



Effect of muscle energy technique on pain, disability and shoulder range of motion in patients with adhesive capsulitis.

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ABSTRACT: Adhesive capsulitis (frozen shoulder) is an insidious painful condition with gradual restriction of all planes of movement in the shoulder. Muscle energy techniques are class of soft tissue osteopathic manipulation consisting of isometric contraction design to improve musculoskeletal function and reduce pain. Methods- Patients were divided into two groups, Group A (15 participants) and Group B (15 participants). Group A (experimental group) patients were treated with Muscle energy techniques for shoulder along with Conventional treatment. Group B (control group) patients were treated with Conventional physiotherapy treatment only. We measured the range of motion, pain and disability of shoulder at 0 day, 2nd week and 4th week. At the end of 4th week analysis was done using paired and unpaired t-test and significant results were found. Result-Both the groups showed significant difference and improvement after treatment. However, greater magnitude of % improvement was observed in the Group A i.e. the experimental group than the Group B i.e. control group. Conclusion- Muscle energy technique along with conventional treatment was significantly effective in improving pain, disability, and range of motion in adhesive capsulitis patients.

KEYWORDS: Visual Analog scale, Shoulder pain and disability index, Ultrasound Therapy, Hot pack, Codman's exercises, AROM.

I. INTRODUCTION

Shoulder pain is the third most common cause of Musculo-skeletal disability after Low Back Pain and Neck Pain (Neviser JS 1989). In 1992, The American shoulder and elbow surgeons' society agreed on the following definition of Frozen Shoulder by consensus: "a condition of uncertain etiology that is characterized by clinically significant restriction of active and passive shoulder motion that occurs in the absence of a known intrinsic shoulder disorder (Harryman DT at el 2004).

Frozen shoulder or adhesive capsulitis or shoulder peri-arthritis affects 2-5% of the population

and is most common in the 40-60 year old age group (Wolf J M et al 2002). Approximately 70% of frozen shoulder patients are women. However, males with frozen shoulder are at greater risk for longer recovery and greater disability. Bilateral involvement occurs in 10-40% cases. The incidence of adhesive capsulitis in people with diabetes is up to 20% (Kulkarni 1999). An Indian study documented prevalence of adhesive capsulitis of shoulder between 50 to 70 years of age group. The same study reported diabetes mellitus and monotonous life style as risk factor for the onset of illness (Rauoof MA at el 2004). A study has reported prevalence of adhesive capsulitis in males and females for ratio of 1.8:1 of 11 percent rheumatic disease. The same study defines manual labor and psychiatric conditions as risk factors for the condition (Hasan SA at el 2009).

Hannafin described adhesive capsulitis in four stages, Stage I (Pre-adhesive stage): in which lining of the joint (synovium) is inflamed depicts little or no restriction of glenohumeral motion and ROM is limited by pain. Stage II (Freezing stage): Acute adhesive synovitis with proliferative synovitis and scar formation of the underlying capsule and ROM is limited by pain and stiffness. Stage III (Frozen stage): Marked stiffness due to scar formation in the capsule with loss of axillary fold causes limited ROM. Pain limits end ROM. Stage IV (Thawing stage): Chronic stage presenting with fully mature adhesions with notable restriction of ROM. In Stages II and III of frozen shoulder, ROM is significantly restricted and limited by pain (Hannafin JA et al 2000). Patients with Frozen Shoulder have difficulties in everyday activities (dressing, grooming, and performing overhead reaching activities and so on for a period of several months to several years) and shoulder pain disturbing sleep at night on the affected side, which is a key diagnostic sign (Jewell DV et al 2009, Bunker TD 1995).

