IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

"THE EFFECT OF INSTRUMENT ASSISTED SOFT TISSUE MOBILIZATION (IASTM) AND PNF IN REDUCING PAIN AND IMPROVES OVER HEAD REACH ACTIVITIES IN SHOULDER IMPINGEMENT SYNDROME"

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INTRODUCTION

Shoulder Impingement Syndrome is the most frequent cause of pain and overhead reach limitation in the shoulder area. It represents the third most frequent disease of the musculoskeletal system. Normal shoulder functions are dependent on the scapular humeral rhythm and rotator cuff muscles control. Disruption of the scapular humeral rhythm synergistic relationship may occur because imbalance in the shoulder muscles.

The subscapularis muscle is the most powerful of the rotator cuff muscles. It has an important role in shoulder movement and stability. Restriction of shoulder movement in most cases results from muscle spasm, which also restricts the flow of blood, lymph, and nerve signals in the area.

The shoulder is the most movable but unstable joint in the body because of the range of motion it allows. It is easily to subject to injury because the ball of the upper arms is larger than the socket that holds it. To remain stable, its muscles, tendons and ligaments must anchor the shoulder.

Shoulder pain and stiffness are common presenting symptoms in patients who seek evaluation from musculoskeletal physicians. A common quandary with this set of complaints exit in determining the cause and effect cycle of the symptoms. It is often difficult establish

which came first and whether pain results from stiffness or produces is to answer these important questions thorough understanding of the differential diagnosis and patho physiology of shoulder stiffness is necessary. The normal anatomy of shoulder joint is shown below.

SHOULDER JOINT

Many treatment methods are practiced clinically of management of Shoulder Impingement Syndrome. Some studies have shown that manual therapy and soft tissue mobilization may promote restoration of joint functions after an injury through elongation of shortened structures, which helps the restoration of range of motion. Manual therapy may promote proper restoration of joint function after an injury. As a treatment for Shoulder Impingement Syndrome, physical therapists often used subscapularis trigger release combined with Proprioceptive Neuromuscular Facilitation (PNF) procedures, both of which are used to induce changes in myofascial length.

Contract-relax PNF procedures have been shown to be effective in increasing shoulder range of motion (ROM). The hold-relax technique is also called the contract-relax technique and is a technique in which the muscle is stretched isometrically, contracted for 10–15 seconds, briefly relaxed for 3–5 seconds, and then immediately subjected to a passive stretch that stretches the muscle even further than the initial passive stretch. This final passive stretch is held for 10–15 seconds. The muscle is then relaxed for 20 seconds before the PNF technique is performed. Few studies on glenohumeral external rotation and overhead, reach exist that prove which treatments are best for immediately minimizing pain in patients with Shoulder Impingement Syndrome. The aim of this study was to evaluate the effects of IASTM and PNF on reducing the level of pain and improving the glenohumeral external rotation and over head reach activities in patient with shoulder impingement syndrome.

MATERIALS AND METHODOLOGY:

MATERIALS:

- Treatment couch
- Pillows
- Goniometer
- Blankets
- Towels
- Chair with armrest
- Ultrasound gel
- Cotton
- IFT
- Inch tape

STUDY DESIGN: Pre and Post Experimental study

STUDY SETTING: The study was carried out at Physiotherapy Department of Dharshan hospital, Erode.

STUDY POPULATION: 40 to 50 years

SAMPLE SIZE : Sample size in 30 Patients
Experimental Group – 15 Patients
Control Group – 15 Patients

STUDY DURATION: 8 months

STUDY SAMPLING: Convenient Sampling

TREATMENT DURATION: 2 weeks

CRITERIA FOR SELECTION

INCLUSION CRITERIA :

- Age group of between 40 to 50 years age people
- Patient diagnosed with pain and stifness of the shoulder
- Both Genders.
- Patient with stage 2 or stage 3 of shoulder Impingement Syndrome.

