotherapy and Maitland's mobilization for the management of adhesive capsulitis align with the results from study on the Cyriax approach versus conventional physical therapy. Both studies demonstrated that a specialized manual therapy technique (Maitland's mobilization in our study and the Cyriax approach in the referenced study) provides a faster and more significant early response in terms of pain reduction and range of motion (ROM) improvement compared to conventional physiotherapy methods. Our study specifically found that a greater proportion of patients in the Maitland group reached 80% of normal passive ROM within two weeks, mirroring the superior outcomes reported for the Cyriax group in the referenced study. Both specialized techniques showed marked improvements in shoulder movements and pain reduction at the end of the first week, underscoring the effectiveness of targeted manual therapies over traditional physical therapy modalities in the early phase of management of adhesive capsulitis.[18]

Our study suggest that Grade III Maitland mobilization produced greater improvements in shoulder range of motion and pain relief compared to standard physiotherapy techniques.

Furthermore, the comprehensive approach of Grade-III Maitland's Mobilization, including techniques like Glenohumeral caudal mobilization, posterior glide mobilization, and anterior glide mobilization, addresses the capsular restrictions and joint stiffness inherent in adhesive capsulitis.[3, 7] These techniques aim to restore normal joint mechanics and improve shoulder mobility through specific manual therapy interventions.

Limitations

The study was limited by its small sample size. Another limitation is the lack of post-treatment follow-up, making it difficult to determine the long-term effectiveness of both protocols. Additionally, the study focused exclusively on patients in the chronic stage of adhesive capsulitis and evaluated shoulder flexion, abduction, and external rotation range of motion.

Conclusion

Our study concludes that Grade III Maitland mobilization was more effective than conventional physiothrapy in improving shoulder function and reducing pain and disability in patients with adhesive capsulitis. These findings add to the ongoing discussion on best treatment approaches for this complex condition, underscoring the importance of manual mobilization techniques within comprehensive rehabilitation programs. Further studies can be conducted to explore different grades of Maitland mobilization in chronic cases and combine conventional and manual therapy to assess long-term benefits.

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