Conservative treatment includes various exercise methods and physical therapy modalities such as hot-therapy, Transcutaneous electrical nerve



stimulation (TENS), Ultrasound (US), Acupuncture and LASER (Light Amplification by Stimulated Emission of Radiations). Exercise programs consist of active and passive ROM exercises, stretching exercises guided by a physiotherapist, self stretching, manipulation and mobilization techniques, strengthening exercises, patient education and home exercises. . By applying appropriate treatment techniques in a creative and judicious manner, the physical therapist can do much to enhance the speed and degree of recovery from frozen shoulder. More controlled studies, however, are needed comparing the combined effects of different forms of treatment.

Muscle energy techniques (MET) are a class of soft tissue osteopathic manipulation methods that incorporate precisely directed and controlled patient initiated, isometric contractions, designed to improve musculoskeletal function and reduce pain. One of the main uses of this method is to normalize joint range, rather than increase flexibility, and techniques can be used on any joints with restricted Range of Motion (ROM) identified during the passive assessment. The main effects of MET can be explained by two distinct physiological processes: Post Isometric Relaxation (PIR) and Reciprocal Inhibition (RI). (John Gibbon 2011) Post-isometric relaxation method of the muscle energy techniques was used to lengthen a shortened muscle and increase joint mobility. The joint is taken to its restricted range within the pain limits. 5-10seconds hold time of the hypertonic muscle with 20% of the patient's available strength. Reciprocal Inhibition is a resisted isotonic effort towards the barrier to facilitate afferent pathways at the conclusion of treatment with active muscular relaxation techniques or adjustments.

Thus this study very much needed and it aimed to compare the efficacy of muscle energy technique along with conventional treatment and conventional treatment alone to reduce the pain and disability and to improve the ROM of the shoulder in patients with adhesive Capsulitis.

II. MATERIALS AND METHOD

Patients were taken from the OPD of University college of Physiotherapy Faridkot and OPD of Orthopaedics Department of Guru Gobind Singh Medical College, Faridkot and written informed consent was received from all patients enrolled in the study. Thirty patients between the ages of 40-60 years were included, according to inclusion criteria i.e. 1. Patients diagnosed with unilateral frozen shoulder with limited Range of Motion of shoulder joint (grade II-III) according to Hannafin JA et al (2000). 2. Patients of both genders

were taken. 3. No physical therapy for shoulder was given to the patients 4-5 weeks prior to study. 4. Minimum 4 out of 10 on a VAS scale. 5. At least 65 out of 100 on SPADI chart.

Patients were divided into two groups, Group A (15 participants) and Group B (15 participants). Group A (experimental group) patients were treated with Muscle energy techniques for shoulder along with Conventional treatment. Group B (control group) patients were treated with Conventional physiotherapy treatment.

PROCEDURE:

Group A: 15 patients with adhesive capsulitis were treated with Muscle energy techniques along with Conventional treatment. Conventional treatment includes moist heat, ultrasound and exercises. Moist heat was given using a hot pack for a period of 20min with a coupling medium (layers of towels). Ultrasound was given in sitting with pulse ratio 1:4 and intensity of 1.5 W/cm² for 10 minutes (Ansari 2012). Active assisted exercises involved the patient to use the uninvolved arm, or use rope-and-pulley. The sustained hold, of 15-30 seconds should be maintained at the end ROMs with 20 repetitions per set. Codman's exercises perform 10 resolutions in each direction. As the symptoms improve, increase the diameter of swing but not forced it.

Post-isometric relaxation method of the muscle energy technique was used to lengthen shortened muscle and increase joint mobility. The joint was taken to its restricted range within the pain limits. 7-10 seconds hold time of the hypertonic muscle with 20% of the patient's available strength is used. Muscle energy technique was applied for 3 repetitions per set, 1 session per day, 3 days a week for 4 weeks. Patients were instructed to perform exercise sessions daily at home on rest of the days.

(MET) Restriction of external rotation:

Position: Left lateral recumbent for right side and vice versa.

