IJTI | INTERNATIONAL JOURNAL OF THERAPEUTIC INNOVATION

Research article

To see the effect of glenohumeral joint mobilization vs scapular proprioceptive neuromuscular facilitation on pain function on scapular dyskinesia associated with adhesive capsulitis

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Received - 06-03-2025**, Revised** - 28-04-2025, **Accepted** - 14-05-2025 **(DD-MM-YYYY)**

Refer this article

Ranjithanini, Monika Negi, To see the effect of glen humeral joint mobilization vs scapular proprioceptive neuromuscular facilitation on pain function in scapular dyskinesia associated with adhesive capsulitis. May-June 2025, V3 – I3, Pages - 01 – 06. Doi: https://doi.org/10.55522/ijti.v3i3.0116.

ABSTRACT

Purpose of the Study: The study aims to determine the efficacy of PNF and MWM techniques in scapular dyskinesia associated with adhesive capsulitis. Methodology: Fifty subjects both male and female aged between 40 to 50 years with the diagnosis of Adhesive capsulitis were selected directly from Physiotherapy OPD at Mahatma Gandhi Hospital Jaipur. These individuals were randomly assigned into two groups: Group A [Scapular Proprioceptive Neuromuscular Facilitation group (n=25)] and Group B [movement with mobilization group (n=25)]. Group A received Scapular Proprioceptive Neuromuscular Facilitation Technique and Group B received movement with mobilization of Glen humeral Joint with both groups also applied combination therapy (TENS & UST). The participants underwent 24 sessions. The intervention duration of both groups received 10 repetitions for 3 sets and interval period for 1 min for 3 sessions per week over a period of 8th weeks, 40 minutes per session. Data Collection: The therapy progress was evaluated by outcome measures (pain was measured using VAS scale, Scapular asymmetry was measured using LSST and pain & functional ability was measured using SPADI scale), at 0 day, at the end of 3rd week, 6th week and 8th week. Results and Conclusion: Both groups showed statistically significant improvement in pain and function in scapular dyskinesia associated with adhesive capsulitis. Group B, mulligan mobilization with movement technique with combination therapy was more effective in relieving pain and restoring functional mobility among patients with Scapular Dyskinesia.

Keywords: Proprioceptive Neuromuscular Facilitation, Glen humeral Joint Mobilization, Adhesive Capsulitis, Scapular Dyskinesia, Functional Ability.

INTRODUCTION

Adhesive capsulitis is often referred to as a frozen shoulder. It is a clinical syndrome characterized by initially painful and later progressively restricted active and passive glen humeral joint ROM. Adhesive capsulitis is an idiopathic disease characterized by synovial inflammation and capsular fibrosis which results in thickening and contracture of the inferior capsule rather than adherence. It is generally believed to be a self-limiting condition for 2-3 years. The incidence of adhesive 2- 5% in the general population and 10-20% in diabetics of which females are more affected than men and is usually seen in the age group of 40-60 years. Adhesive capsulitis can be classified as either primary or secondary. The primary disease typically has an insidious onset, is idiopathic and often associated with other diseases such as thyroid, drugs, hypertriglyceridemia. The Secondary disease typically follows trauma or injuries to the shoulder. Common injuries include rotator cuff tear, fractures, surgery and immobilization. It has three phases: The painful stage (lasts up to 6-9 weeks), The Frozen stage (lasts from 4-6 months) and the thawing stage (lasts from months to 2 years) [1].

Scapular dyskinesia, the forgotten culprit of shoulder pain and dysfunction, is defined as alterations and variations in scapula position and movement (resting and active position) in relation to the scapulothoracic joint. Scapular dyskinesis can lead to the altered glen humeral joint regulation, abnormal stresses on shoulder ligaments, overload on acromioclavicular joint and also causes increased stress on scapular stabilizing muscles. The ratio of

scapulohumeral rhythm in healthy subjects should be 2:1 (humerus: scapula). The efficiency in the generation and transfer of forces by shoulder requires an adequate positioning of scapula to minimize the loads on GH joint and AC joint. Warner et al, evaluated the scapular asymmetry in patients with glen humeral instability such as frozen shoulder, impact syndrome [2, 3].

