"A COMPARATIVE STUDY ON THE EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUES AND MAITLAND MOBILIZATION COUPLED WITH ULTRASOUND IN PATIENTS WITH PERIARTHRITIS OF THE SHOULDER JOINT"

Dissertation submitted to

THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY,

Chennai-32

Towards partial fulfillment of the requirements of

MASTER OF PHYSIOTHERAPY

(ORTHOPAEDIC PHYSIOTHERAPY)

Submitted by

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Cherraan's College Of Physiotherapy

Cherraan's Institute Of Health Sciences

Coimbatore, Tamilnadu, India

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Cherraan's College Of Physiotherapy

Cherraan's Of Health Sciences

Coimbatore, Tamilnadu.

THE DISSERAITION ENTITLED

"A COMPARATIVE STUDY ON THE EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUES AND MAITLAND MOBILIZATION COUPLED WITH ULTRASOUND IN PATIENTS WITH PERIARTHRITIS OF THE SHOULDER JOINT"

Submitted by

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Under the guidance of

Asst. Prof .Y. SHANTHOSHRAJA., M.P.T(ORTHO).,

Dissertation submitted to

THE TAMIL NADU DR.M.G.R. MEDICAL UNIVERSITY,

CHENNAI-32

Dissertation evaluated on ----------

Internal Examiner External Examiner

CERTIFICATE-I

CERTIFICATE-I

The work embodied in the thesis entitled '' A COMPARATIVE STUDY ON THE EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUES AND MAITLAND MOBILIZATION COUPLED WITH ULTRASOUND IN PATIENTS WITH PERIARTHRITIS OF THE SHOULDER JOINT '' submitted to The Tamilnadu Dr.MGR Medical University, Chennai in partial fulfillment for the degree of Master of Physiotherapy [Orthopaedic Physiotherapy], was carried out by candidate bearing register number 271410162 at Cherraan's College Of Physiotherapy, Coimbatore Under my Supervision. This is an original work done by him and has not been submitted in part or full for any other degree/diploma at this or any other University/Institute. This thesis is fit to be considered for evaluation for award of the degree of Master of Physiotherapy.

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Signature of supervisor **Principal**

Mr. Y. Shanthoshraja., MPT (ORTHO). Mrs. Selvarani., MPT.

Date: ---------- Date: ----------

Internal Examiner **External Examiner**

Project Work Evaluated On: ----------

DECLARATION

The work embodied in the thesis entitled '' A COMPARATIVE STUDY ON THE EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUES AND MAITLAND MOBILIZATION COUPLED WITH ULTRASOUND IN PATIENTS WITH PERIARTHRITIS OF THE SHOULDER JOINT'' submitted to The Tamilnadu Dr.MGR Medical University, Chennai in partial fulfilment for the degree of Masters of Physiotherapy [Orthopaedic Physiotherapy], was on original work done by me and has not been submitted in part or full for any other degree/diploma at this or any other university/institute. All the Ideas and references have been duly acknowledged.

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Signature of the supervisor Signature of the student

Mr. Y. SHANTHOSHRAJA., MPT (ORTHO)

Date: ----------

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ABSTRACT

ABSTRACT

PURPOSE OF THE STUDY

To compare the effectiveness of Muscle Energy Technique and Maitland mobilization coupled with Ultrasound in patients with periarthritis of shoulder joint.

MATERIALS AND METHODS

20 subjects with periarthritis were randomly allocated. The subjects were treated Ultrasound coupled with Muscle Energy Technique (Group I) and Maitland Mobilization (Group II).The treatment was given for 45 minutes a day up to 2 months. The outcome was measured in terms of shoulder pain and disability index (SPADI).

RESULTS

Independent t- test was used to compare the pre test and post test values between each groups. On comparing the mean values of SPADI of two groups, the study shows there is a significant increase in the post test values of ultrasound coupled with muscle energy technique than Ultrasound coupled with Maitland Mobilization.

CONCLUSION

Ultrasound coupled with muscle energy technique is more effective than Maitland mobilization in reducing pain and disability, enhancing shoulder function among periarthritis subjects.

KEY WORDS

Maitland mobilization, Ultrasound, Muscle Energy Technique, Neer's test, shoulder joint, periarthritis.

CONTENTS

TABLE OF CONTENT

LIST OF TABLES

LIST OF GRAPHS

Introduction

"A COMPARATIVE STUDY ON THE EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUE AND MAITLAND MOBILIZATION COUPLED WITH ULTRASOUND IN PATEINTS WITH PERIARTHRITIS OF SHOULDER JOINT"

CHAPTER I

1. INTRODUCTION

The shoulder joint (glenohumeral joint) is a ball and socket joint between the scapula and humerus. It is the major joint connecting the upper limb to the trunk. It is one of the most mobile joints in the human body, at the cost of joint stability. The shoulder joint is formed by the articulation of the head of the humerus with the glenoid cavity of the scapula. This gives rise to the alternate name for the shoulder joint. Like most synovial joints, the articulating surfaces are covered with hyaline cartilage. The head of the humerus is much larger than the glenoid fossa, giving the joint a wide range of movement at the cost of inherent instability. To reduce the disproportion in surfaces, the glenoid fossa is deepened by a fibrocartilage rim, called the glenoid labrum. As a ball and socket synovial joint, there is a wide range of movement permitted: Flexion, Extension, Abduction, Adduction, Internal rotation, External rotation.

Shoulder joint is one of the most rewarding and functional joints involved in daily routines including performances, occupational and recreational activities. Operation of this joint facilitates stability and mobility which often mutually co-exist between the upper and lower limb movements during skilled and powerful activities of the hands. The joints in human body get affected by different disabilities, of which arthritis represents a major one. Arthritis of the shoulder joint is reported since 1872, described as 'Humero Scapular Periarthritis'. The ailment was renamed as 'Frozen Shoulder' in 1934 by Codman and later described as 'Adhesive Capsulitis', by Neviarer in 1945, who reported the occurrence of this ailment amongst 7%-21% of the

population. The condition is characterized by painful stiff shoulder.