Procedure: Therapist stood behind the patient. Therapist left hand was placed superior to the patient's glenohumeral joint. Therapist right forearm was placed medial to the patient's flexed right forearm and the therapist right hand support the patient's right hand and wrist. The elbow was held close to the patient's body. The patient's arm was externally rotated to an initial resistance. The patient was directed to attempt to internally rotate the arm by pressing the right hand against the equal counterforce of the therapist right hand. The patient's right elbow was used as the pivot joint. Forces were maintained long enough to sense the patient's contractile force at the localized segment



(7-10 seconds). The patient was asked to gently cease the directive force. Rest time of 2 seconds for the tissues to relax was given and then taken up the slack to the new point of initial resistance.

(MET) Restriction of Abduction:

Position: Left lateral recumbent for right side and vice versa.

Procedure: Therapist stood in front of the patient. Right hand was placed over the top of the patient's shoulder (superior part of scapula) to palpate the motion. The patient's flexed right elbow was supported with the therapist left hand and arm abducted to initial resistance. The patient was directed to press the elbow towards the body (adduct) against equal counterforce at the elbow. Forces were maintained long enough to sense the patient's contractile force at the localized segment (7-10 seconds). The patient was asked to gently cease the directive force. Rest time of 2 seconds for the tissues to relax was given and then taken up the slack to the new point of initial resistance.

Group B: 15 patients with adhesive capsulitis were given conventional treatment only same as in group A.

OUTCOME MEASURES:

Patients were assessed at baseline, 2nd week and 4th week by:

1. A standard plastic goniometer was used to measure active shoulder range of motion (abduction and external rotation).
2. Assessment of shoulder pain using VAS.
3. Assessment of shoulder disability using shoulder pain and disability index.

III. RESULT:

STATISTICAL ANALYSIS:

The data was described as mean and standard deviation, for normally disturbed data. Paired t test was used to compare between variable within each group, while student unpaired t test was used to compare between two groups. The P value was set at level less than 0.05.

GROUP A

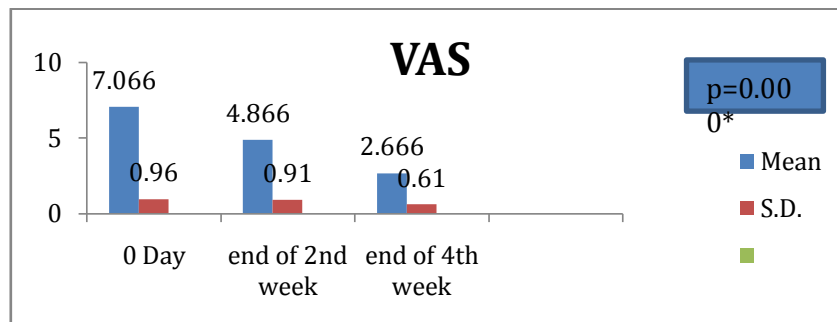


Table 1.1 describes the comparison of mean of VAS score in patients with adhesive capsulitis: 0 Day, 2nd week and 4th week of group A.

The calculated t-value of VAS was 12.602, 9.054, 13.719, which indicated that the difference was statistically significant at $p < 0.05$.

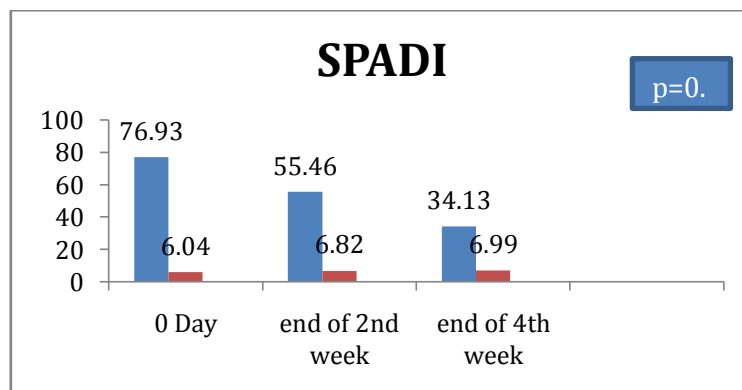


Table 1.2 describes the comparison of mean of SPADI score in patients with adhesive capsulitis: 0

Day, 2nd week and 4th week of group A. The calculated t-value of SPADI was 8.455, 12.402,



21.071 which indicated that the difference was statistically significant at $p < 0.05$.