Management of adhesive capsulitis focuses on restoring joint movement and reducing shoulder pain involving medications, physiotherapy, and surgery. Conservative management: Analgesics drugs, Anti-inflammatory drugs, corticosteroid and hydrocortisone injections. Physiotherapy management: includes electrotherapy modalities, exercise programs, and joint mobilization techniques [4].

In the treatment options for scapular dyskinesis Conservative management aims to restore scapular retraction, posterior tilt, and external rotation. Flexibility exercises, scapular stabilization exercises, stretching exercises and strengthening exercises are performed [5].

Very few studies have been done on the comparative effects of these techniques (PNF and MWM) in the case of Scapular Dyskinesia in Patients with Adhesive Capsulitis. Therefore, the purpose of the study was to find out the efficacy of PNF technique and MWM technique in Scapular Dyskinesia associated with adhesive capsulitis [6, 7].

MATERIAL AND METHODS

The research was structured as a comparative random study. 50 patients were chosen based on specific criteria, and they were divided into two groups of 25 patients each: Group A (Scapular PNF) and Group B (MWM). The respective treatment procedures were explained to each group. Both groups underwent a pre-treatment assessment of pain, range of motion, and functional performance. The Institutional Ethics Committee of Mahatma Gandhi University of Medical Science and Technology Jaipur approved the study [9, 10]. Prior to enrollment, all participants were informed about the study's purpose and test procedures. Written informed consent was obtained from all participants before they were included in the study. The inclusion criteria encompass patients diagnosed with adhesive capsulitis, aged between 40 and 50 years, of any gender, who have experienced pain for over a month, and exhibit unilateral frozen shoulder and limited scapular upward rotation. The exclusion criteria pertain to patients who have undergone shoulder surgery, experienced specific neurological deficits, or suffered from certain fractures or conditions such as cervical stenosis, rotator cuff tear, prolapsed cervical disc, or structural scoliosis [11, 12].

Outcome Measures

Visual analogue scale for pain.

Lateral scapular slide test (LSST) to evaluate scapula asymmetry.

Shoulder pain and disability index (SPADI) for pain and functional activities.

Procedure

Group A: [Scapular Proprioceptive Neuromuscular Facilitation (PNF) Group]

In this group patients received scapular PNF in two diagonal patterns, anterior elevation posterior depression and posterior elevation and anterior depression. Patient lay on the unaffected side while the therapist stood in line of desired motion. Firstly, the therapist pulled the scapula to the elongated position and then gave instructions for desired motion. Rhythmic initiation and repeated contractions Facilitation techniques were applied in all patterns with 10 repetitions for 3 sets and interval period 1 min for 3 sessions per week over a period of 6 weeks 30 minutes per session.

Conventional Physiotherapy

Conventional Physiotherapy comprises US therapy, TENS & shoulder exercises. These were applied on the painful side of the shoulder. Therapeutic Ultrasound- was applied with1MHz US head, 5cm square radiating area, intensity 1.5 W\cm2 dosages for 5-7 minutes. TENS- was applied to painful sites of the shoulder for 10 minutes. TENS unit was set to a frequency of 100Hz, a pulse duration of 60usn. EXERCISES- The exercises given were: - Codman's exercise, finger ladder exercise, Stretching, Shoulder ROM Exercise and pulley exercise [13, 14].

Group B: [Movement with Mobilization (MWM) Group]

In this group patients received glen humeral joint mobilization for shoulder abduction and external rotation.[20]Patient was in relax position. Joint stabilized was one side by therapist hand and other with belt around. After it, the patient was asked to perform free Movement.[21] It was performed in 3 sets with 10 repetitions in each and internal period 1 minute for 3 sessions per week over a period of 6 weeks 30 minutes per session.

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Data Collection

Outcome measures of all individuals were analyzed on day 1 before start of therapy (pre intervention), at the end of 3rd week and at the end of 6 weeks (post intervention) [15].

