

## Short Term Effect of Maitland's Technique and Mulligan's Technique in Patients with Adhesive Capsulitis of Shoulder Joint

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### Abstract

**Objective:** The purpose of this study was to evaluate the comparative effect between Maitland's technique and Mulligan's technique in reducing pain, disability and improving range of motion in patients with adhesive capsulitis of shoulder joint.

**Methodology:** It was a pre and post experimental design study. The patients diagnosed with adhesive capsulitis of shoulder joint which shows signs and symptoms and were requested to participate in study. The total number of patients 46 was enrolled in this study but on the basis of inclusion and exclusion criteria 30 subjects with male and female ratio 10:20. Patients were equally divided into two groups, group A and group B respectively. Group A received moist Maitland technique and group B received Mulligan's technique. Moist heat pack and conventional exercises were given to both groups. Purpose of this study was explained to the patients. An informed consent was taken from each patient prior to participate in this study. This study was conducted at physiotherapy OPD, Chhatrapati Shivaji Subharti hospital, Swami Vivekanand Subharti University, Meerut India.

**Result:** In both groups, p-value was significant i.e.,  $p < 0.05$  with SPADI and ROM score (0.0000), (0.0000) and (0.0000). The 4 weeks protocol of Maitland and Mulligan's showed difference in both group individually in improving ROM and decreasing the pain and disability but group B, Mulligan's technique showed statistically more significant difference in decreasing pain, disability and ROM.

**Conclusion:** 4 weeks, both manual technique resulted in significant effect in both groups individually in improving range of motion and decrease in pain and disability but group B received Mulligan's technique showed statistically more significant difference in pre to post SPADI and ROM score in order to decrease pain, disability and increase in ROM.

**Keywords:** VAS; SPADI; ROM; Maitland's Technique, Mulligan's Technique.

### Introduction

Adhesive capsulitis is a condition of unknown aetiology characterized by a progressive, painful

restriction of all joint motion, chronicity and slow spontaneous restoration of partial or complete motion over months to year<sup>1</sup>. When the cuff or the intra-articular biceps tendon is rendered ineffective by tears, degeneration and elongation, plus superimposed muscles weakness (result of inactivity), the upward thrust of the deltoid act alone and, at about 45° of abduction, the tuberosity impinge on the coraco-acromial arch, and further gleno-humeral movement is limited<sup>2</sup>. The Pattern in which frozen shoulder usually is developed may be described as 3 times periods of six months<sup>3</sup>. First phase, freezing phase shows as insidious onset where pain is dominating the clinical picture. Subacromial impingement is initially suspected because of the involvement of the subacromial bursa.

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At the end of this period range of motion becomes limited in the typical way and diagnosis is usually no longer a problem. This can last anywhere from 6 to 9 months<sup>4</sup>. Second phase, frozen Phase which shows reduction of pain but the restricted mobility remains. This stage can last 4 to 12 months. Third and last phase, throwing phase that includes successive re-establishment of normal or near normal range of motion. This can take anywhere from 6 to 2 years<sup>5</sup>. Adhesive capsulitis rarely occurs before age of 40 year unless an acute age of trauma followed by long periods of inactivity and anxiety or trauma<sup>6</sup>. Frozen shoulder occurs mostly between the age group of 40 to 60 year<sup>7</sup>. Women are affected more than men, the fact that women are more frequently affected, since women are more predisposed to developing thoracic kyphosis than men with adhesive capsulitis of shoulder joint<sup>8</sup>. Sedentary workers are more affected than labours from adhesive capsulitis<sup>9</sup>. Among neck pain, low back pain and knee osteoarthritis, adhesive capsulitis of shoulder joint is the most common musculoskeletal disorder faced by the elderly population globally. So, there is need of physiotherapeutic approach to give potential benefit in the management of adhesive capsulitis. The purpose of this study was to evaluate the effect of Maitland technique versus Mulligan's technique in reducing pain and disability in patients with adhesive capsulitis of shoulder joint.

### *Objective*

To evaluate the comparative effect of Maitland technique and Mulligan's technique in reducing pain and disability in patient with adhesive capsulitis

### **Hypothesis**

#### *Experimental Hypothesis*

There will be significant difference between effect of Maitland technique and Mulligan's technique in reducing pain and disability and improving range of motion in patients with adhesive capsulitis of shoulder joint.

#### *Null Hypothesis*

There will be no significant difference between the effect mulligan's technique versus Maitland technique in reducing pain and disability and improving range of motion in patients with adhesive capsulitis of shoulder joint.

### **Methodology**

It was a pre and post experimental design study. The patients diagnosed with adhesive capsulitis of shoulder joint which shows signs and symptoms and were requested to participate in study. The total number of patients 46 was enrolled in this study but on the basis of inclusion and exclusion criteria 30 subjects with male and female ratio 10:20. Patients were equally divided into two groups, group A and group B respectively. Group A received moist Maitland technique and group B received Mulligan's technique. Moist heat pack and conventional exercises were given to both groups. Purpose of this study was explained to the patients. An informed consent was taken from each patient prior to participate in this study. This study was conducted at physiotherapy OPD, Chhatrapati Shivaji Subharti hospital, Swami Vivekanand Subharti University, Meerut India.

### *Selection Criteria*

Patients with age between 40 - 60 year, gender both male and female, history of pain up to 4 months, Mean range of motion (ROM) of shoulder joint upto these degree's -flexion - 70, extension -30 abduction - 70, lateral rotation - 30, medial rotation - 30 were included. Age not above 60 years, trauma to cervical spine, trauma to shoulder joint, fracture to shoulder joint, any nerve compression, systemic conditions like hypertension, Diabetes Mellitus and cardiac disease, any surgery procedure around the shoulder joint, Rheumatoid disorder, bone and joints tumours congenital and acquired deformity at shoulder joint were excluded in this study.

### *Protocol*

After assessment of the patients, initially moist heat pack was given for 10 minutes for both groups to reduce muscle tightness and pain and to help improve extensibility of tissues. Position of the patient was supine lying on the plinth or sits on chair. Perform a skin sensation test over the neck region to be treated, wrap the heat pack in a towel (two layers) apply the heat pack over the shoulder region to be treated if the quick feels excessive hot to the patient or the therapist detects distinct skin colour change, more towelling should be added or the hot pack should be removed check the area after 5min.

### *Group A*

#### *Maitland Technique*

Position of the patients was supine lying and therapist stands towards the affected shoulder joint while improving all movements except extension which was performed in prone lying position.

#### *To perform Flexion*

One hand stabilised the gleno-humeral joint and another hand hold distal part of forearm and therapist do flexion while do the movement therapist elbow supports the patient elbow, and do movement up to no pain, then slightly increase the ranges.

#### *To perform Medial rotation*

Shoulder was abducted upto its maximum range and elbow flexed at 90 degree. One hand hold the distal part of the wrist another hand of therapist the elbow and form the same hand its elbow support the shoulder. From which hand the therapist hold the wrist do the external rotation upto range then increase the ranges.

#### *To Perform Abduction*

Patient was in supine lying position and therapist stand towards the affected side. One hand stabilised the gleno-humeral joint and another hand hold distal part of for humerus and therapist do abduction up to no pain, then slightly increase the ranges.

