

# Effect of Mulligan Techniques on Pain Reduction and Improving Functional Activity of Shoulder Among Periarthritis Shoulder Individuals

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## Abstract

**Background:** The background of the study is the incidence of Movement restriction among Periarthritis subjects which affects the Pressure pain threshold and Functional activity of the shoulder.

**Purpose:** To compare the effectiveness of shoulder strengthening exercises in patients with Periarthritis Shoulder. To evaluate the effect of pain and functional activity by pressure algometer and SPADI.

**Materials and methods:** The two groups; Group-A (Mulligan Mobilisation with Movement) and Group-B (Shoulder strengthening exercises) were randomly assigned. The pre-test assesses Pressure Pain Threshold by utilising a pressure algometer and Shoulder Pain and Disability Index (SPADI) Questionnaires to assess Shoulder Functional Activity among periarthritis shoulder in both the groups. The Group-A(MWM) has received Mulligan Mobilisation with Movement for a period of 4 weeks. In contrast to Group-B, which has received shoulder strengthening exercises for periarthritis shoulder. The same tests were measured after 4 weeks of treatment as post-test values.

**Results:** The pretest and post test values significant difference ( $p < 0.0001$ ) between groups A(MWM) and B(Shoulder strengthening exercises). The study showed that MWM has a major impact on recovery of PPT and Functional activity affected in Periarthritis shoulder participants.

**Conclusion:** The Mulligan mobilisation with movement was effective on improving the Functional activity and reduction in pressure pain threshold.

**Keyword:** Periarthritis shoulder, Movement with Mobilisation, Pressure pain threshold(PPT), Pressure Algometer, Shoulder Pain and Disability Index(SPADI).

## Introduction

Periarthritis of the shoulder is an inflammatory condition that affects the soft tissues around the shoulder joint, capsule, and joint itself. It frequently happens and causes a great deal of discomfort, impairment, and time away from work<sup>1</sup>. In Bangladesh, the prevalence of shoulder discomfort

and disability is at 7.3%<sup>2</sup>. Numerous entities with comparable clinical symptoms are included in the differential diagnosis. The most frequent lesions are rotator cuff tendinitis and tears, biceps tendinitis, and subacromial- subdeltoid bursitis<sup>3</sup>. Numerous disorders, including chronic shoulder strain, trauma, and regular exposure to cold or wet conditions are acknowledged as potential causes for PA despite

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the fact that its aetiology is unclear.<sup>4</sup> A more or less continuous clinical syndrome is periarthritis shoulder can be easily identified by pain in the shoulder area that radiates down the arm in patients between the ages of 50 and 60, gradual movement limits, and frequently co-occurring anxiety or depression<sup>5</sup>. From the posture in which the limb is resting mostly in abduction and external rotation<sup>6</sup>, the motions are restricted in all directions. Effective treatment options for shoulder periarthritis continue to be elusive. The treatment provided should be such that the shoulder joint is more mobile and has a greater range of motion<sup>7,8,9</sup>. Mulligan mobilisation, also known as Mulligan techniques or mobilisation with movement, is a manual therapy approach used by physiotherapists to treat pain and improve joint movement. The main principle behind Mulligan techniques is the concept of mobilisation with movement (MWM), which aims to improve joint mechanics, reduce pain, and enhance function through pain-free and immediate improvements in range of motion. The Mulligan mobilisation technique often involves combining active movements from the patient with passive assistance from the therapist. This approach is believed to stimulate specific joint receptors, which can contribute to improved proprioception (awareness of joint position) and pain reduction. By optimising joint movement and reducing soft tissue tension, the Mulligan mobilisation technique may help alleviate pain related to joint dysfunction. The combination of joint receptor activation and decreased soft tissue tension may contribute to pain relief in some individuals.

Due to the modification of the articular surfaces and reconditioning of the shoulder kinematics, the Mulligan technique outperforms the Maitland treatment in terms of results for range of motion (ROM). Additionally, it has been claimed that the Mulligan approach relaxes surrounding soft tissues, such as ligaments and capsules, and lessens pain by activating joint receptors<sup>11</sup>.