Shoulder pain is a commonly encountered problem, with prevalence studies indicating a frequency of 7–20% among the adult general population. Frozen shoulder, also called adhesive capsulitis, is one of the diseases that cause shoulder pain. The incidence of this condition in the general population is between 2% and 5%. It is more common among women aged 40–60 years. The disease is characterized by pain, loss of function, and loss of joint range of motion (ROM). Its etiology is incompletely elucidated. The pathologic anatomy of frozen shoulder includes synovial inflammation, joint capsule hypertrophy, and a resulting development of fibrous structures. The condition occurs bilaterally in 20–30% of cases. Awareness of the disease generally starts with a sensation of strain while performing critical movements and joint pain when moving in any direction.

One of the main complaints in patients with shoulder pain is functional disability. Treatment of shoulder pain is usually aimed at pain reduction and improvement of functional disabilities. Consequently, outcome measurements should include an instrument (e.g., questionnaire) for the evaluation of functional disabilities. There are several self-administered shoulder pain and disability questionnaires. Patients ranked the Shoulder Disability Questionnaire (SDQ) and the Shoulder Pain and Disability Index (SPADI) as the most relevant questionnaires. The SPADI was the least time-consuming, both the SDQ and the SPADI appear to be convenient and easy to complete. The SPADI was originally developed in English. It has been translated and validated in several languages and showed excellent reliability and responsiveness.

The cases of chronic adhesive capsulitis are reported to be responding well to therapeutic massage with muscle energy technique (MET), leading to decreases in pain and increase in functional quality. MET is generally classified as a direct technique against other methods, because the muscular effort is in the form of controlled position at specific direction against its

counterforce. However, the key exercise of this method is to normalize the joint range, rather than improving joint flexibility. These techniques have been recommended for all joints with restricted Range of Motion (ROM) identified during the passive assessment.

The correlation between the tightness in a joint capsule and pattern of motion restriction in a joint was revealed by Hannafin et al. Agonizing shoulder, freezing stage with chronic pain, frozen stage with significant limitation of ROM and thawing phase with progressive improvement in ROM have been identified as the major phases of frozen shoulder. End range mobilization of the shoulder joint and intensive mobilization techniques [MT] have been identified as useful approaches for reducing the risk of stiffness or joint contracture progression in patient with adhesive capsulitis. However, MET has been reported to be facilitating release of muscles and promoting body healing mechanisms and improving shoulder ROM.

Three phases of clinical presentation

Painful freezing phase

Duration 10-36 weeks, Pain and stiffness around the Shoulder with no history of injury. A nagging constant Pain is worse at night, with little response to Non-steroidal anti-inflammatory drugs

Adhesive phase

Occurs at 4-12 months. The pain gradually subsides but stiffness remains. Pain is apparent only at the extremes of movement. Gross reduction of glenohumeral movements, with near total obliteration of external rotation

Resolution phase

Takes 12-42 months. Follows the adhesive phase with spontaneous improvement in the range of movement. Mean duration from onset of frozen shoulder to the greatest resolution is over 30 months

MET is a unique technique in which the patient provides the corrective force rather than the care provider. MET is defined as the procedure that provides voluntary con- traction of the muscle at varying levels of intensity, in a very controlled direction, against a force applied by the care provider. The potential applications of MET includes lengthening and strengthening of muscles, increasing fluid flow and decreasing local edema.

Application of ultrasound as a therapeutic modality has been in practice since the 1940's. Potential heating effect, promotion of tissue relaxation, easing local blood flow, and breaking down of the scar tissue achieved through ultra- sound therapy makes it a highly useful treatment mode in physiotherapy. This therapy is used in the treatment of frozen shoulder as well. Availability of the portable ultrasound device makes it a convenient mode, followed at homes also. Visual Analog Scale (VAS) and Shoulder Pain and Disability Index (SPADI) are standard measurement tools in clinical practices comparing the pain and physical functional scores in a linear scale from mild to severe pain pre and post treatments.

Although, MET coupled with ultrasound therapy and joint mobilization technique coupled with ultra sound technique are effective in treating periarthritic shoulder, it would be interesting to determine the technique which is more effective in treating periarthritic shoulder. The present study intends to compare the effectiveness of MET coupled with ultrasound therapy and joint mobilization coupled with ultrasound therapy in patients with periarthritic shoulder.

The term “Muscle Energy’’ suggests that effort and energy of person or patient performing movements provide the primary force involved in process. It is used to help mobilize restricted joints by stretching hypertonic muscles, capsules, ligaments, and fascia. This leads to improved postural alignment and the restoration of proper joint biomechanics and functional movement.

1.1 AIM OF THE STUDY

The Aim of the study is to compare the effectiveness of Muscle energy technique and Maitland Mobilization coupled with Ultrasound in improving shoulder function on patients among periarthritic shoulder subjects.

OBJECTIVES OF THE STUDY

- To evaluate the effectiveness of Ultrasound coupled with Muscle energy technique to improve the shoulder function on patients among periarthritic shoulder subjects.
- To evaluate the effectiveness of Ultrasound coupled with Maitland Mobilization to improve the shoulder function on patients among periarthritic shoulder subjects.
- To compare the effectiveness of Muscle energy technique and Maitland Mobilization to improve the shoulder function on patients among periarthritic shoulder subjects.

To compare the effectiveness of Muscle energy technique and Maitland Mobilization coupled with Ultrasound to improve the shoulder function on patients among periarthritic shoulder subjects.

1.3. NEED OF THE STUDY

Frozen shoulder can be a primary or idiopathic problem or it may be associated with another systemic illness. By far the most common association of a secondary frozen shoulder is diabetes mellitus. The incidence of frozen shoulder in diabetes patients is reported to be 10%-36%.

The prevalence of shoulder pain throughout the whole lifetime is estimated to be approximately 35% (Guerra de Hoyos et al, 2004). Shoulder problems were believed to be connected with abnormal scapular dyskinesia and shoulder muscle tension, spasms, and inflammation in the shoulder region like the rotator cuff syndrome as well as associated joints such as glenohumeral, scapulothoracic, sternoclavicular and acromioclavicular (Ratcliffe et al, 2014).