Statistical Analysis

The data was coded and entered into Microsoft excel spreadsheet. Analysis was done using SPSS version 23 (IBM SPSS statistics Inc, Chicago, Illinois, USA) windows software program. Descriptive statistics included calculations of means and standard deviations with minimum and maximum values. Shapiro- Wilk test was used to check if a continuous variable follows a normal distribution.

The Wilcoxon Test was used to compare two independent samples, while Wilcoxon signed-rank test is used to compare two related samples, matched samples, or to conduct a paired difference test of repeated measurements on a single sample to assess whether their population mean ranks differ. Level of significance was set at $P < 0.05$.

RESULTS

Within Group Analysis of VAS Score

The figure below describes the comparison of pre and post scores of VAS within two groups. It shows in both the groups there was significant improvement between pre and post mean scores. In scapular PNF Group when we compared the pre and post mean scores there was significant improvement from 8.16±2.96 with p value <0.01.

And also, in MWM Group there was a significant improvement from 7.84±1.48 with p value < 0.01. This result shows that VAS score was significantly decreased in both the groups but VAS score was more significantly decreased in movement with mobilization (MWM) exercise group [16, 17].

Figure 1: Comparison of vas score in both groups at various time intervals

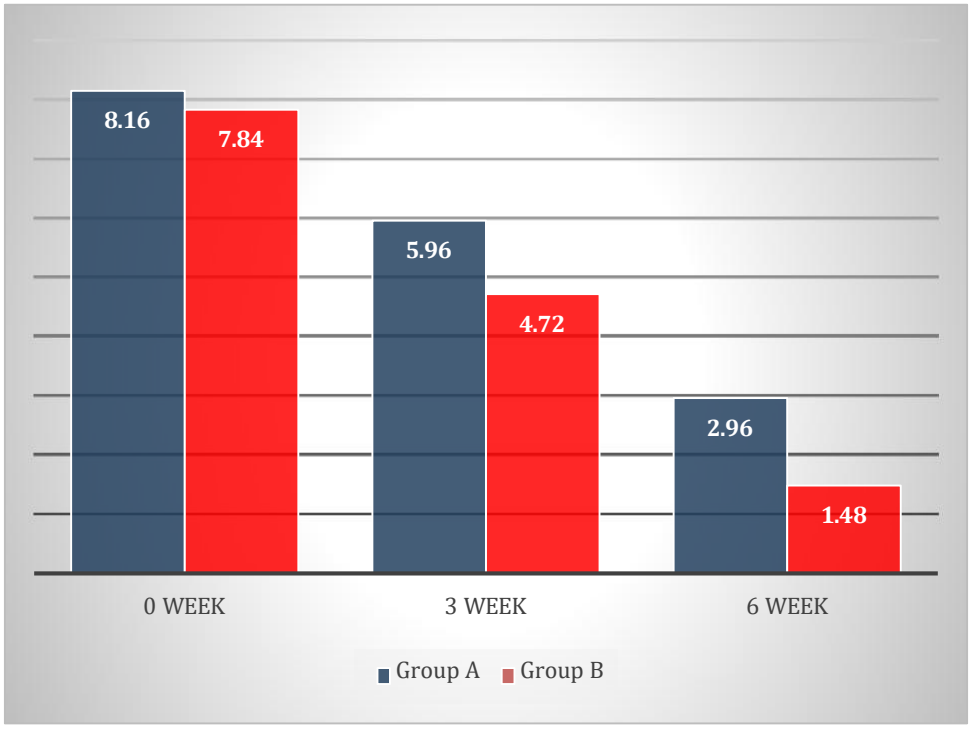


Figure 2: Comparison of spadi score in both groups at various time interval

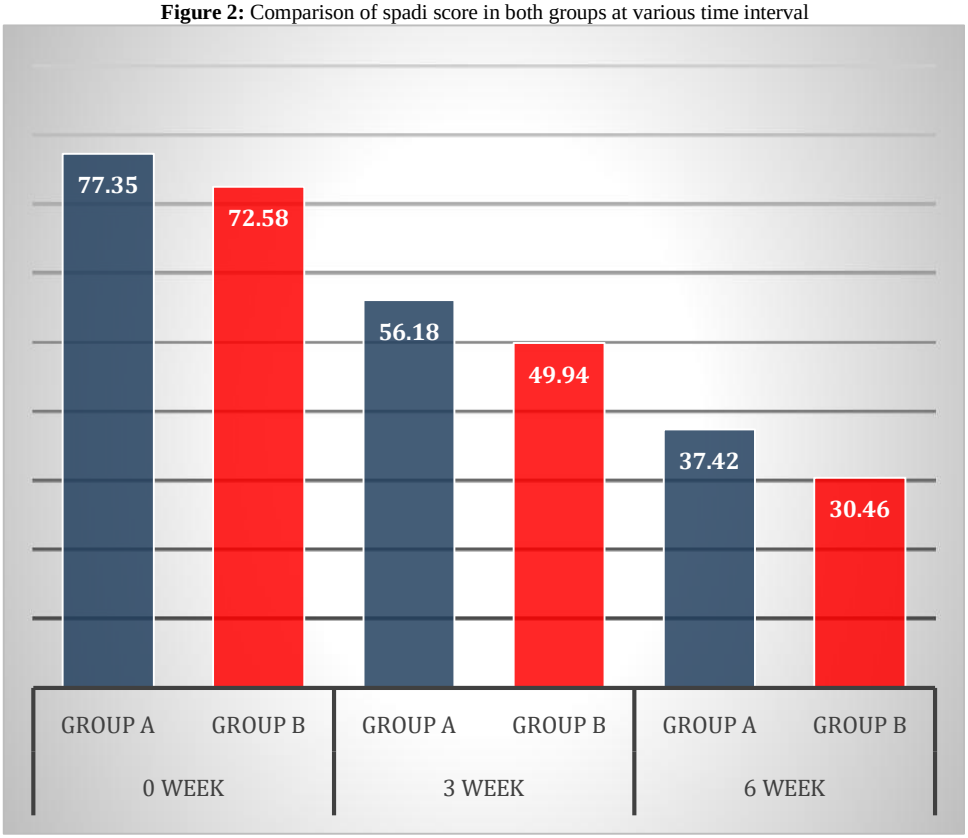
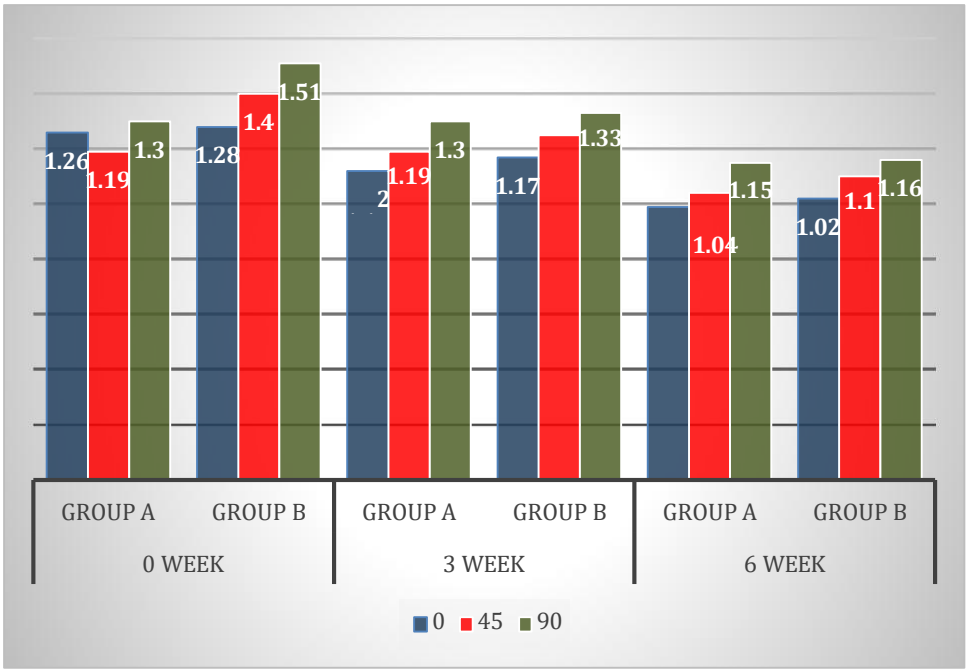
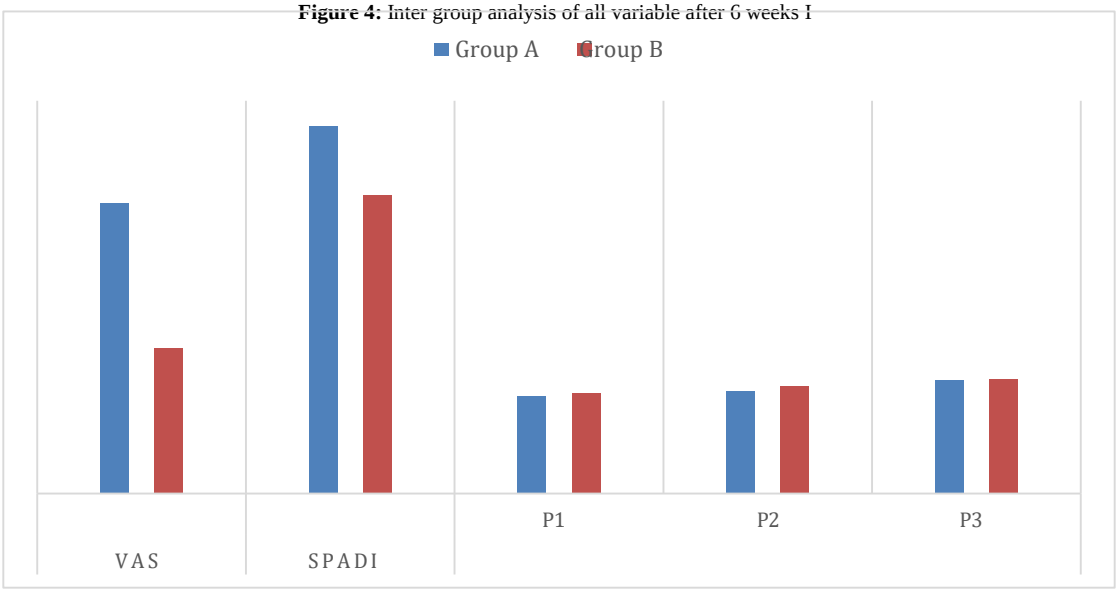