Three articles that all contained level I evidence of Mulligan mobilisation were discovered. In comparison to Maitland mobilisation and guided shoulder exercises, all three studies supported Mulligan mobilisation and demonstrated significant improvements in discomfort, range of motion, and

function in individuals with frozen shoulders<sup>12</sup>. Theraband exercises, also known as resistance band exercises, have gained popularity as an effective and versatile method for shoulder strengthening. In this essay, we will explore the benefits and effectiveness of Theraband exercises for shoulder strengthening and their role in promoting optimal shoulder health. Benefits of shoulder strengthening exercises are 1) Progressive Resistance: A variety of resistance levels, from light to heavy, are offered in therabands. As an outcome, individuals can gradually increase resistance as their shoulder muscles receive stronger, starting with lower resistance. Theraband exercises are suitable for people of all fitness levels and ages because of their adaptability. 2) Targeted Muscle Activation: Theraband exercises can isolate specific shoulder muscles, such as the rotator cuff muscles (supraspinatus, infraspinatus, teres minor, and subscapularis), deltoids, and trapezius. This targeted muscle activation helps address muscle imbalances and weaknesses, which are common contributors to shoulder injuries and pain. 3) Safe and Low-Impact: Theraband exercises are generally low-impact and safe on the joints, making them suitable for individuals with shoulder issues or those in the early stages of rehabilitation. The elastic nature of Therabands also provides a controlled resistance, reducing the risk of overloading the muscles during exercises. 4) Versatility: Therabands can be used in a variety of exercises, including shoulder external and internal rotations, shoulder abduction, scapular retractions, and shoulder flexion. Their versatility allows for a comprehensive shoulder strengthening routine that targets different muscle groups and movement patterns. 5) Rehabilitation and Injury Prevention: Theraband exercises are widely used in shoulder rehabilitation programs to restore muscle strength and function after injuries or surgeries. Theraband exercises are a valuable and accessible tool for shoulder strengthening. Their progressive resistance, targeted muscle activation, safety, and versatility make them effective in addressing shoulder muscle imbalances, preventing injuries, and promoting overall shoulder health. Whether used in rehabilitation or as part of a regular exercise routine, Theraband exercises offer numerous benefits that contribute to stronger, more stable, and pain-free shoulders. Embracing Theraband

exercises for shoulder strengthening can empower individuals to take charge of their shoulder health, improve performance, and enhance their overall quality of life.

### **Aim**

To determine the effectiveness of mulligan technique versus shoulder strengthening exercises in patients with Periarthritis Shoulder.

### **Material and Method**

In this experimental study, the effectiveness of movement with mobilization (MWM) and shoulder strengthening exercises (SSE) among periarthritis shoulders were analyzed. Total of Thirty samples were selected from Saveetha medical college and hospital, Thandalam. The duration of the entire study was around 4 months i.e., from July to October 2022 including the sample collections procedures and treatment period. This study was performed in the line with the principles of Helsinki. Approval was granted approval by the ethical committee of Saveetha College of Physiotherapy, Tamil Nadu, India (ISRB NO:01/009/2022/ISRB/PGSR/SCPT).

#### **Inclusion Criteria:**

- Participants with periarthritis shoulder Both Male and female
- Participants were aged between 40 to 60 years
- Participants with painful stiffness shoulder for at least 3 months
- Participants with limited range of motion and difficulty in shoulder functional activity.

#### **Exclusion Criteria:**

- Traumatic injury patients
- Neurological conditions
- Other musculoskeletal disorders
- Fractures and post-surgery patients
- Patients with corticosteroid injections.

### **Procedure**

Participants of 30 with Periarthritis Shoulder were chosen based on the criteria, and informed consent was

obtained before treatment was initiated. Participants were randomly allocated to either: Movement with mobilisation or Shoulder Strengthening Exercises based on concealed envelope method; they were explained about the procedure and intervention of the study. All the participants underwent pre-test and post-test measurement with pressure algometer and Shoulder Pain and Disability Questionnaire. Both the groups underwent a treatment session thrice a week for 4 weeks. Each sitting glide is performed about 10-15 repetitions.