A variety of shoulder functional enhancement including Muscle Energy Technique and Maitland Mobilization coupled with Ultrasound are used, to provide clinical evidence in the management of individuals with shoulder pain to improve shoulder function.

1.4. HYPOTHESIS

❖ Null hypothesis (HO)

There is no significant improvement in shoulder function following Ultrasound coupled with Muscle energy technique among periarthritic shoulder subjects.

There is no significant improvement in shoulder function following Ultrasound coupled with Maitland Mobilization among periarthritic shoulder subjects.

There is no significant improvement in shoulder function following Ultrasound coupled with Muscle Energy Technique and Maitland Mobilization among periarthritic shoulder subjects.

❖ Alternate hypothesis (AO)

There is significant improvement in shoulder function following Ultrasound coupled with Muscle energy technique among periarthritic shoulder subjects.

There is significant improvement in shoulder function following Ultrasound coupled with Maitland Mobilization among periarthritic shoulder subjects.

There is significant improvement in shoulder function following Ultrasound coupled with Muscle Energy Technique and Maitland Mobilization among periarthritic shoulder subjects.

1.5. OPERATIONAL DEFINITIONS:

PERIARTHRITIS:

Adhesive capsulitis and frozen shoulder syndrome (FSS) are two terms that have been used to describe a painful and stiff shoulder. The current consensus definition of a frozen shoulder by the American Shoulder and Elbow Surgeons is "a condition of uncertain etiology characterized by significant restriction of both active and passive shoulder motion that occurs in the absence of a known intrinsic shoulder disorder."

MAITLAND MOBILIZATION:

“The Maitland Concept of Manipulative Physiotherapy [as it became to be known], emphasizes a specific way of thinking, continuous evaluation and assessment and the art of manipulative physiotherapy (“know when, how and which techniques to perform, and adapt these to the individual Patient”) and a total commitment to the patient.”

The application of the Maitland concept can be on the peripheral or spinal joints, both require technical explanation and differ in technical terms and effects, however the main theoretical approach is similar to both.

ULTRASOUND:

Therapeutic ultrasound is a treatment modality commonly used in physical therapy. It is used to provide deep heating to soft tissues in the body. These tissues include muscles, tendons, joints, and ligaments.

MUSCLE ENERGY TECHNIQUE:

Muscle Energy Technique (MET) is a form of a manual therapy which uses a muscle's own energy in the form of gentle isometric contractions to relax the muscles via autogenic or reciprocal inhibition, and lengthen the muscle. As compared to static stretching which is a passive technique in which therapist does all the work, MET is an active technique in which patient is also an active participant. MET is based on the concepts of Autogenic Inhibition and Reciprocal Inhibition. If a sub-maximal contraction of the muscle is followed by stretching of the same muscle it is known as Autogenic Inhibition MET, and if a sub-maximal contraction of a muscle is followed by stretching of the opposite muscle than this is known as Reciprocal Inhibition MET.

GLENOHUMERAL JOINT MOBILISATION:

Skilled passive movement of the articular in shoulder joint performed by a physical therapist to decrease pain or increase joint mobility.

SCAPULAR STABILISATION EXERCISE:

Scapula stabilization exercises to strengthen the trapezius and serratus anterior muscle, which are responsible for stabilizing the scapula. They also restore the position and movement of the scapula to prevent any secondary damage to the shoulder joint, and help to restore the range of motion in shoulder.

SHOULDER FUNCTION:

Shoulder function is a compromise between mobility and stability. Its large mobility is based on the structure of the glenohumeral joint and simultaneous motion

of all segments of the shoulder girdle. This requires fine-tuned shoulder muscle coordination. Given the joint's mobility, stability is mainly based on active muscle control with only a minor role for the glenohumeral capsule, labrum and ligaments.

PAIN INTENSITY:

Pain intensity was measured using a numeric rating scale (NRS). The NRS is a clinically standard instrument used to assess in patients with chronic pain. The NRS involved asking the patients to rate their pain from 0 (best) to 10 (worst), with 0 representing one end of the pain intensity.

RANGE OF MOTION (ROM):

The ROM was actively measured using a standard goniometer during shoulder flexion and abduction in sitting positions. The ROM test was performed three times consecutively without pain and the average of the tests was calculated. This device has a reliability of .95and a validity of .85 (Kolber and Hanney, 2012).

Review of Literature

CHAPTER II

REVIEW OF LITERATURE

The review of literature is instrument to get clear idea and supports the findings with regard to the problem under study. An essential aspect of research project is the review of related literature. Survey of the literature is a crucial aspect of the planning of the study and the time spend in such a survey is wise. The study of the relevant literature is an essential step to get a full picture of what has been done and said with regard to the problem under study. such a review brings about deep inside and clear perspective of the overall field.

- **Janda (2010);** suggests that before any attempt is made to strengthen weak muscles, any hypertonicity in their antagonists should be addressed by appropriate treatment which relaxes (and if appropriate lengthens) them.

- **Greenman (1989)** depicts that Muscle Energy Technique helps to regain the mobility of the hypomobile joints by restoring normal length tension relationships which are shortened and by strengthening the weakened muscles and reduce edema by pumping action for lymphatic system.

- **Handel et al** quoted that MET procedures and post isometric procedures such as Proprioceptive Neuromuscular Facilitation (PNF), have concluded to be more effective than static stretching for improving extensibility of shortened muscle. There is very little strain on the therapists as long as proper body mechanics are used. Individuals who suffer from headache or chronic shoulder, neck or back pain may find relief through MET.An experimental study concluded that MET produced a change in ROM was possibly due to an increased tolerance to stretch, as there was no evidence of viscoelastic change.

- **Baena de Leon E, et. al,(2002):** The interplay of 4 articulations of the shoulder complex, results in an coordinated movement pattern of the arm elevation. The involved movements at each joint are continuous, although occurring at various rates and at different phases of arm elevation. The movement of the scapula can be described by rotations in relation to the thorax. The scapula moves around a dorso-ventral axis, resulting in a rotation in the frontal plane. The glenoid cavity is turned In this movement

cavity is turned cranially (upward rotation) or caudally (downward rotation). In the sagittal plane, around a latero-lateral axis the scapula rotates posteriorly (posterior tilting) or anteriorly (anterior tilting). External and internal rotation occurs around a cephalo-caudal (longitudinal) axis. The external rotation brings the glenoid cavity more into the frontal plane, whereas the internal rotation turns the glenoid cavity.