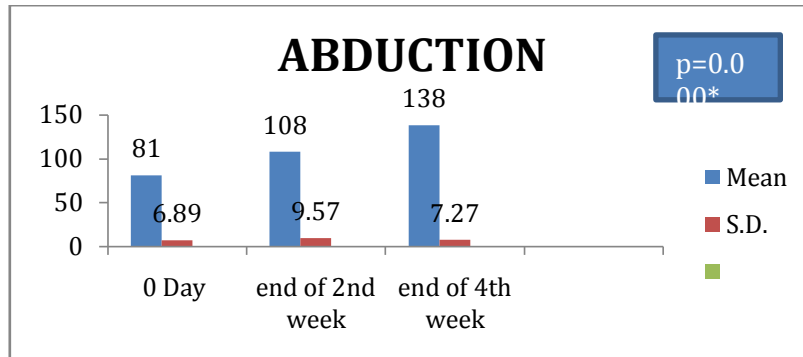


Table 1.3 describes the comparison of mean of Abduction ROM score in patients with adhesive capsulitis: 0 Day, 2nd week and 4th week of group A.

The calculated t-value of Abduction ROM was -15.617, -11.395, -22.155 which indicated that the difference was statistically significant at $p < 0.05$.

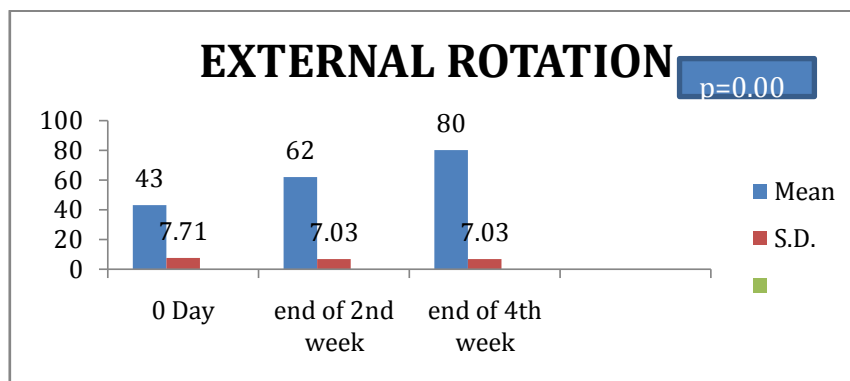


Table 1.4 describes the comparison of mean of External Rotation ROM score in patients with adhesive capsulitis: 0 Day, 2nd week and 4th week of group A. The calculated t-value of External Rotation

ROM was -10.640, -11.784, -13.771 which indicated that the difference was statistically significant at $p < 0.05$.

GROUP -B

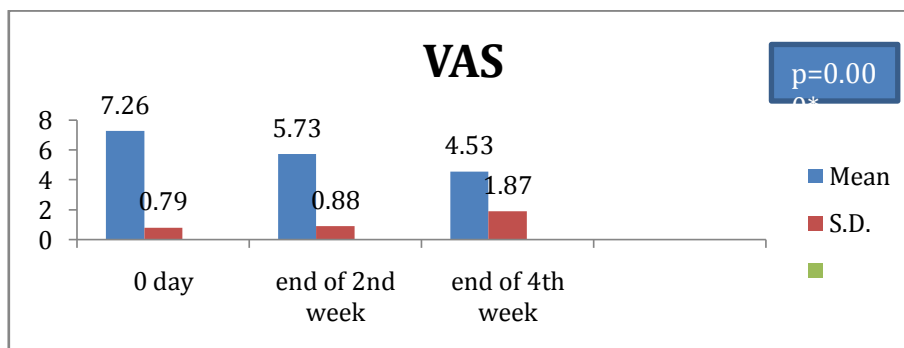


Table 2.1 describes the comparison of mean of VAS score in patients with adhesive capsulitis: 0 Day, 2nd week and 4th week of group B. The calculated t-

value of VAS was 7.122, 6.874, 9.103 which indicated that the difference was statistically significant at $p < 0.05$.