#### *To Perform Lateral Rotation*

Shoulder was abducted upto 90 degree and elbow flexed 90 degree. Therapist was stand towards the affected side. One hand hold the distal part of the wrist another hand of therapist the elbow and form the same hand its elbow support the shoulder. From which hand the therapist hold the wrist do the lateral rotation upto range then increase the ranges.

#### *To Perform Extension*

One hand stabilised the glenohumeral joint and another hand hold distal part of forearm and therapist do extension up to no pain then slightly increase the ranges.

### **Group B**

#### *Mulligan's technique*

#### *To perform Flexion*

Patient was in seated position and therapist stand in unaffected side with one hand placed the medial end of the affected side scapula and another thenar and hypothenar eminence of another hand placed along lateral border of scapula. Therapist asks the patient to raise his/her arm up from his side while therapist applies a postero-lateral glide, force over the head of humerus with the hand.

#### *To Perform Abduction*

Patient position was in seated position. Therapist stand in unaffected side with one hand over his affected scapula and the thenar eminence of other hand placed over the head of humerus. Therapist asks the patient to raise his/her arm from front while therapist applies a postero-lateral glide, force over the head of humerus with the hand.

#### *To Perform Internal Rotation*

Patient was in standing position. Therapist stand facing the patient affected side. Placed right thumb over his/her flexed right elbow. His/her hand should be as far behind his back as possible. Now placed the fingers and thumb in patient's axilla. Now glide the head of humerus down in the glenoid fossa using your right thumb while stabilising the scapula with left hand. Make sure left hand is stabilizing up and inwards. While this distraction is taking place, the patient internally rotate his shoulder, with the help of another hand.

#### *To Perform External Rotation*

Patient was supine and placed his /her shoulder up to its maximum range. Therapist was standing towards affected side. Therapist grasps the distal part of humerus posteriorly and another hand placed over the axilla and give distraction perpendicularly to the sternum. Therapist asks the patient to do external rotation upto its maximum range.

#### *To Perform Extension*

Patient was in standing position the patient's hand their back to the movement limitation or pain onset. Therapist was also in standing on the same as the affected shoulder and facing the patient, place web space of one hand up into the axilla to stabilise the scapula in a medial and superior direction. And another hand is placed in the cubital fossa of the patient flexed elbow, with the palm facing towards the therapist. Patient asks the patient to take his/her hand backward upto the pain free range.

**Result**

**Data Analysis**

All analysis was obtained using SPSS version 20.0. Demo graphic data of the patients including age and gender were summarized. The dependent variables for the statistical analysis were disability and ROM. A base line data was taken at the beginning of the study (pre-test values) and after the completion of the treatment (post -test values) to analyze the difference between the two treatment groups;

independent t-test was used. A level of 5% was used to determine the statistical significance.

It shows difference in pre and post mean score of flexion range of motion in both groups. But in group B, shows more significant difference in order to improving flexion range of motion.

It shows difference in pre and post mean score of extension range of motion in both groups. But in group B, shows more significant difference in order

**Table 1 :** Pre and post score of flexion range of motion.

Groups	Mean		SD		SEM		t-test	p-value
	Pre	post	Pre	Post	Pre	Post		
Group A (Maitland)	125.33	147.33	13.02	12.79	3.36	3.30	-15.19	.000
Group B (Mulligan)	120.67	154.33	17.5	16.56	4.52	4.27	-19.54	.000

**Table 2 :** Pre and post score of extension range of motion.

Groups	Mean		SD		SEM		t-test	p-value
	Pre	Post	Pre	Post	Pre	Post		
Group A (Maitland)	35.67	44.33	4.57	1.75	1.18	.45	-8.40	.000
Group B (Mulligan)	30.67	43.00	3.71	2.53	.95	.45	-14.92	.000

to improving extension range of motion. It shows difference in pre and post mean score of

abduction range of motion in both groups. But in group B, shows more significant difference in order

**Table 3 :** Pre and Post Score of Abduction Range of Motion.

Groups	Mean		SD		SEM		t-test	p-value
	Pre	Post	Pre	Post	Pre	Post		
Group A (Maitland)	104.0	126.67	11.21	12.91	2.89	3.33	-12.47	.000
Group B (Mulligan)	96.33	130.67	10.76	13.34	2.78	3.44	-17.33	.000

to improving abduction range of motion. It shows difference in pre and post mean score of

medial rotation range of motion in both groups. But in group B, shows more significant difference in order to improving medial rotation range of motion.

**Table 4 :** Pre and Post Score of Medial Rotation Range of Motion.

Groups	Mean		SD		SEM		t-test	p-value
	Pre	Post	Pre	Post	Pre	Post		
Group A (Maitland)	42.67	58.00	8.63	6.49	2.22	1.67	-10.21	.000
Group B (Mulligan)	38.67	58.33	8.55	10.46	2.20	2.70	-9.13	.000

It shows difference in pre and post mean score of lateral rotation range of motion in both groups. But

in group B, shows more significant difference in order to improving lateral rotation range of motion.

**Table 5 :** Pre and Post Score of Lateral Rotation Range of Motion.

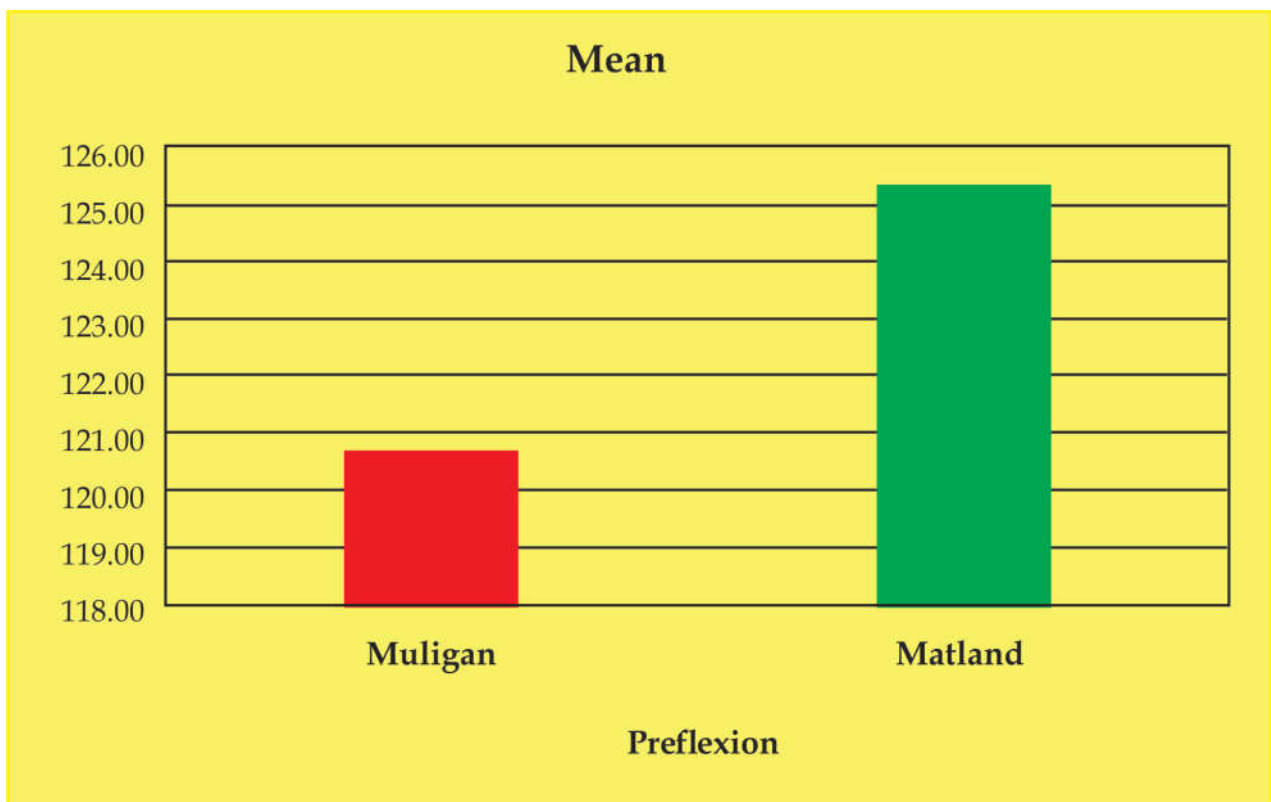
Groups	Mean		SD		SEM		t-test	p-value
	Pre	Post	Pre	Post	Pre	Post		
Group A (Maitland)	51.00	73.33	10.72	8.38	2.76	2.16	-9.36	.000
Group B (Mulligan)	40.67	67.33	8.20	10.99	2.11	2.84	-12.32	.000