- **Hess SA, Richardson C, Darnell R, et. al,(2005):** When we perform abduction, the GH-joint contributes 90-120°. The combination of scapular and humeral movement result in a maximum range of elevation of 150-180°. Also by abduction Inman et al. reported an inconsistent amount and type of scapular motion in relation to GH- motion this time during the initial 30°. In this early phase, motion occurs primarily at the GH joint, although stressing the arm may increase the scapular contribution.

- **Park SI, Choi YK, Lee JH, et. al,(2009):** The Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire, the Shoulder Pain and Disability Index (SPADI) and the American Shoulder and Elbow Surgeons (ASES) score. These questionnaires have been shown acceptable for clinical use. These questionnaires are specific for scapulohumeral rhythm disorders.

- **Ratcliffe E, Pickering S, McLean S, et. al,(2010):** The Shoulder Pain and Disability Index (SPADI) was developed to measure current shoulder pain and disability in an outpatient setting. The SPADI contains 13 items that assess two domains; a 5-item subscale that measures pain and an 8-item subscale that measures disability. There are two versions of the SPADI; the original version has each item scored on a visual analogue scale (VAS) and a second version has items scored on a numerical rating scale (NRS). The latter version was developed to make the tool easier to administer and score.

- **JS, Moffet H, Hebert LJ, et. al,(2011):** The original version the patient was instructed to place a mark on the VAS for each item that best represented their experience of their shoulder problem. Each subscale is summed and transformed to a score out of 100. A mean is taken of the two subscales to give a total score out of 100, higher score indicating greater impairment or disability. In the NRS version the VAS is replaced by a 0-10 scale and the patient is asked to circle the number that best

describes the pain or disability.

- **Kolber and Hanney, et.al,(2011):** The SPADI demonstrates good construct validity, correlating well with other region-specific shoulder questionnaires .

- **(Hawker et al, 2011**).**:** It has been shown to be responsive to change over time, in a variety of patient populations and is able to discriminate adequately between patients with improving and deteriorating conditions.

- **Tucci HT, Martins J, Sposito Gde C, et. al,(2010):** When the SPADI is used more than once on the same subject, eg, at initial consultation and then at discharge, the minimal detectible change is noticed.

- **Walther M, Werner A, Stahlschmidt T, et. al,(2011):** The Shoulder Pain and Disability Index (SPADI) is a self-administered questionnaire that consists of two dimensions, one for pain and the other for functional activities. The pain dimension consists of five questions regarding the severity of an individual's pain. Functional activities are assessed with eight questions designed to measure the degree of difficulty an individual has with various activities of daily living that require upper- extremity use. The SPADI is the reliable and valid region-specific measure for the shoulder**.**

Methodology

CHAPTER III

METHODOLOGY

STUDY DESIGN:

- Experimental study comparative in nature.

STUDY SETTING:

- OPD of Cherran's College of Physiotherapy.

SUBJECTS:

- 20 subjects were included in the study.

PROJECT DURATION:

- 2 months

STUDY DURATION:

- 45 days.

TREATMENT DURATION:

- 45 minutes

SAMPLING METHOD:

- Convenient sampling method.

INCLUSION CRITERIA

- Age between 35-50 years.
- Only male were included.
- Subjects with Chronic periarthritic shoulder

EXCLUSION CRITERIA

- Malignancy in area of treatment
- Infectious Arthritis
- Metabolic Bone Disease
- Neoplastic Disease
- Fusion or Ankylosis
- Osteomyelitis
- Fracture or Ligament Rupture
- Arthroplasty
- Hypermobility

MATERIALS AND MEASUREMENT TOOL:

- Informed consent
- Patient information sheet
- Shoulder pain and disability index chart
- Couch with bed
- Ultrasound

VARIABLES:

Independent variables:

- Maitland Mobilization
- Muscle Energy Technique
- Ultrasound

Dependent variables:

- Shoulder joint pain and Function

PROCEDURES

The subjects were screened based on the inclusion and exclusion criteria. The subjects were explained about the Ultrasound coupled with Muscle Energy Technique and Maitland Mobilization. The purpose of study was explained to them and informed consent was obtained. The subjects were randomly assigned into Group I and Group II. The subjects in Group I were treated with Ultrasound coupled with Muscle Energy Technique, the subjects in group II were treated with ultrasound coupled with maitland mobilization

The treatment was given for the total time period of 45 minutes.

1. MUSCLE ENERGY TECHNIQUE COUPLED WITH ULTRASOUND

The subjects of Group A received Muscle energy technique coupled with ultrasound therapy (called as METU here- after) for Glenohumeral joint restricted flexion, joint restricted abduction, and joint restricted external rotation.

For flexion, the therapist placed one hand at the subject's superior part of the scapula and glenohumeral joint to examine for motion. The other hand of the therapist supported the subject's flexed elbow and stretched the humerus bone at the glenohumeral joint in the sagittal plane to the initial point of resistance. The subject was subsequently instructed to extend his elbow against the therapist's counterforce. The force was maintained for 5 s and let to relax for 2 s.

For abduction, the therapist placed hand to cup the glenohumeral joint to examine for motion. The subject was directed to press his elbow towards the body.

2.MAITLAND MOBILIZATION COUPLED WITH ULTRASOUND:

- The subject is advised to rest in one end of the couch in supine position, Joint mobility is tested according to ordinal scale (joint mobility), subjects satisfying grade 2 of ordinal scale were selected for mobilisation.
- Applying translatory glide thrust mobilization grade V to the affected shoulder joint (concave surface: glenoid fossa and convex surface: humerus head).
- Grade I – small amplitude movement at the beginning of the available ROM
- Grade II – large amplitude movement at within the available ROM
- Grade III – large amplitude movement that reaches the end ROM
- Grade IV – small amplitude movement at the very end range of motion
- Grade V – high velocity thrust of small amplitude at the end of the available range and within its anatomical range (manipulation) .