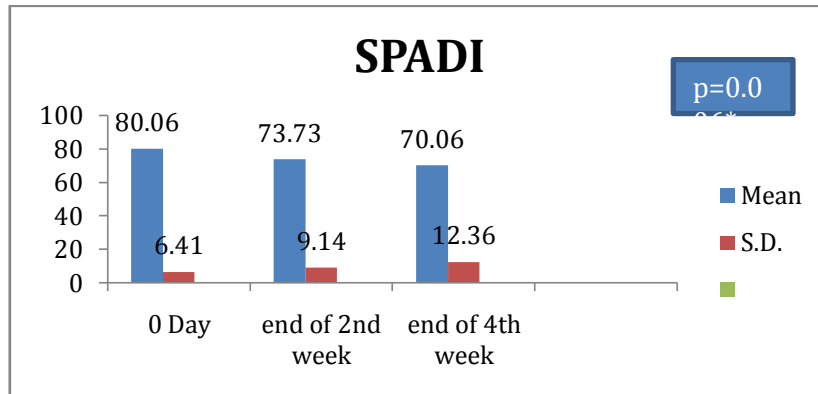


Table 2.2 describes the comparison of mean of SPADI score in patients with adhesive capsulitis: 0 Day, 2nd week and 4th week of group B. The

calculated t-value of SPADI was 2.969, 3.435, 3.164 which indicated that the difference was statistically significant at $p < 0.05$.

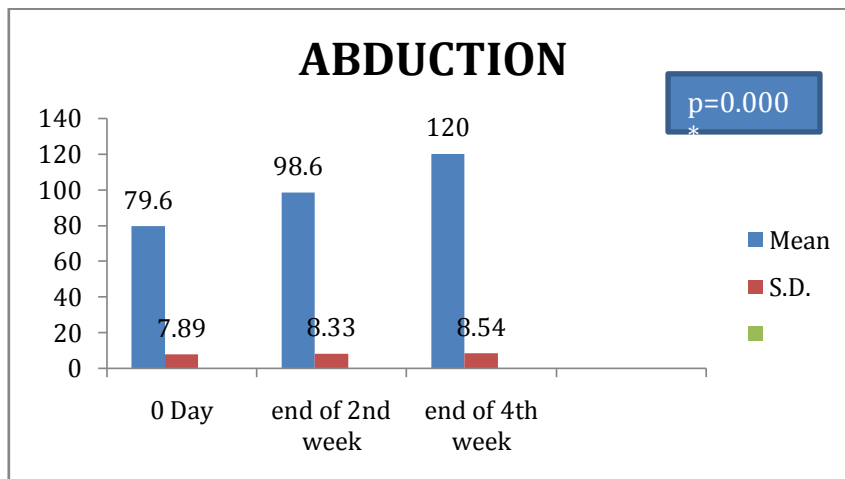


Table 2.3 describes the comparison of mean of Abduction ROM score in patients with adhesive capsulitis: 0 Day, 2nd week and 4th week of group B.

The calculated t-value of Abduction ROM was -8.084, -11.218, -15.001 which indicated that the difference was statistically significant at $p < 0.05$.