It shows difference in pre to post mean score of SPADI in order to decrease in both groups. But in

Group B shows more significant difference in order to decreasing pain and disability.

**Table 6 :** Pre and Post SPADI Score.

Groups	Mean		SD		SEM		t-test	p-value
	Pre	Post	Pre	Post	pre	Post		
Group A (Maitland)	54.19	30.11	24.22	21.40	6.25	5.52	8.25	.000
Group B (Mulligan's)	51.42	19.24	17.51	8.73	4.52	2.25	9.28	.000



**Fig. 1 :** Average pre Flexion ROM scores

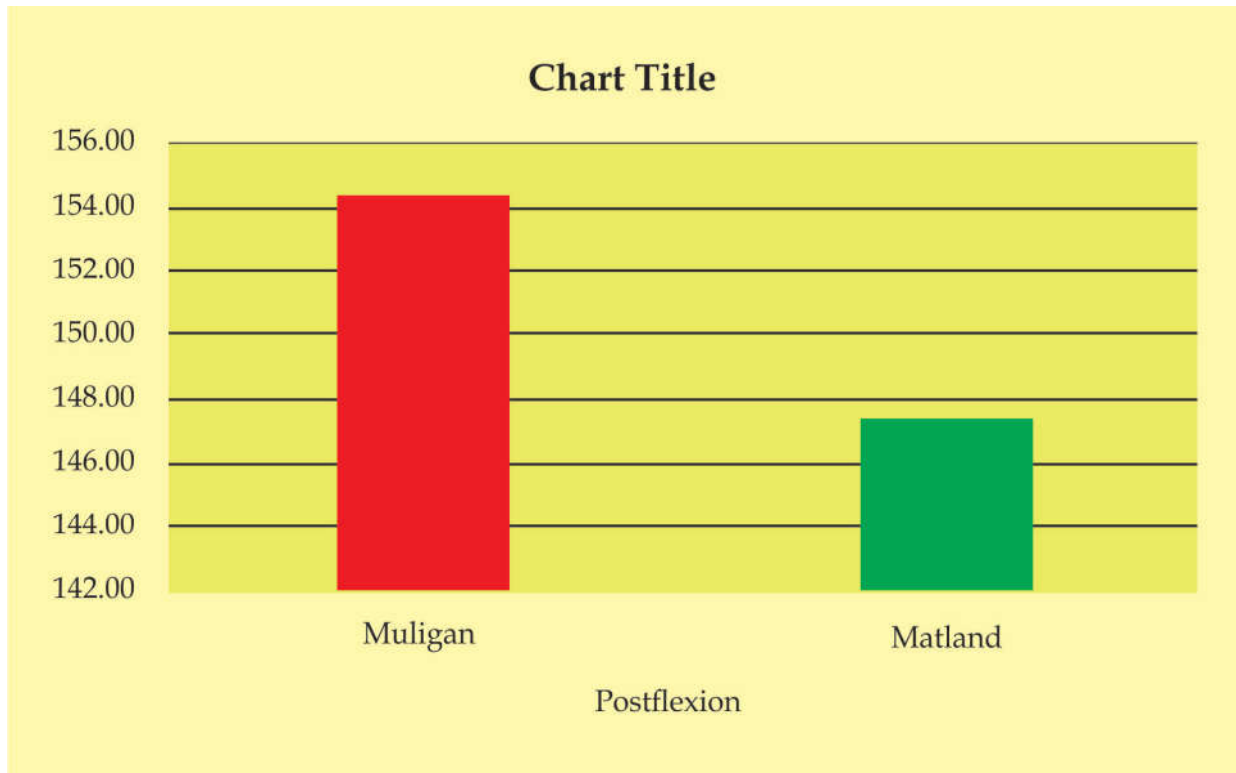


Fig. 2 : Average post Flexion ROM scores

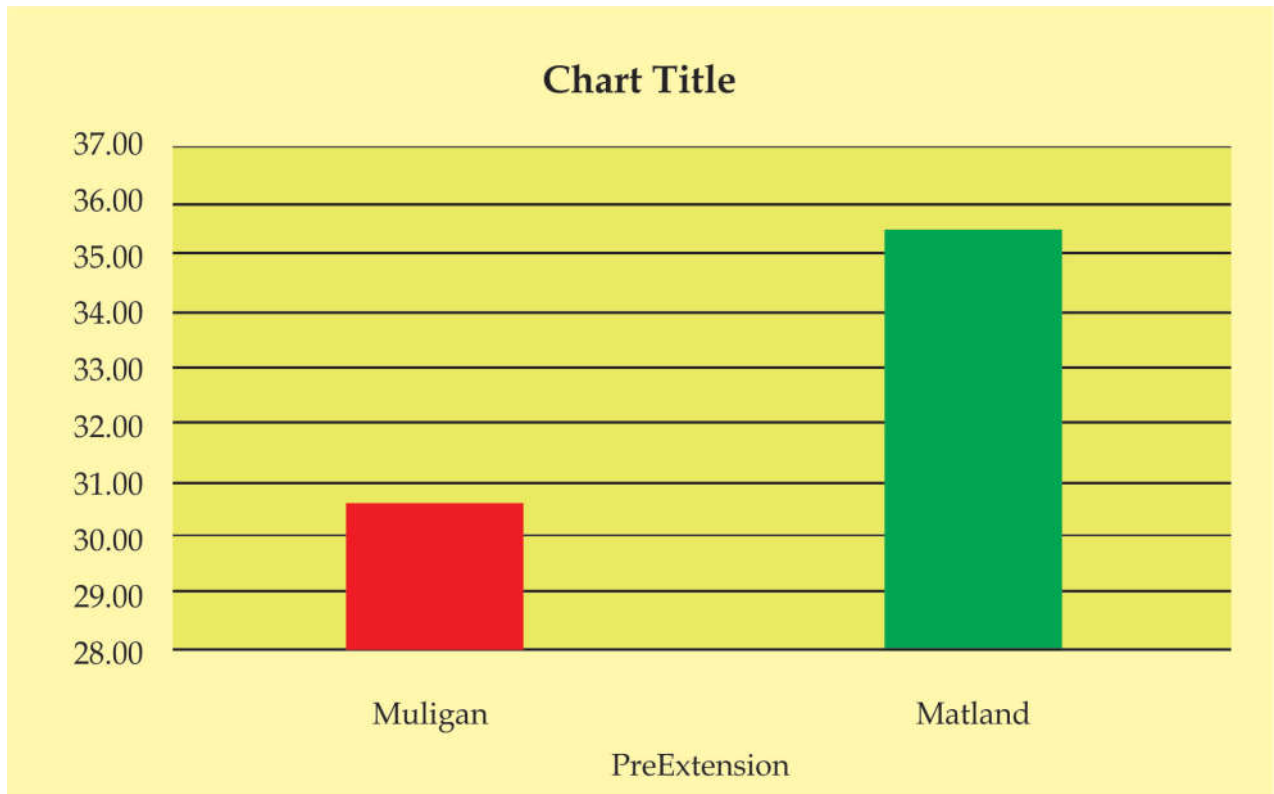


Fig. 3 : Average pre Extension ROM scores

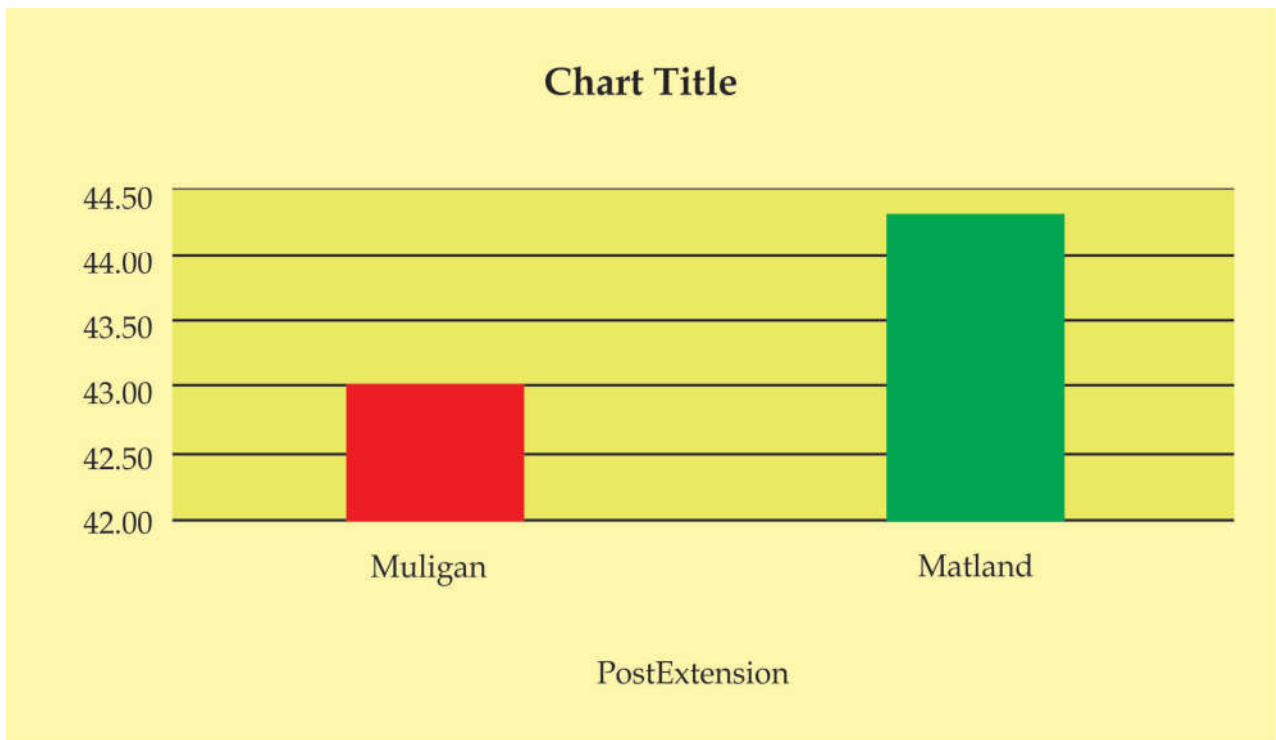


Fig. 4 : Average post Extension ROM scores

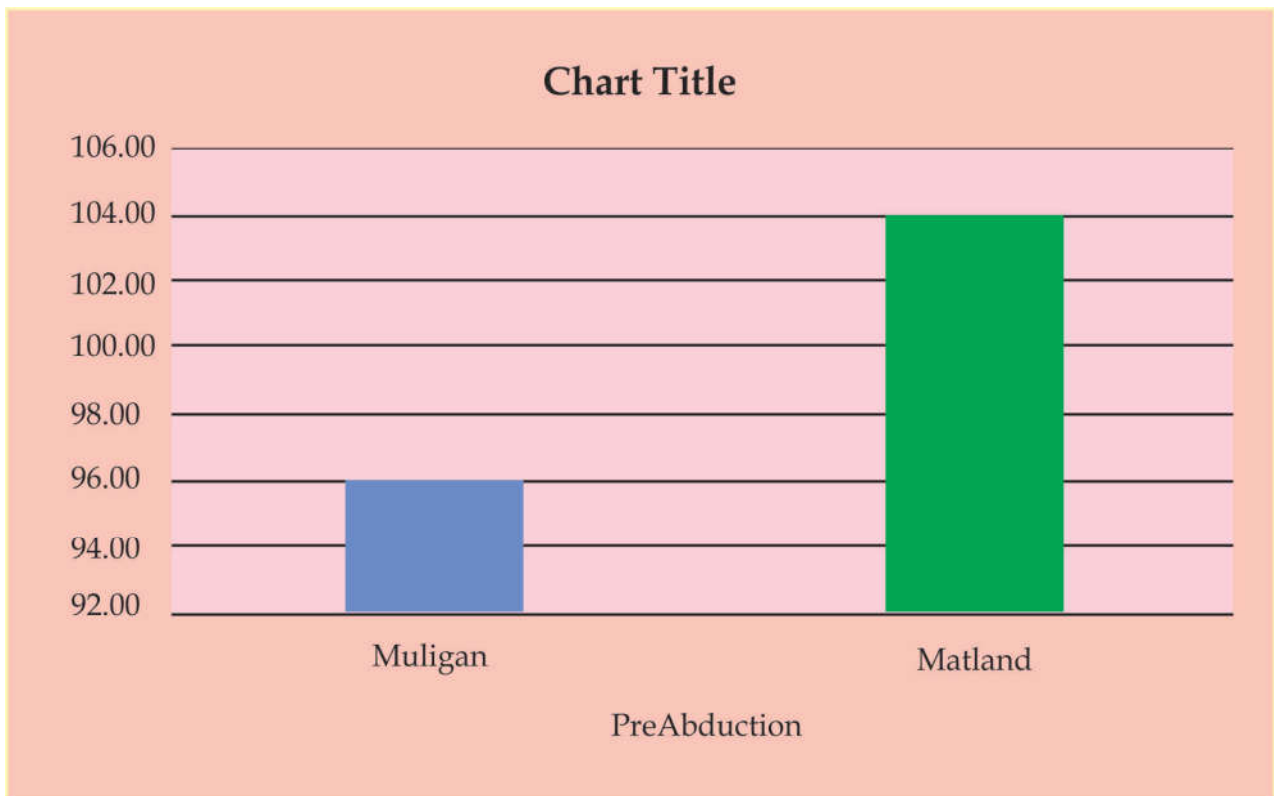


Fig. 5 : Average pre Abduction ROM scores

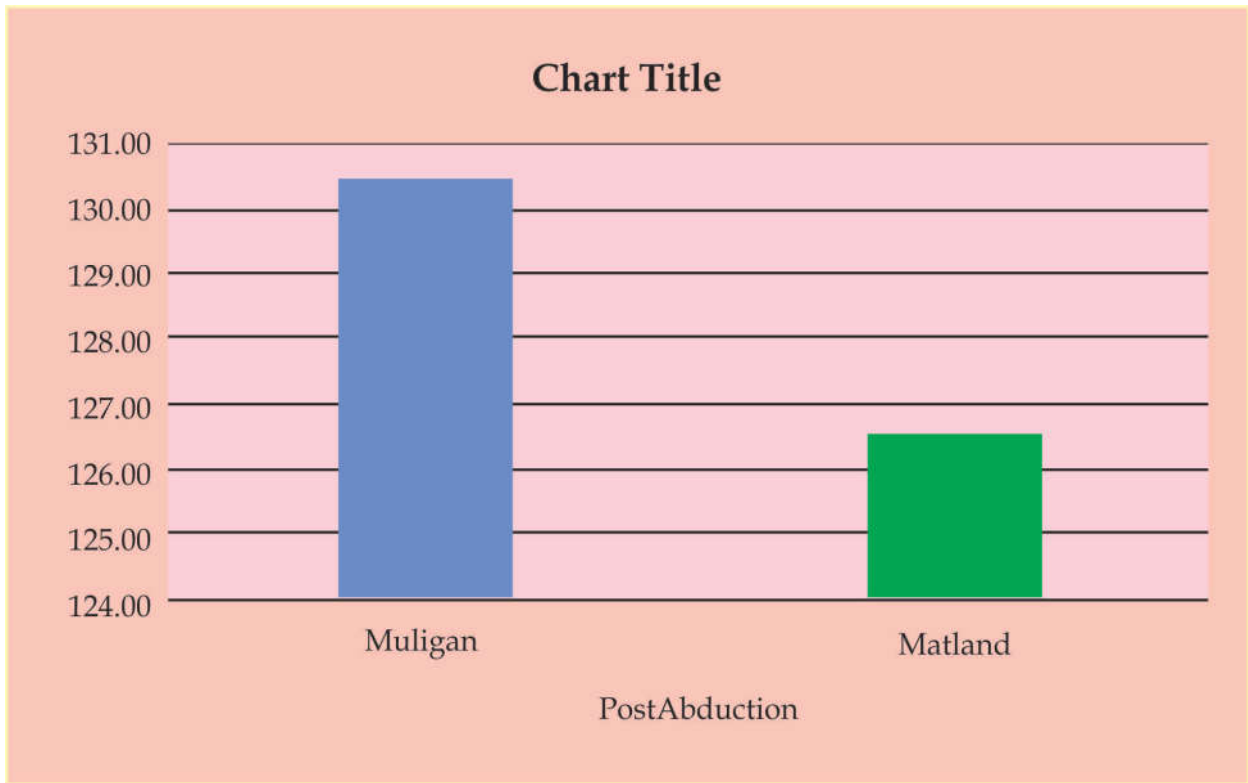


Fig. 6 : Average post Abduction ROM scores

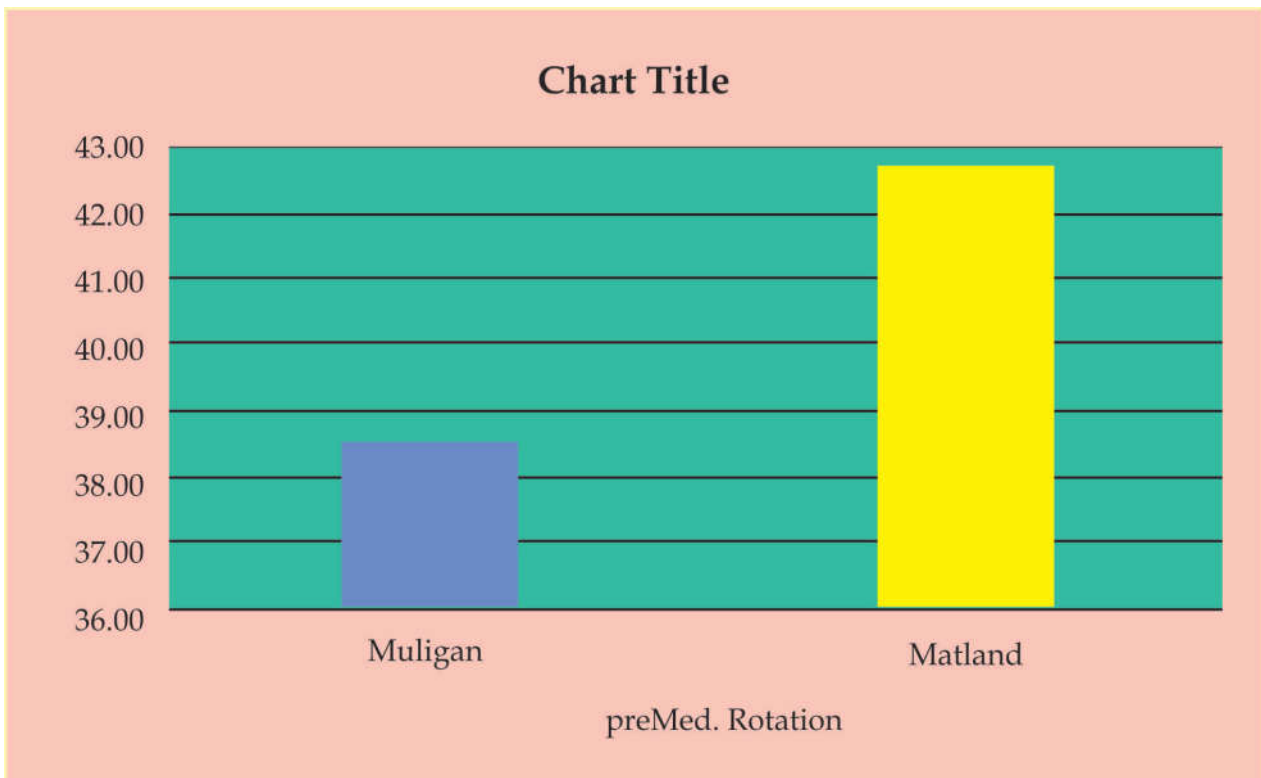


Fig. 7 : Average pre Medial Rotation ROM scores



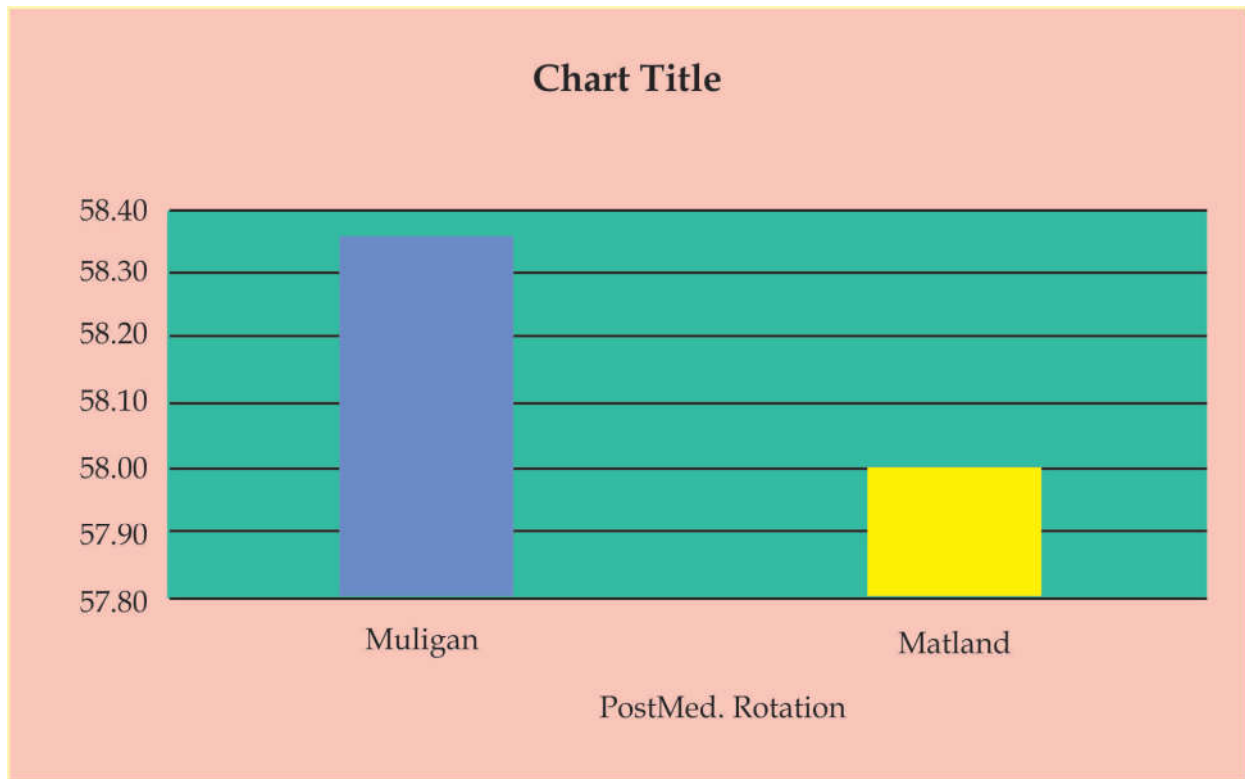


Fig. 8 : Average Post Medial Rotation ROM Scores

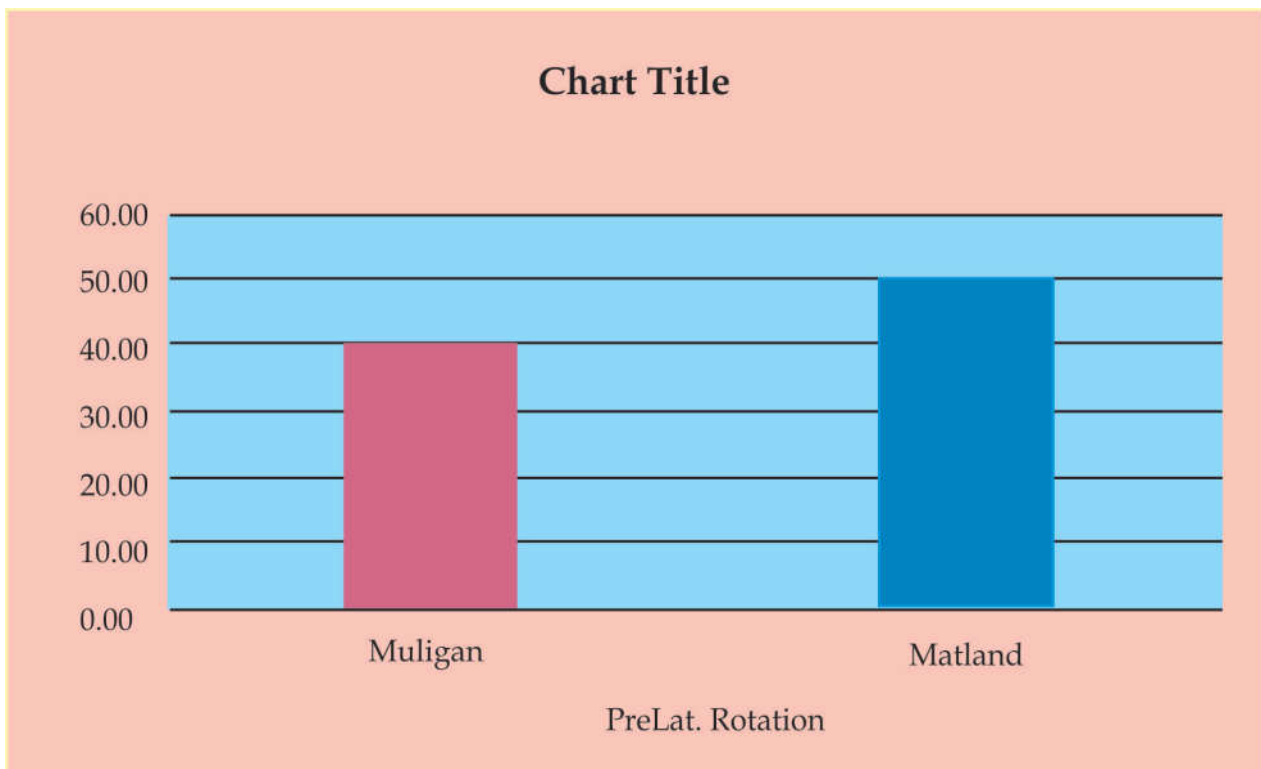


Fig. 9 : Average pre Lateral Rotation ROM scores

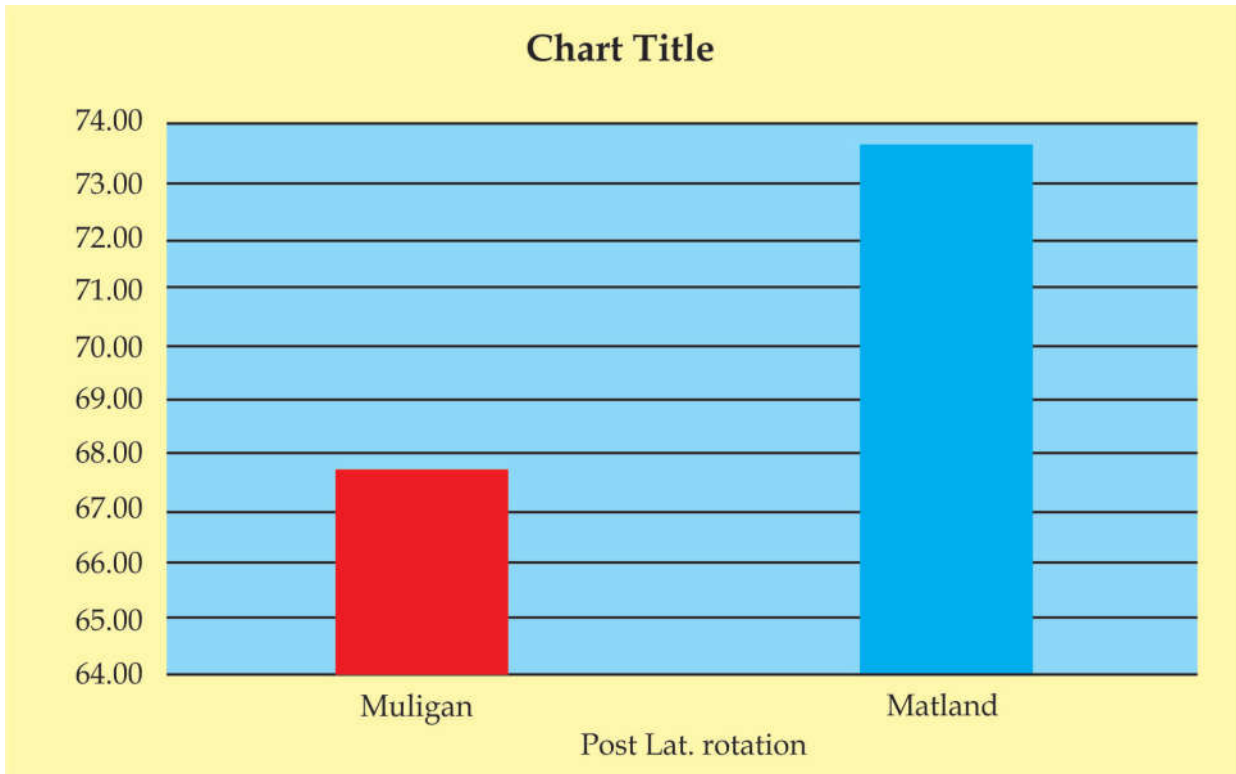


Fig. 10 : Average post Lateral Rotation ROM scores