The Group B patients received Mobilization technique (general) coupled with ultrasound therapy (called as MTU hereafter) for glenohumeral joint abduction, joint external rotation, joint forward flexion.

For flexion, the subject was allowed to lie in a supine position and the affected arm was made to rest on the edge of the resting table and the upper limb was brought forward to flexion. The arm of the subject was supported against the therapist's trunk; the distal humerus of the subject was grasped by the therapist's lateral hand. The lateral border of the therapist's top hand was placed in a distal position to the anterior margin of the joint, with the fingers positioned in a superior position. Caudal glide was per- formed to improve rotation and range beyond 90 degrees.

For abduction, the subject was made to lie in a supine position with the arm in resting position. The forearm of the subject was supported between the therapist's trunk and elbow. The therapist stood on the affect side of the subject facing toward the cephalic end. The therapist subsequently placed one hand on the subject's axilla thereby providing grade 1 distraction. The web space of the therapist's other hand was placed distally to the acromion and subsequently caudal glides were provided.

Photo No-1: ultrasound

Photo No-2: MET

Photo No-3: Mailand Mobilization

Data Analysis & Result

CHAPTER IV
DATA ANALYSIS

4.1 TECHNIQUE OF DATA ANALYSIS

The improvement in the reduction of pain and disability was calculated using the pre-test and post-test taken before and after treatment.

The data obtained are analyzed using paired "t" test.

1. **MEAN** $\bar{d} = \sum \frac{d}{n}$

2. **STANDARD DEVIATION** **S.D=** $\sqrt{\sum \frac{(d-\bar{d})^2}{n-1}}$

3. **PAIRED "t" TEST** **t=** $\frac{\bar{d}\sqrt{n}}{S.D}$

Where,

$\bar{d}$ **= calculated mean difference pre-test and post-test**

n = sample size

S.D=standard deviation

d =difference between pre and post-test

UNPAIRED “t” TEST

The unpaired “t” test was used to compare the statistical significant difference between Group A and Group B.

FORMULA

$$S= \sqrt{\frac{(n_{1-1})s1^2+(n_{2-1})s2^2}{n1+n2-2}}$$

$$t = \frac{\bar{x}_1-\bar{x}_2}{s\sqrt{\frac{1}{n1}+\frac{1}{n_2}}}$$

$n_{1=}$**Total number of subjects in Group I**

n_2**=Total number of subjects in Group II**

$x_{1=}$**Difference between pre test and post test values of Group I**

$x_{2=}$ **Difference between pre-test and post-test values of Group II**

$\bar{x}_1 =$ **Mean difference between pre test and post test values of Group I**

$\bar{x}_2 =$**Mean difference between pre-test and post-test values of Group II.**

Table 1, shows the comparative mean value, mean difference, standard deviation & SEM between pre and post-test of **Group I.**

Table 1:

S.NO	variables	N	Improvement		Standard deviation	Standard Error Mean
			Mean	Mean difference		
1	pre-test	10	63	34.4	5.6316	1.7074
2	Post test	10	28.8			

Above values shows that there is significant improvement in shoulder function among pre &post-test values

Table -2, shows the comparative mean value, mean difference, standard deviation & SEM between pre and post-test in **Group II.**

Table: 2

S.No	Variables	N	Improvement		Standard deviation	Standard Error Mean
			Mean	Mean difference		
1.	Pre test	10	65.6	30.2	3.569	1.0934
2.	Post test	10	35.4			

Above values shows that there is significant improvement in shoulder function among pre and post-test value

Table-3, shows the comparative mean value, mean difference, standard deviation & paired' value between pre and post-test of shoulder function in **Group I and Group II.**

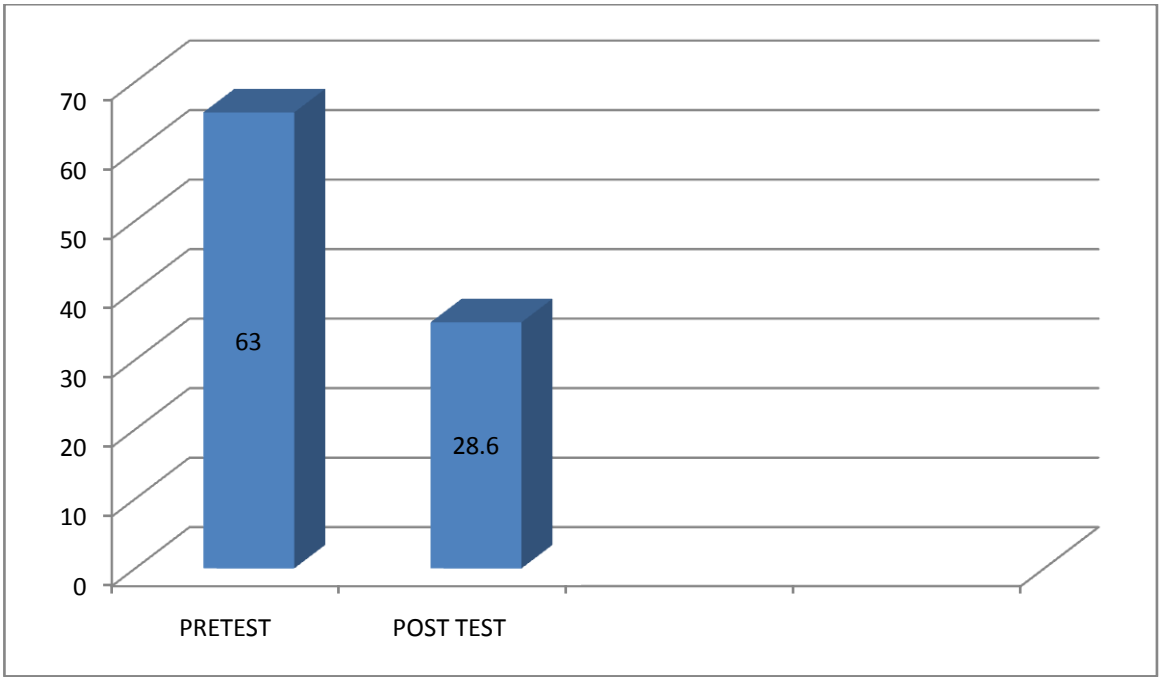
TABLE- 3:

S.No	Variable	N	Improvement		P value	Paired t value
			Mean difference	Standard deviation		
1.	Group I	10	34.4	4.7144	0.0811	1.9639
2.	Group II	10	30.2			

In paired' test the calculated' value is 1.9908. Above values shows that there is significant difference in improving shoulder function among Group I and Group II.