#### **Group A: Movement with Mobilization**

In MWM, the therapist applies a gentle, oscillatory glide or pressure to the affected joint in the direction that is restricted. The patient is then asked to perform a pain-free movement that complements the mobilisation force. MWM may involve applying a lateral glide to the humeral head while the patient actively raises their arm overhead. The therapist instructs the patient to perform pain-free active movements while applying the mobilisation force to the joint. During shoulder abduction, apply a gentle glide or distraction force to the humeral head while the patient raises their arm. Likewise glide is performed in all the directions in periarthritis shoulder patients during the treatment session. The treatment session takes place thrice a week for 4 weeks.

#### **Group B: Shoulder strengthening exercises (SSE)**

Shoulder strengthening exercises - The patient stood comfortably on the surface of the ground via both feet set firmly on the TheraBand. The patient is directed to apply pressure gradually and asked to hold over the end of the TheraBand. From the starting position, abduction, external rotation, and shoulder flexion have been encouraged. After retaining the position, turn to it without bouncing. Each of the subjects initially received strengthening using yellow bands for 2 weeks, followed by progression provided by using red TheraBand's for the following 2 weeks. The treatment protocol is structured so that exercises using the red TheraBand are carried out five times and those using the yellow band at the beginning of treatment. Hold for 25 seconds, three times per week for three weeks on alternate days.

## Materials required

Pressure pain threshold Algometer, SPADI Scale.

## Outcome measures

Pain Threshold pressure algometer

The pressure pain threshold (PPT) is the point at which a pressure stimulus changes from being painless to being painful. It is suggested to use pressure algometry (PA) to objectively measure this PPT. Applying a mechanical stimulation to track when the pressure-induced sensation of the stimulus first transforms into pain allows us to determine PPT. While sufficient pressure is applied to the pre-selected points at a 90 degree angle, the Pressure Algometer, a valid and reliable tool for measuring pain intensity, is used to measure it. A force gauge with a rubber disc of 1 kg/cm<sup>2</sup>/s perpendicular to the skin operates as the pressure threshold meter. It had been displayed that this instrument can be useful in clinical practice for determining deep muscle tenderness<sup>19</sup>. Deltoid muscles and subscapularis muscles were assessed for the pain pressure threshold for the trigger point's pain intensity. The validity and reliability were 0.9. In addition, there was only 1 reading taken.

Shoulder Pain And Disability Index

The SPADI scale, a measurement of shoulder pain and disability, was used to evaluate it. The shoulder pain and disability index was created to quantify the pain and limitation caused due to shoulder pathology. The thirteen items on this self-administered index have been divided down into two subscales, namely pain and disability. It takes about 10 to 15 minutes to complete the task. This scale has a 0.89 reliability and validity scores. The outcome is represented as a percentage<sup>20</sup>

## Data analysis

All parameters were subjected to the mean and standard deviation (SD). For analyzing pre and post-test measurements. Within the group, paired t test was performed.

The unpaired t test was used to compare the group's pre and post-test measurements between

the group. The P value of <0.0001 was deemed statistically significant.

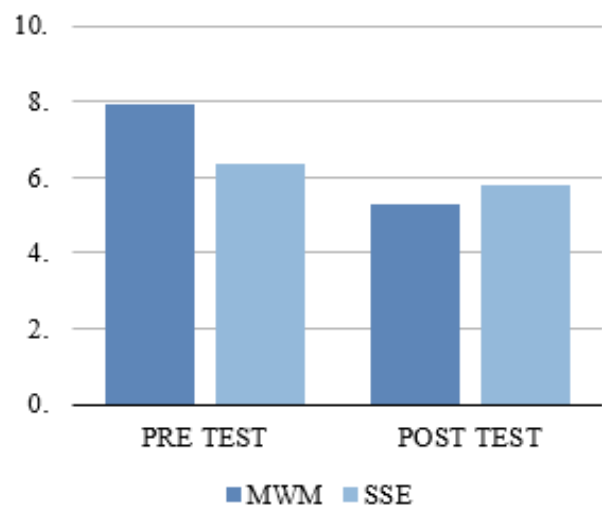
## Results

The Mean and standard deviation of the data were determined. The before and after values for both the groups were evaluated using the Shapiro-Wilk test for the normalcy. A p-value of 0.0001 or less was considered significant.