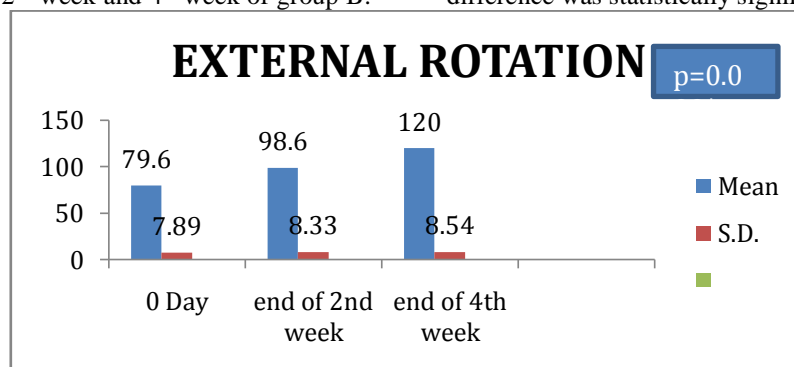


Table 2.4 describes the comparison of mean of External Rotation ROM score in patients with adhesive capsulitis: 0 Day, 2nd week and 4th week of group B. The calculated t-value of External Rotation

ROM was -7.321, -6.925, -10.017 which indicated that the difference was statistically significant at $p < 0.05$.



INTERGROUP

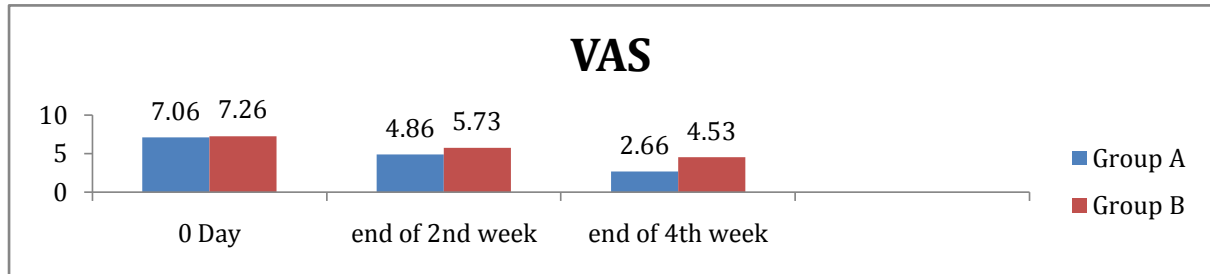


Table 3.1 describes the comparison of VAS score in between Group A and Group B in adhesive capsulitis patients. At the end of 4th week mean value of Group A 2.66 and Group B 4.53

which indicated that the pain score of Group A was less than Group B i.e. Group A shows better improvement than Group B.