GRAPH-1

COMPARISION BETWEEN PRE-TEST AND POST-TEST MEANS IN GROUP I:

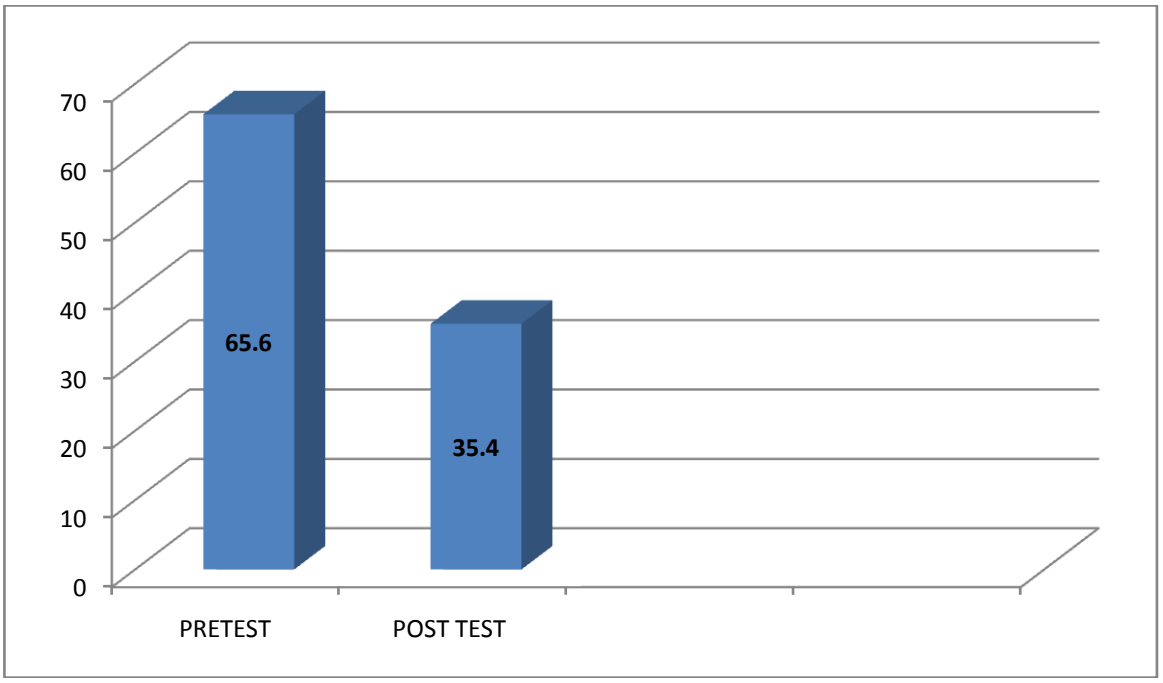


Bar diagram shows pre-test and post-test Mean values of Group

I. Pre-test and post-test values are 63 and 28.6 respectively. This shows that there is improvement of Mean value of pre and post-test of Group I

GRAPH-2

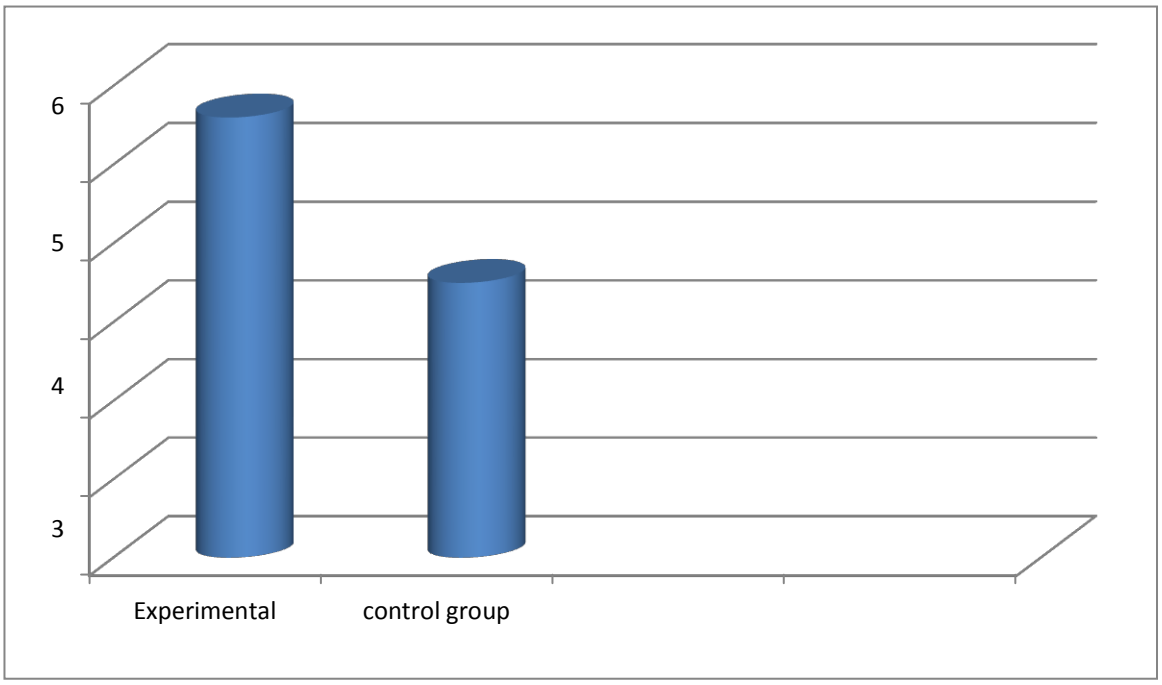
COMPARISION BETWEEN PRE-TEST AND POST-TEST MEANS IN GROUP II:



Bar diagram shows pre-test and post-test Mean values of Group II. Pre-test and post-test values are 65.6 and 35.4 respectively. This shows that there is improvement of Mean value of pre and post-test of Group II.