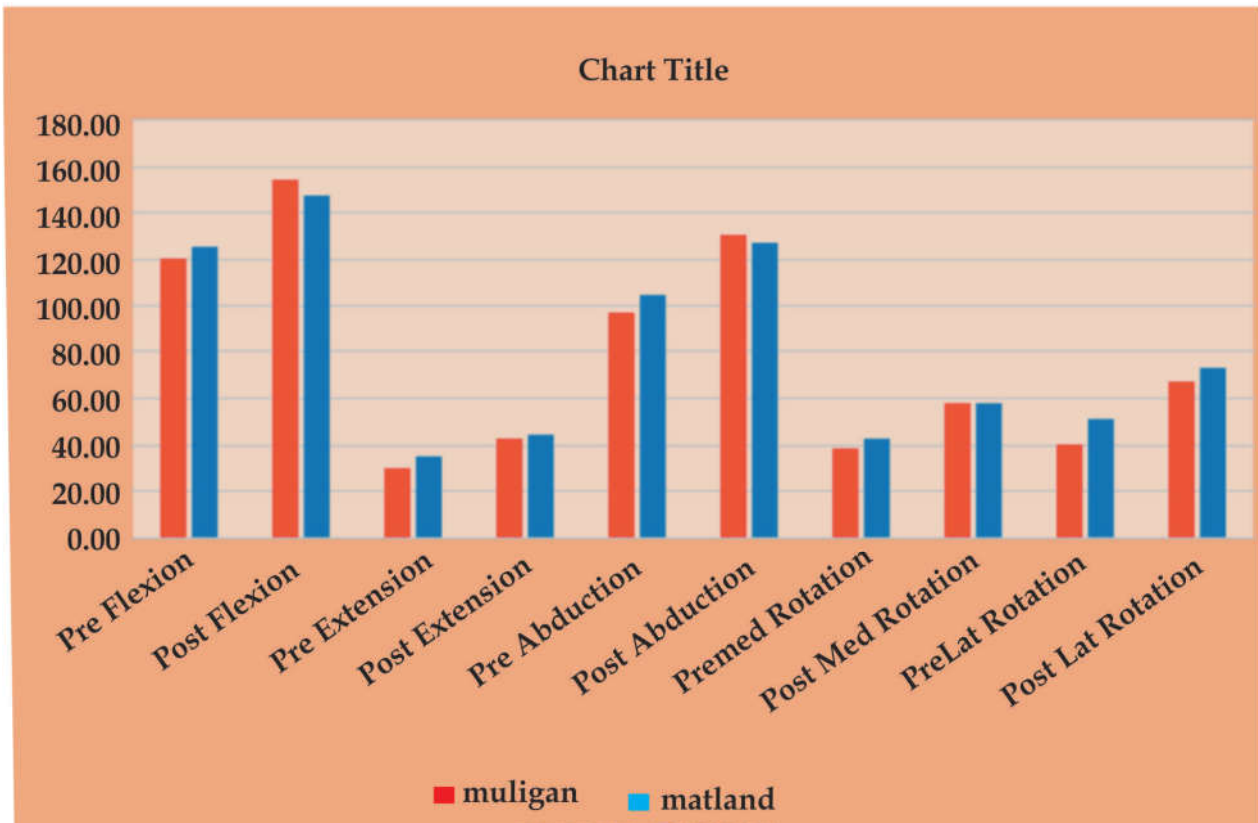


Fig. 11 : Average pre ROM and POST ROM scores

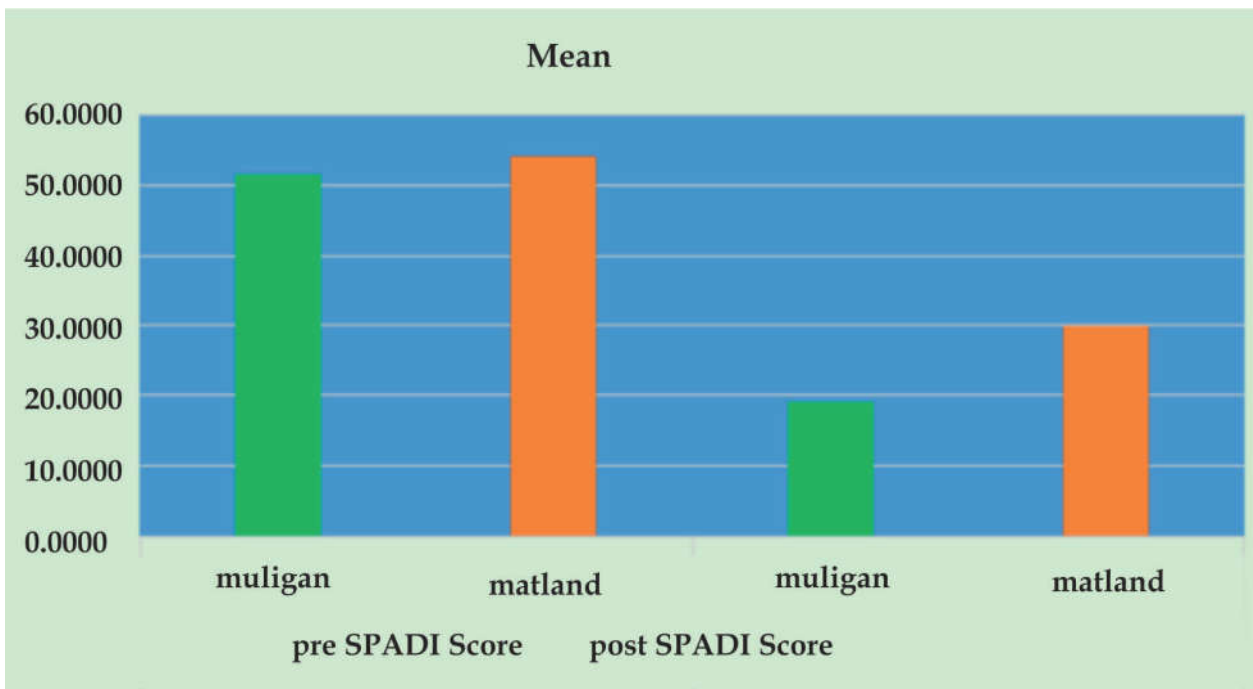


Fig. 12 : Average pre and post Shoulder Pain and Disability Index score (in%)

### Discussion

The purpose of this study was to evaluate the comparative effect between the Maitland technique and Mulligan's technique in patients with adhesive capsulitis of shoulder joint. 30 patients were participated in this study. In this study the patients were allocated in two groups, group A and B. In both groups, patients were first given hydro collator pack followed by Maitland technique and Mulligan's technique respectively. Before starting the exercises protocol the Shoulder pain and disability index (SPADI) and range of motion (ROM) was measured, similarly then readings also noted down after 4 weeks.

Data of ROM and SPADI of both groups for pre and post interventional study are expressed in terms of mean, S.D and S.E.M is shown in table-1,2,3,4,5,6 respectively. Further application, paired t-test was used to find out the significant difference between pre and post intervention study which revealed significance difference for the 15 patients each group individually at 5% level of significance. Within the group, pre and post values of SPADI and