EXCLUSION CRITERIA :

- Pinching pain and redness
- Patient who have undergone a surgical procedure of the shoulder less than 4 weeks prior to study enrollment
- Patient who have undergone total shoulder arthroplasty
- Patient with reflex sympathetic dystrophy
- Patients with rheumatoid arthritis
- Patient with glenohumeral arthritis
- Patient with neoplasms in and around the shoulder joint
- Patient with surgical pathology

PROCEDURE:

Patients were selected by convenient sampling method. Thirty Patients who fulfilled inclusion and exclusion criteria were selected by convenient sampling method, out of them 15 were in Experimental Group and 15 in control group. The patients were clearly explained about the study and written informed consent was obtained from the subjects who fulfilled criteria. After completing the informed content and they were explained about the scale and the scale was administered. Proper instruction such as purpose, safety measures,comfort,precautions and psychological support were given to the subject. All vital signs were checked. While doing the assessment, the subjects willingness to continue the procedure with or without rest was given preference. Both groups subjects were involved for pre test assessment.

Experimental Group underwent IASTM and PNF Technique. Control Group underwent IFT and Ultrasound therapy for shoulder muscles. The total duration is 30 minutes. Measurements of pain, external rotation and over head reach activities were made for all subjects before and after receiving either the experimental or control intervention. Pain was measured using (VAS). Glenohumeral external rotation was measured with the subjects lying supine on a treatment table with a pillow under their knees. Stabilization of the scapula was achieved by depressing the shoulder girdle. Reference lines for abduction were drawn on the skin over the midline of the sternum and the anterior aspect of the midline of the humerus. A reference point was also drawn on the skin over the anterior aspect of the acromion. In addition, a reference line was drawn on the skin over the ulnar aspect of the forearm. Overhead reach was measured with the subjects in a standing position facing a wall, with the tips of their toes aligned with a pre marked line on the floor from the wall. The subjects were asked to actively walk their fingers up the wall to reach as far as they could. Overhead reach was measured as the distance in centimeters from the floor to the tip of the middle finger using a tape measure.

TREATMENT

EXPERIMENTAL GROUP

The subjects in the treatment group received Instrument Assisted Soft Tissue Manipulation (IASTM) of the subscapularis, followed by PNF. The subjects were positioned with the humerus abducted to 45° with elbow flexed to 90°, and the humerus was externally rotated to a midrange position, typically about 20° to 25° of external rotation. The subscapularis was palpated in the axilla and treated over the taut bands / trigger points with IASTM for 10 minutes. The IASTM was followed by contract-relax PNF for the subscapularis and other glenohumeral medial rotators, beginning in the same position used for the IASTM. The patients were instructed to perform maximal glenohumeral internal rotation against an opposing, isometric, manual resistance applied by the treating physical therapist for 10 seconds.

Afterwards, the patient actively moved the humerus into full available external rotation. This position was maintained for 30 seconds. This 10-second internal rotation contraction against resistance followed by full active external rotation was repeated 3-5 times. Subjects were then instructed to actively move through the PNF flexion-abduction external-rotation diagonal pattern for 7-10 repetitions with manual facilitation. The total time is about 30 minutes.

CONTROL GROUP

The subjects were then made to sit in a comfortable position with back support. The arm was abducted to 45 and the forearm was rested on the pillow for support. Ultrasound therapy was given to the subscapularis muscle insertion at the shoulder region for 10 Mins and IFT was given for 15 Mins. The total duration of the treatment was 30 minutes.

After 3 weeks of treatment post reading for pain, external rotation of shoulder and overhead reach were recorded.

DATA PRESENTATION AND STASTISTICAL ANALYSIS

STATISTICAL TOOLS

The statistical tools used in the study are paired t-test and unpaired t-test. The paired t-test was used to find out the statistical significance between pre and post t-test values before and after treatment for Experimental Group and Control group. The unpaired t-test was used to compare the statistically significance difference of VAS, ER and over head reach activities for Experimental and Control Group before and after treatment.