GRAPH-3

COMPARISION OF TWO GROUP I & II:



Comparison of Group I (Muscle Energy Technique with Ultrasound) and Group II (Maitland Mobilization with Ultrasound).

RESULTS

CHAPTER V

RESULTS

The number of subjects for the study was 20 (n=10).The subjects were divided into two groups (group I & group II).For group I Ultrasound coupled Muscle Energy Technique was given. The group II received Ultrasound coupled with Maitland Mobilization.

Readings of pre and post-test values of shoulder pain and disability of Group I and II given in table 1 & 2 respectively. The result showed that for Ultrasound coupled with Muscle Energy Technique , group I the mean values of pre-test and post- test values were 63 and 28.6 respectively, and the mean difference is 34.4, standard deviation is 5.6316 with SEM 1.7074.

The result showed that for Ultrasound coupled with Maitland Mobilization, group II the mean values of pre- test and post-test values were 65.6 and 35.4 respectively, and the mean difference is 30.2, standard deviation is 3.569 with SEM 1.0934.The paired 't' value for comparative analysis is 1.9639 at 0.005 levels, and p value is 0.0811. Thereby the null hypothesis is rejected and alternative hypothesis is accepted.

Hence this study concludes that group I shows difference in significant improvement of shoulder function than group II. We concluded that group I received Ultrasound coupled with Muscle Energy Technique will be more effective than group II which received Ultrasound coupled with Maitland Mobilization.

Discussion

DISCUSSION

Shoulder pain and disability are the major common cause for shoulder dysfunction in shoulder complex abnormalities. Scapula plays a major role in shoulder kinematics. Scapular dysfunction may occur due to muscle weakness or injury to the shoulder complex.

In this study the effect of scapular stabilization exercise in enhancing shoulder function is measured through shoulder pain and disability scale. After
45 days of experimentation, the results show that there is significant improvement in shoulder function.

This study provides evidence that Ultrasound coupled with Muscle Energy Technique was effective in improving shoulder function through SPADI scores from 63 to 28.8 with the mean difference of 34.4. And the Ultrasound coupled with Maitland Mobilization gleno were from 65.6 to 35.4 with the mean difference of 30.2. Hence Ultrasound coupled with Muscle Energy Technique improved in SPADI than Ultrasound coupled with Maitland Mobilization. There was a significant difference between the US coupled with MET and MM.

Conclusion

CONCLUSION

The study aims at exploring the effectiveness of Ultrasound coupled with Muscle Energy Technique in the treatment of periarthritis shoulder to enhance shoulder function by reducing shoulder pain and disability.

In this study we used Ultrasound coupled with Muscle Energy Technique and Maitland Mobilization, the aim of the study is to find effectiveness of Ultrasound with Muscle Energy Technique to enhance shoulder function among periarthritic shoulder

This study concluded that the Ultrasound with Muscle Energy Technique in periarthritic shoulder is more effective than Ultrasound with Maitland Mobilization in Periarthritic shoulder condition.

LIMITATIONS AND FUTURE RECOMMENDATIONS

LIMITATIONS

- This study was limited to small sample size of 20 subjects
- Study researches concentrated only in improving shoulder function.
- Short duration of study
- The long term retention of training was not studied
- Only one measurement tool (SPADI) was used for shoulder pain and disability.

FUTURE RECOMMENDATIONS

- Sample size can be increased
- Studies can be done with various duration
- Studies can be done with larger samples
- Further studies can include other measuring tools

It is recommended to do the studies with specific age and gender

Reference

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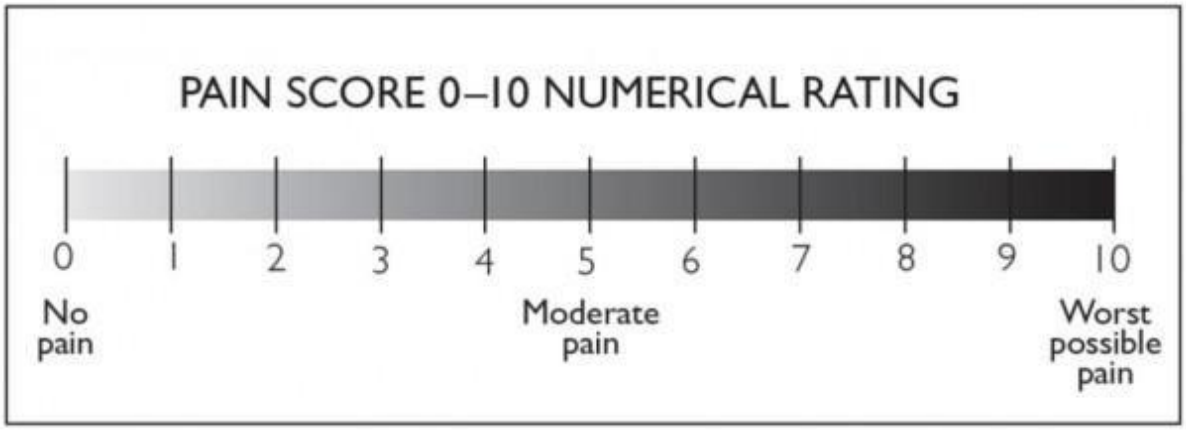
Annexure

ANNEXURE

NUMERAL RATING SCALE:



TRANSLATORY GLIDE MOBILIZATION GRADING:

- Grade I – small amplitude movement at the beginning of the available ROM
- Grade II – large amplitude movement at within the available ROM
- Grade III – large amplitude movement that reaches the end ROM
- Grade IV – small amplitude movement at the very end range of motion
- Grade V – high velocity thrust of small amplitude at the end of the available range and within its anatomical range (manipulation)

ORDINAL SCALE (CLASSIFICATION OF JOINT MOBILITY)