ROM were assessed by paired t-test in both the groups that showed in table 1,2,3,4,5,6 respectively. In both groups, p-value was significant i.e.,  $p < 0.05$  with SPADI and ROM score (0.0000), (0.0000) and (0.0000). The 4 weeks protocol of Maitland and Mulligan's showed difference in both group individually in improving ROM and decreasing

the pain and disability but group B, Mulligan's technique showed statistically more significant difference in decreasing pain, disability and ROM.

Gai Do Moon, Jin Yong Lim conducted a study on comparison of Maitland mobilisation and Kaltenborn Mobilisation techniques for improving pain and range of motion in patients with frozen shoulder. 20 subjects were participated in their study. The subjects were screened on the basis of inclusion and exclusion criteria and then they were requested to participate in the study. The demographic data including age, gender, affected area, Body Mass Index and duration of symptom were collected through data collection sheet along with initial assessment of outcomes measures. Pain was assessed by Visual Analogue Scale (VAS), functional disability by Range of Motion (ROM) for flexion, Extension, abduction, Lateral and Medial Rotation. After this initial evaluation they were allocated into two groups, Group A (antero-posterior oscillation) and Group B (posterior translation). Both groups received the selected treatment for 12 therapy sessions three times per week with warm up and cool down period. On completion of the treatment on 12th day, post interventional assessment was done for the 2 outcome measures and documented for analysis. This study concluded that posterior Maitland and Kalterborn mobilisation techniques are effects for improving pain and range of motion<sup>10</sup>

Another study was conducted by GokhanDoner PT, Msc, ZeynepGuven, MDon the effect of Mulligan's technique for relieving pain and improving functional capacity of shoulder in patient with adhesive capsulitis in stiffness phase. 40 patient were participated in their study. All patients were assessed before and after the treatment. The demographic data include age, gender, and duration of symptoms. Pain was assessed by VAS, AROM, PROM, constant score, and shoulder disability questionnaire. After this initial evaluation they were allocated into two groups, each group contain 20 patients. Group 1 were treated with hot pack, TENS and passive stretching exercise. Group 2 were treated with hot pack, TENS, Mulligan's technique. Both groups received the selected treatment for 5 days