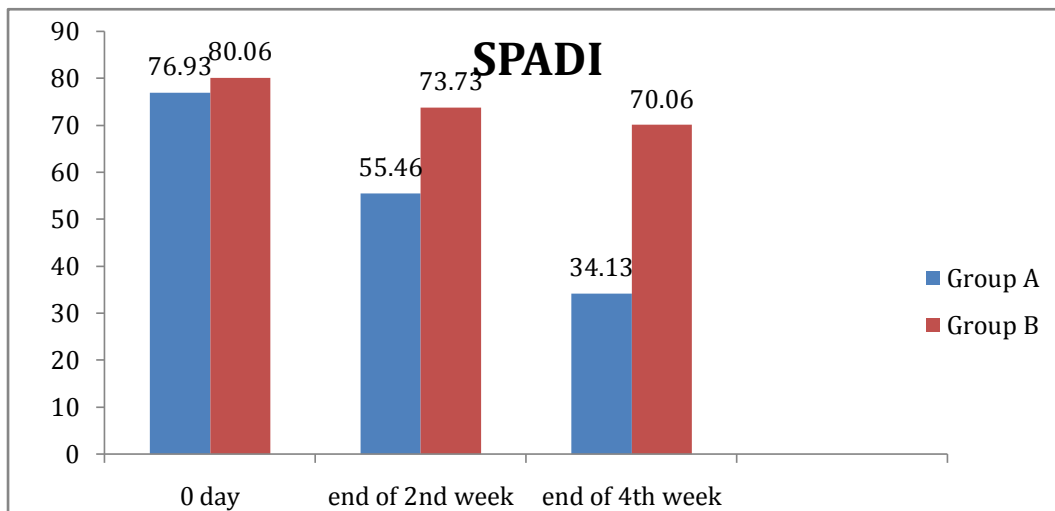


Table 3.2 describes the comparison of SPADI score in between Group A and Group B in adhesive capsulitis patients. At the end of 4th week mean value of Group A 34.13 and Group B 70.06

which indicated that the disability score of Group A was less than Group B i.e. Group A shows better improvement than Group B.

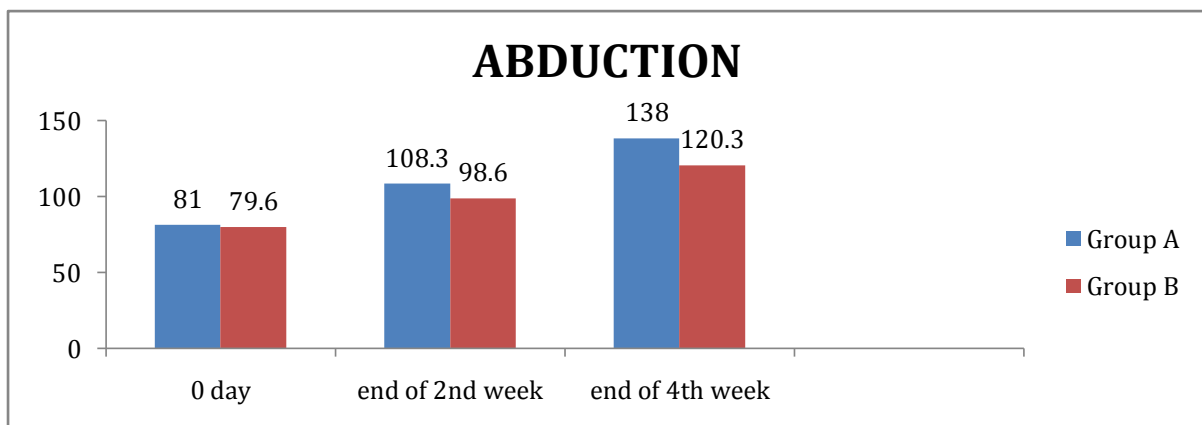




Table 3.3 describes the comparison of Abduction ROM score in between Group A and Group B in adhesive capsulitis patients. At the end of 4th week mean value of Group A 138 and Group

B 120.3 which indicated that the Abduction ROM score of Group A was more than Group B i.e. Group A shows better improvement than Group B.

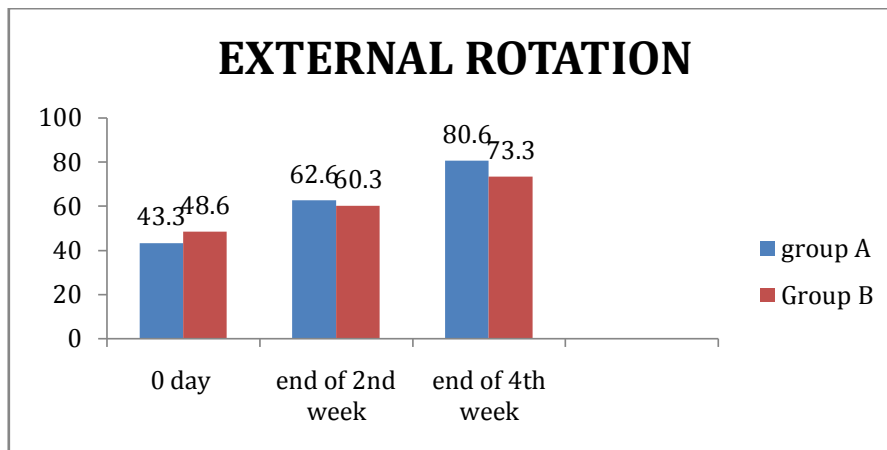


Table 3.4 describes the comparison of External Rotation ROM score in between Group A and Group B in adhesive capsulitis patients. At the end of 4th week mean value of Group A 80.6 and Group B 73.3 which indicated that the External Rotation ROM score of Group A was more than Group B i.e. Group A shows better improvement than Group B.