Grade	Definition	Treatment possibilities
0	**No movement-joint ankylozed.**	**No attempts to be made to mobilize.**
1	**Extremely hypomobile**	**No mobilization**
2	**Slightly hypomobile**	**Mobilization**
3	**Normal**	**Mobilization-Manipulation**
4	**Slightly hypermobile**	**Taping,bracing.**
5	**Extremely hypermobile**	**Taping, bracing.**
6	**Unstable**	**Surgical stabilization.**

SPADI (SHOULDER)

Name _____ Date_____

PAIN SCALE	
How severe is your pain:	
1. At its worst.	No pain 0 1 2 3 4 5 6 7 8 9 10 Worst Pain Imaginable
2. When lying on involved side.	No pain 0 1 2 3 4 5 6 7 8 9 10 Worst Pain Imaginable
3. Reaching for something on a high shelf.	No pain 0 1 2 3 4 5 6 7 8 9 10 Worst Pain Imaginable
4. Touching the back of your neck.	No pain 0 1 2 3 4 5 6 7 8 9 10 Worst Pain Imaginable
5. Pushing with the involved arm.	No pain 0 1 2 3 4 5 6 7 8 9 10 Worst Pain Imaginable
DISABILITY SCALE	
How much difficulty did you have:	
1. Washing your hair.	No difficulty 0 1 2 3 4 5 6 7 8 9 10 So difficult required help
2. Washing your back.	No difficulty 0 1 2 3 4 5 6 7 8 9 10 So difficult required help
3. Putting on an undershirt or pullover sweater.	No difficulty 0 1 2 3 4 5 6 7 8 9 10 So difficult required help
4. Putting on a shirt that buttons down the front.	No difficulty 0 1 2 3 4 5 6 7 8 9 10 So difficult required help
5. Putting on your pants.	No difficulty 0 1 2 3 4 5 6 7 8 9 10 So difficult required help
6. Placing an object on a high shelf.	No difficulty 0 1 2 3 4 5 6 7 8 9 10 So difficult required help
7. Carrying a heavy object of 10 pounds.	No difficulty 0 1 2 3 4 5 6 7 8 9 10 So difficult required help
8. Removing something from your back pocket.	No difficulty 0 1 2 3 4 5 6 7 8 9 10 So difficult required help

DEVELOPED BY Roach 1991 [1];

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Range (90% confidence) = 13 points(Change less than this may be attributable to measurement error)

- **Total pain score _____/50 x 100 = _____ %**

(Note: If a person does not answer all questions divide by the total possible score, eg. if 1 question missed divide by 40)

- **Total disability score _____/80 x 100 = _____%**

(Note: If a person does not answer all questions divide by the total possible score, eg. if 1 question missed divide by 70)

- **Total SPADI score _____/130 x 100 =_____%**

(Note: If a person does not answer all questions divide by the total possible score, eg. if 1 question missed divide by 120)Minimum

MASTER CHART-I

PRE-TEST AND POST –TEST VALUES OF GROUP-I

Showing pre-test and post-test values for group I by using Shoulder Pain And Disability Scale (SPADI).

GROUP-I		
S.NO	**PRE-TEST**	**POST-TEST**
1	76	30
2	70	36
3	62	26
4	70	36
5	60	28
6	54	22
7	60	28
8	66	26
9	56	28
10	56	28

MASTER CHART-II

PRE-TEST AND POST –TEST VALUES OF GROUP-I

Showing pre-test and post-test values for group I by using Shoulder Pain And Disability Scale (SPADI).

GROUP-I		
S.NO	**PRE-TEST**	**POST-TEST**
1	62	34
2	64	36
3	56	30
4	74	42
5	64	36
6	74	42
7	64	36
8	70	36
9	64	32
10	64	32

INFORMED CONSENT FORM

TITLE: "A COMPARATIVE STUDY ON EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUE AND MAITLAND MOBILIZATION COUPLED WITH ULTRASOUND ON PATEINTS ON PERIARTHRTIS OF THE SHOULDER JOINT"

INVESTIGATOR: Mr. DEVENDRAN.M

Co- INVESTIGATOR: Asst.Prof. Y.SHANTHOSHRAJA M.P.T(ORTHO)., PURPOSE

OF THE STUDY:

I ---------- have been informed that this study will help clinicians, therapists to find effectiveness on Muscle Energy Technique and Maitland Mobilization coupled with Ultrasound to improve shoulder function on periarthritic shoulder.

PROCEDURE OF THE STUDY:

I understand that i will undergo the physical therapy treatment, which involves Muscle Energy Technique and Maitland Mobilization coupled with Ultrasound under the direct supervision of the physiotherapist. I am aware that i have to follow therapist's instructions as has been told to me.

RISK AND DISCOMFORT:

I understand that there are no potential risks associated with the procedure, and understand that physiotherapist will accompany me during this procedure. There are no known hazards associated with this procedure.

CONFIDENTIALITY:

I understand that the medical information produced by this study will be confidential. If the data are used for publication in the medical literature or for the teaching purpose. No names will be used and other literatures such as photographs and audio or videotapes will be used only with permission.

REFUSAL OR WITHDRAWAL OF PARTICIPATION:

I understand that my participation is voluntary and I may withdraw consent and discontinue participation at any time. I also understand that he may terminate my participation in the study at any time after he has explained the reasons for doing so.

I confirm that MR.DEVENDRAN.M / ASST.PROF. Y.SHANTHOSHRAJA.,MPT(ORTHO)
have explained me the purpose of the study, the study procedure and the possible risk that I may experience. I have read and I have understood this concern to participate as a subject in this study.

---------- **----------**

SUBJECT DATE

I have explained to---------- the purpose of the research, the procedure required and the possible risks and benefits, to the best of my ability.

---------- ----------

INVESTIGATOR DATE

PATIENT INFORMATION SHEET

Name: Group: I/II

Age:

Gender:

Date:

Address for communication:

Contact number:

Vital signs:

Temperature:

Blood pressure:

Heart rate:

Respiratory rate:

Shoulder Pain And Disability Index Score:

SCALE	Pre-test	Post-test
SPADI		