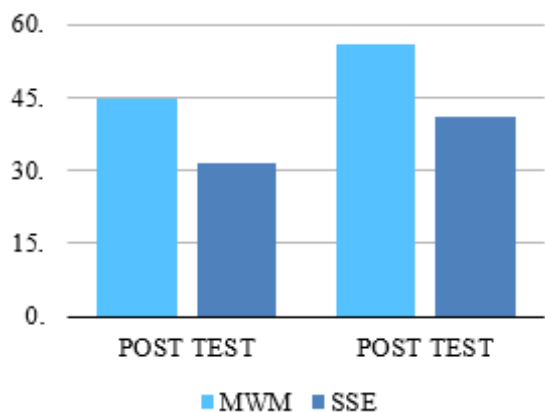
The mean value of MWM in pretest and posttest is 7.94 and 5.27 also the mean value of SSE in pretest and posttest is 6.34 and 5.80 which was measured using pressure algometer.

The mean value of MWM in pretest and posttest is 44.88 and 56.07 also the mean value of SSE in pretest and posttest is 31.6 and 40.93 which was measured using SPADI.

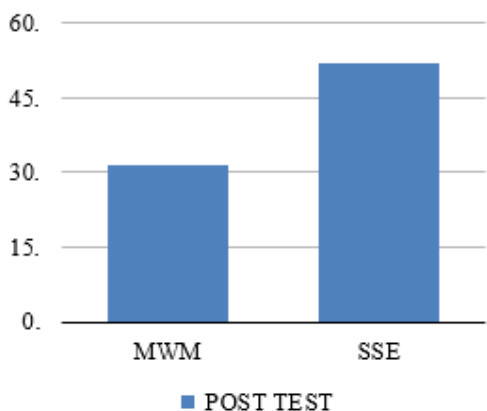
The mean value of MWM in posttest is 31.6 and also the mean value of SSE in posttest is 51.93 which was measured using pressure algometer. The mean value of MWM in posttest is 55.6 and also the mean value of SSE in posttest is 53.8 which was measured using SPADI



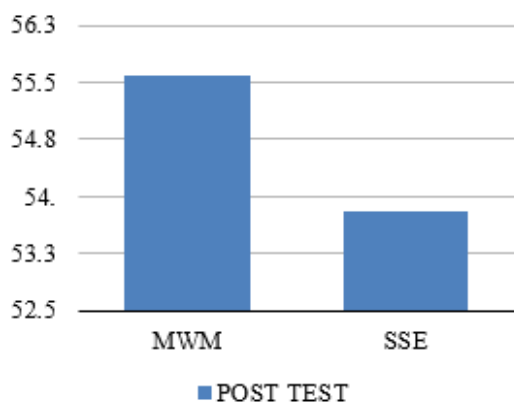
**INTERPRETATION:** Graph 1 shows the Pretest and Posttest Mean and Standard deviation (SD) values of Movement with mobilisation and Shoulder Strengthening exercises within the group using Pressure Algometer.



**INTERPRETATION:** Graph 2 shows the Pretest and Posttest Mean and standard deviation (SD) values of Movement with mobilization and Shoulder Strengthening exercises within the group using SPADI Questionnaire.



**INTERPRETATION:** Graph 3 shows the Pretest and Posttest Mean and Standard deviation (SD) values of Movement with mobilisation and Shoulder Strengthening exercises between the groups using Pressure Algometer.



**INTERPRETATION:** Graph 4 shows the Pretest and Posttest Mean and standard deviation (SD) values of Movement with mobilisation and Shoulder Strengthening exercises between the group using SPADI Questionnaire.

On comparing both the groups, movement with mobilisation showed an improvement than shoulder strengthening exercise.