per week for 3 weeks with warm up and cool down period. On completion of the last day, post interventional assessment was done for the outcome measures and documented for analysis. This study concluded that Mulligan's technique led to better improvement<sup>11</sup>

There is less empirical data found related to this study which shows a significant effect of comparison of Maitland and Mulligan technique in patient with adhesive capsulitis. But in this study, statistical difference showed in pre and posts SPADI and ROM score in both groups. Finally, Group B that received Mulligan's technique showed significant difference in order to decrease pain, disability and increase range of motion of the shoulder joint.

#### *Limitations of Study*

- Small sample size
- Short duration
- No control group was included
- Only pain and disability were included

#### **Conclusion**

The study shows that the techniques used were effective for reducing pain, disability and improving ROM. The significant difference was found between the effect of both manual therapies in order to reduce pain disability and improving ROM. After seeing the tables and graphs, Group B showed statistically more significant reduction in order to reduce pain, disability and improvement in ROM. Therefore, Mulligan's technique may be incorporated into the treatment regimen of the patient undergoing physiotherapy for the pain and disability in adhesive capsulitis. Study conclude that the difference from 1st to 28th day in SPADI and

ROM score in both groups/therapies which shows that both groups A and B i.e. Maitland technique and Mulligan's technique reduced pain, disability and increase ROM. In both groups, p-value was significant i.e.,  $p < 0.05$  with SPADI and ROM score (0.000) and (0.000). Further application, graphs (1 to 8) showed average difference of SPADI and ROM showed 1st to 30th respectively and Graph - 12 showed that average difference in pre and post SPADI, ROM scores was significant in both groups but group B showed statistical significant difference of pre to post SPADI and ROM score in order to decreased pain, disability and in improving range of motion.

4 weeks, both manual technique resulted in significant effect in both groups individually in improving range of motion and decrease in pain and disability but group B received Mulligan's technique showed statistically more significant difference in pre to post SPADI and ROM score in order to decrease pain, disability and increase in ROM.

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