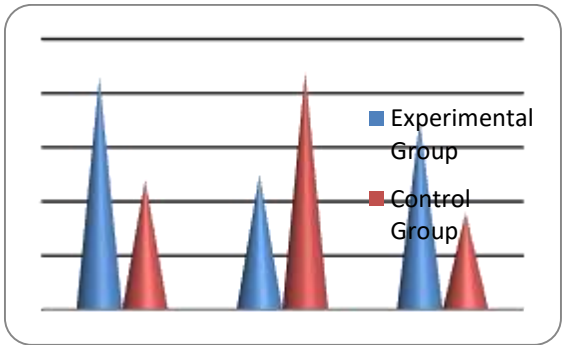
Comparison of Mean Difference, SD and Paired ‘t’ test value of VAS, ER and Over Head Reach

Parameters	Mean		SD		Paired ‘t’ Test Value	
	Exp Group	Control Group	Exp Group	Control Group	Exp Group	Control Group
VAS	1.8	3.3	1.4	1.3	25.6	14.6
ER	44.62	34.57	3.5	3.1	23.2	20.9
Over Head Reach	110	84.33	7.85	7.11	75.6	55.2

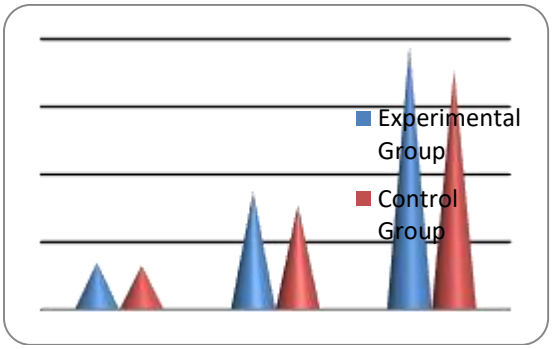
Comparision of unpaired ‘t’ test and table value between Experimental and Control Group

Parameters	Calculated Unpaired ‘t’ Value	Table Value	Significance
VAS	8.6	2.05	Significant
ER	3.2	2.05	Significant
Over Head Reach	5.2	2.05	Significant

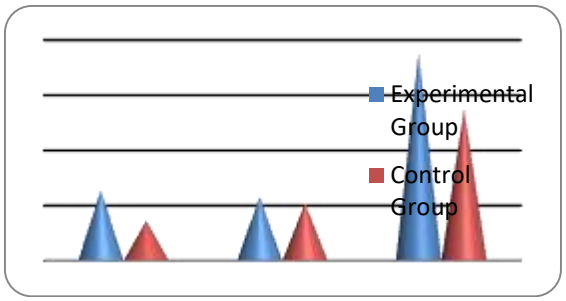
Mean Difference of VAS, ER and Over Head Reach



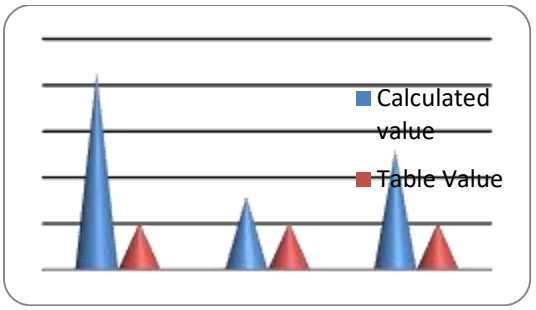
Standard Deviation of VAS, ER and Over head Reach



Paired 't' test value of VAS, ER and Over Head Reach



Comparison of Unpaired 't' test and table value



RESULTS

The study sample comprised 30 patients, of which 20 were male and 10 were female. The mean age of patients was 52 years. The median time interval between VAS scale and goniometry applied before and after therapy was 3 weeks. Among 30 patients, 15 were treated with IASTM and PNF Technique and 15 were treated with Ultrasound and Interferential therapy.

The mean difference, standard deviation, Paired 't' test of VAS score in Experimental Group is 1.8,1.4 and 25.6 and the mean difference, standard deviation, Paired 't' test VAS score in Control Group is 3.3, 1.3 and 14.6.

The mean difference, standard deviation, Paired 't' test of glenohumeral External rotators in Experimental Group is 44.6,3.5 and 23.2 and the mean difference, standard deviation, Paired 't' test of glenohumeral External rotators in Control Group is 34.5,3.1 and 20.9.