Figure 3: Comparison of lsst in both groups at various time interval



Inter Group Analysis of all variables after 6 Weeks

Figure 4: Inter group analysis of all variable after 6 weeks I



Within Group Analysis of SPADI Score

The figure below describes the comparison of pre and post scores of SPADI score within two groups. It shows, in both the groups there was significant improvement between pre and post mean scores.

In scapular PNF Group when we compared the pre and post mean scores there was highly significant improvement from 77.35±37.42 with p value < 0.01 (highly significant) and also in MWM Group mean scores there was also highly significant improvement from 72.58±30.46 with p value <0.01.

Within Group Analysis of LSST Score

The figure below describes the comparison of pre and post scores of LSST within two groups. It shows, in both the groups there was significant improvement between pre and post mean scores. Paired Sample t test illustrate that upon intergroup analysis there was significant difference in the Mean of LSST scores at 0 Day (p=0.01), 3 Weeks (p=0.01) and after 6 Weeks (p=0.00), for Scapular PNF Group and Movement with Mobilization (MWM) group.

The above figure describes the comparison of Mean difference in improvement in all variables (VAS, SPADI & LSST) between two groups. Both groups statistically significant with p value (p <0.05). Statistically significant greater changes in scores were found in group B (MWM technique with combination therapy (US+ TENS) with variables as compared to Group A (scapular PNF technique with combination therapy (US+ TENS). The statistically analysis of study showed a significant improvement in group

B on pain and function in scapular dyskinesia along with level of improvement in scapular position, pain and disability.