IV. DISCUSSION

In the present study, total 30 patients were selected and assigned randomly into two groups of 15 each. Experimental group received Muscle Energy Technique along with conventional treatment and Control group received conventional treatment only. The main objective of the study was to compare the effectiveness of Muscle Energy Technique alone or in combination with conventional treatment on pain, disability and Range of Motion in patients with adhesive capsulitis.

The pain, disability status and shoulder ROM of the subjects was assessed three times, pre intervention, mid intervention and post intervention through visual analogue scale, SPADI and Goniometer. Statistical analysis showed that both groups received treatment had an improvement in gleno-humeral joint motion with a decreased pain and disability score within group comparison. This showed significant changes in the improvement of pain, disability and ROM when compared the readings of VAS, SPADI and ROM between Group A (MET and conventional) and group B (conventional) from 0 day to end of 4th week of intervention. Hence, on the basis of our within

group analysis, we can say that both groups improved in pain, disability and ROM but in between group analysis group A showed better improvement on pain, disability and ROM.

The reduction in pain due to MET can be extrapolate on the basis of its neurophysiology ,as described by Chaitow that PIR refers to the subsequent reduction in tone of the agonist muscle after isometric contraction. This occurs due to stretch receptors called Golgi tendon organ that are located in the tendon of the agonist muscle. These receptors react to overstretching of the muscle by inhibiting further muscle contraction. In more technical terms, a strong muscle contraction against equal counterforce triggers the Golgi tendon organ. The afferent nerve impulse from the Golgi tendon organ enters the dorsal root of the spinal cord and meets with an inhibitory motor neuron. Lewit confirm this observation that the increased tension of the affected muscles and the resulting pain and dysfunction are both relieved by restoring the full stretch length of the muscle. The significance and efficiency of MET over conventional treatment was due to the difference in the rationale. The rationale was that loosening tight muscles in the region of joint restriction will result in a more comfortable, successful and easily administered adjustment. The muscle stretching was considered a preparatory procedure for primary intervention, the adjustment unfortunately situations exist where joint hypomobility and/or pain can interfere with the performance of muscle stretching (Lisi 2002).

There was evidence that MET procedures actually result in increased myo-electric activity of the target muscle. The clinical benefit derived from



MET stretching may be due to patients feeling more involved or confident in the procedure and willing to tolerate the discomfort of the stretch rather than any neurologic muscular relaxation. Thus MET was one of the interventions that can reduce pain and muscle rigidity, lengthen muscle fibers and increase ROM necessary for motor behaviour.

V. CONCLUSION

This study concluded that Muscle Energy Technique along with conventional treatment was effective in treating adhesive capsulitis. It was best analysed by using shoulder ROM, VAS and SPADI. Subjects received Muscle Energy Technique along with conventional treatment showed significant decrease in VAS, increase in range of motion and decrease in SPADI scoring as compared to subjects who had received conventional treatment only.

LIMITATIONS OF THE STUDY

1. The small sample size, so the results could not be generalized to population.
2. Age group was limited i.e. most of the patients was in 40 to 60 years age group.
3. Study involved short follow up.
4. Range of motion of all movements were not measured
5. Time period of the study was small.
6. Functional disability measurements and treatments were based only on the glenohumeral joint in the shoulder complex and hence may lead to variations in outcome.
7. Muscle strength and scapula humeral rhythm was not considered in outcome.

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