The mean difference, standard deviation, Paired 't' test of overhead reach in Experimental Group is 110,7.8 and 75.6 and the mean difference, standard deviation, Paired 't' test of value of post-test overhead reach in Control Group is 84.3, 7.1 and 55.2. The paired 't' test value is more than table value 2.15 for 5% level of significance at 14 degrees of freedom.

The calculated 't' values by unpaired 't' test were 8.6,3.2 and 5.2 respectively . The calculated 't' values were more than the table value 2.05 for 5% level of significance at 28 degrees of freedom.

The paired 't' test values have shows that IASTM and PNF technique was more effective than US and Interferential Therapy for patients with shoulder impingement syndrome . The unpaired 't' test values have shown that there was significant difference between two groups in showing improvement in patients with shoulder impingement syndrome.

DISCUSSION

The purpose of the study was to determine whether soft tissue mobilization (STM) with proprioceptive neuromuscular facilitations (PNF) are effective in producing significant improvement in glenohumeral external rotation, at 45° of shoulder abduction and overhead reach in patients with shoulder impingement syndrome.

The results of this study proved that the IASTM with PNF is more effective in improving the glenohumeral external rotation and overhead reach. The subjects of Experimental Group, who underwent the treatment of IASTM with PNF were assessed for pain, glenohumeral external rotation and overhead reach. The study shows significant improvement in pain, when compared with Control Group, who underwent the treatment of ultrasound and Interferential therapy.

The results of this study was in agreement with the results was obtained by the research work done by Joseph J. Godges, et al and Mahieu NN etal. The main reason for the increase in the range of motion and the overhead reach is that the IASTM helps in reducing the tightness and it promotes changes in myofascia allowing the elongation of the shortened structures.

PNF is effective in increasing the range of motion and its reciprocal activation of agonist and antagonist provides the greatest potential for muscle tendon as it lengthens the Golgi tendon organ which stimulates relaxing the antagonist muscles. When PNF is applied and the patient is told to contract the muscle in internal rotation against the resistance and the muscle tension develops, the golgi tendon fibers inhibits alpha motor neurons activity and decreases tension in the muscle tendon, so for the neuromuscular system, inhibition is the state of decreased neuronal activity and altered synaptic potential which reflexively diminishes the capacity of a muscle to contract. As the capacity of muscle to contract decreases the arm is moved to external rotation, the antagonists are contracted and antagonist muscles are relaxed and again tension is developed in the agonist muscles. This golgi tendon organ monitors the excessive tension during muscle contraction and thus inhibits the excessive contractions.

The shoulder rotation at the position of 45° of abduction was adopted for soft tissue mobilization and proprioceptive neuromuscular facilitation because at this position subscapularis muscle flexibility deficit is major cause than any capsular restrictions which is mainly the cause of restriction at 90° of glenohumeral external rotation. While performing the IASTM, the subscapularis was palpated in the axilla to identify the areas of myofascial mobility restrictions, taut bands or trigger points identified restrictions were treated with IASTM utilizing a combination of sustained manual pressure and slow deep strokes to the subscapularis myofascia for 10 minutes.

In Control Group also there was decrease in the pain level, increase in the range of motion and overhead reach but it is comparatively less than that of Experimental Group.

Our study confirmed that there is significant difference in the effect of IASTM with PNF and significant values for reduction in pain, increased glenohumeral external rotation and overhead reach were obtained.

CONCLUSION

In our samples IASTM and PNF resulted in a positive impact on the shoulder impingement syndrome in the functional levels. The pain, external rotation and over head reach activities in shoulder impingement syndrome were statistically significant before and after the treatment. Whereas a variety of techniques have been described, IASTM and PNF is a simple, cost effective,efficient treatment for patiens with shoulder impingement syndrome.

Through the resuts, alternate hypothesis is accepted and also the study could be concluded that there is a significant difference between IASTM and PNF in reducing pain and improving the functional levels in subjects with Shoulder Impingement Syndrome.

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