### Discussion

This comparative study was the first to investigate the outcome of MWM and SSE among periarthritis shoulders. The study included 15 individuals who were separated into two groups: MWM group and SSE group. The study investigated and analysed the effect of Mulligan Technique in improving Functional ability and Pain threshold in subjects with periarthritis shoulder.

Group A had 10 males and 5 Females where Group B had 8 females and 7 females. Group A received the Mulligan technique (MWM) in improving Functional ability and decrease in pressure pain threshold whereas Group B received Shoulder strengthening exercises with TheraBand among Periarthritis Shoulder individuals. Aliaa rehab Youssef, Ahmed moors et.al.,A significant contribution to the field of shoulder rehabilitation is the comparison of the Maitland technique and the Mulligan mobilisation in the treatment of diabetic frozen shoulder. The results indicate that for this particular condition, Mulligan mobilisation is superior to Maitland technique. The results may have major implications for physicians and physical therapists who treat diabetic patients who have frozen shoulder because they point to a potentially more beneficial strategy for treating this difficult condition.

Y.V. Raghava Neelapala et al. Conducted study provided a valuable evidence supporting the efficacy of the Mulligan’s posterolateral glide technique in improving shoulder rotator strength and scapular upward rotation in individuals with shoulder pain. The results suggest that this intervention could be a promising addition to the repertoire of physiotherapy techniques for managing shoulder pain and improving shoulder function. Khyathi et.al study adds to the evidence supporting the use of physiotherapy techniques in managing frozen shoulder. The research highlights the effectiveness of both the Spencer technique and the Mulligans technique in providing pain relief, increasing shoulder range of motion, and improving functional abilities in patients with frozen shoulder. These

findings encourage physiotherapists to consider these techniques as viable options for treating individuals with adhesive capsulitis. Nonetheless, further research with larger sample sizes and longer follow-up periods would be valuable to validate and strengthen the results of this study. The prevalence of periarthritis shoulder in people over 40 is very high, and in our study, group A's mean age was 62 and group B's mean age was 59. Pressure Pain Threshold and SPADI Score were the end measures in the current study, and they were both analysed every other day for seven days. Pre and post analyses were conducted on days 1 and 7. The study found that the Mulligan technique (MWM) considerably improved functional ratings, but that Group A(MWM) alone had a significant decrease in pressure pain threshold. This might suggest that the Mulligan technique has a positive impact on raising functional ability and lowering pain threshold under pressure.

Improvements in MWM may be a result of its biomechanical and neurophysiological mechanisms. According to biomechanics, mulligan's mobilisation with movement (MWM) may address joint partner bone alignment, for example, when shoulder biomechanics are altered, the head of the humerus is pulled towards the glenoid fossa, changing the glenohumeral mechanism and causing positional faults that can be corrected through movement. In MWM, the patient simultaneously experiences input from painless joint movements, increasing activity level. MWM aids in extending and relaxing the muscles and capsule surrounding the shoulder joint, which may have improved motor function and set the patient up for long-term benefits.<sup>18,19</sup>

Jeyakumar S et al., states that maitland and mulligan techniques shows a good improvement in increasing the range of motion and reducing the pain in adhesive capsulitis of shoulde.<sup>21</sup>

Jeyakumar S et al., states that both, Maitland mobilization and myofascial trigger point release are proven to be effective in treatment of adhesive capsulitis.

The findings of this study also demonstrated that each intervention had a comparable favourable effect on the study's primary outcome measures. The Mulligan technique (MWM) had produced favourable results quickly.

Examining the long-term effects of Movement with Mobilisation in people with Periarthritis Shoulder would therefore be interesting.

## Conclusion

In accordance with the study, Movement with mobilisation opposed to Shoulder strengthening exercises, has a larger favourable impact on pain threshold and functional activity among periarthritis shoulder. Although the results of the pain pressure algometer and SPADI Questionnaire for both groups showed a significant improvement after treatment, movement with mobilisation had a greater increase in functional activity and decrease in pressure pain threshold than the SSE group.

**Ethical Clearance:** The study was approved by the Committee of Institutional Scientific Review Board.

**Funding:** Nil

**Conflict of interest:** None

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