DISCUSSION

The aim of this study was to compare the two manual techniques on pain and function in patients with scapular dyskinesia associated with adhesive capsulitis. A sample of 50 patients were taken and divided into two equal groups (group A & group B) by

simple random sampling method. Each group consisted of 25 individuals who matched the inclusion and exclusion criteria. Group A: were treated with scapular PNF technique along with Conventional Physiotherapy. Group B: were treated with mulligan MWM technique with combination therapy (US+ TENS). The statistical analysis of all variables like VAS, SPADI & LSST across baseline, after 3 weeks and after 6 weeks showed a significant improvement in their mean score within both groups ($p < 0.05$ In present study, when Pre and Post interventions values were analyzed for pain and function, the results were highly significant ($p<0.05$) in both Scapular PNF Group and Movement with Mobilization Group. Suggesting that both Scapular PNF and MWM is effective in improving in Pain, Shoulder ROM, and function [18].

Intergroup comparison showed significant difference in improvement on pain as evaluated on VAS between Group A and Group B. Improvement of pain was more in Group B (Mulligan's MWM) compared to Group A (Scapular PNF) [19].

Clinically Mulligan MWM (Group B) was more effective in reducing pain as Mobilization reduces pain due to neuro physiologic effect on the stimulation of peripheral mechanoreceptors and inhibition of nociceptors. The activation of Apical Spinal Neurons as a result of peripheral mechanoreceptors by joint mobilization produces pre synoptic inhibition of nociceptive afferent activity [20].

The Mulligan MWM technique enables the impaired joint to move freely without pain. The manual force in the form of joint glide by the therapist and active movement performed by the patient may be responsible for the rapid recovery of pain free movements.

This study showed a statistically significant difference in the improvement of Shoulder Pain and Function evaluated on SPADI index between Group A and Group B. Suggesting that movement with Mobilization was more effective in improving shoulder function and reduction in Pain and Disability.

Improvement in Scapular PNF Group is based on the mechanisms of autogenic and reciprocal inhibition. Also, the mechanism of Scapular PNF includes that there is increment in the excitability and decrease in response time to be responsible for post interventional increase in ROM [21].

PNF has been proven to produce analgesic effects through gait control mechanisms. Pressure and Proprioceptive inputs make it to the spinal level and inhibit the entry and transmission of pain signals.

Mulligan's Technique has been shown previously to results favorably in terms of pain and ROM and function in various studies. Suman Malukani et al, Vol. 11 2022, suggest that Mulligan Mobilization and Proprioceptive Neuromuscular Facilitation Techniques are effective in reducing Pain and Disability, improving Shoulder ROM, and Shoulder Function. Mulligan MWM is more effective in reducing pain and improving functions as compared to PNF Group [22].

Henricus M. Vermealen et al, 2006 systemic review suggests that high grade mobilization technique (HGMT) proved to be m are effective than low (LGMT) in management of adhesive capsulitis of shoulder [23].

Neeti Mishra et al, 2019 suggest that the application of Scapular PNF along with conventional physiotherapy exercises can be considered beneficial in reducing pain and disability in patients with adhesive capsulitis [24].

Satpute K et al, 2022 in a systemic review revealed that MWM in isolation or in addition to exercise therapy is superior in improving pain and disability in patients with Shoulder Dysfunction when compared with Exercise therapy [25].

Tedla JS et al, 2019 concluded that PNF group is superior then conventional physical therapy in decreasing pain, increasing external rotation and abduction ROM and also improving function.

Thus, this study shows that both Scapular PNF and MWM Technique are Effective in reducing pain, improving Shoulder ROM and shoulder function. More significant results were found in MWM Group in subjects with Scapular Dyskinesia associated with adhesive capsulitis [26, 27].

CONCLUSION

From the above study it is indicated that there was a difference between both groups when the values obtained were analyzed. The results indicate that two manual techniques are effective in improving function of shoulder joint and reduction in pain and disability. It indicates that Group B (Mulligan MWM Technique with combination therapy) had a significant improvement in VAS Scores when compared to Group A (Scapular PNF). Their Scores in SPADI had reduced which indicates decreased level of disability and bett functional ability.

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