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Priyabrata Dash
Associate Professor cum
Principal (I/C), KIMS School
of Physiotherapy, KIMS,
KIIT-DU, Bhubaneswar,
Odisha, India

Pritam Sahoo
Senior Physiotherapist, KIMS
School of Physiotherapy,
KIMS, KIIT-DU,
Bhubaneswar, Odisha, India

Nihar Ranjan Mohanty
Assistant Professor, KIMS
School of Physiotherapy,
KIMS, KIIT-DU,
Bhubaneswar, Odisha, India

Swami Prabhu Ranjan
Assistant Professor, KIMS
School of Physiotherapy,
KIMS, KIIT-DU,
Bhubaneswar, Odisha, India

Smrutiranjana Sahu
Assistant Professor, KIMS
School of Physiotherapy,
KIMS, KIIT-DU,
Bhubaneswar, Odisha, India

Dwarikanath Rout
Assistant Professor, KIMS
School of Physiotherapy,
KIMS, KIIT-DU,
Bhubaneswar, Odisha, India

Corresponding Author:
Dwarikanath Rout
Assistant Professor, KIMS
School of Physiotherapy,
KIMS, KIIT-DU,
Bhubaneswar, Odisha, India

The efficacy of muscle energy techniques and Maitland mobilizations coupled with therapeutic ultrasound in patients with peri-arthritis of the glenohumeral joint: A comparative study

Priyabrata Dash, Pritam Sahoo, Nihar Ranjan Mohanty, Swami Prabhu Ranjan, Smrutiranjana Sahu, Dwarikanath Rout

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Abstract

Introduction: Shoulder joint (Glenohumeral Joint) is one of the most functional Joint involved in daily routines including performances, occupational and recreational activities. These joints in human body get affected by different disabilities, of which arthritis represents a major one.

Objectives: To compare the efficacy of muscle energy technique and maitland mobilization coupled with ultrasound in patients with peri-arthritis of the glenohumeral joint.

Methodology: Twenty (20) individuals diagnosed with peri-arthritis of glenohumeral joint were randomly allocated for this study. The individuals were treated with therapeutic ultrasound coupled with Muscle Energy Technique (Group A) and Maitland Mobilization (Group B). The treatment was given for 45 minutes a day up to 2 (Two) 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 shown 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 peri-arthritis individuals.

Keywords: Glenohumeral joint, ultrasound, muscle energy technique, glenohumeral joint, shoulder joint, peri-arthritis

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^[1]. The shoulder joint 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 much larger than the glenoid fossa, giving the joint a wide range of movement at the cost of inherent instability^[2]. 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^[3]. Arthritis of the shoulder joint is reported since 1872, described as "Humero Scapular Peri-arthritis. The ailment was renamed as 'Frozen Shoulder' in 1934 by Codman and later described as Adhesive Capsulitis, by Neviarier in 1945, who reported the 2 occurrence of this ailment amongst 7%-21% of the population. The condition is characterized by painful stiff shoulder^[4]. 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, 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 [5]. The disease is characterized by pain, loss of function, and loss of joint range of motion (ROM). Its aetiology is incompletely elucidated. The pathologic anatomy of frozen shoulder includes synovial inflammation, joint capsule hypertrophy, and a resulting development of fibrous structures [6]. 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 [7]. 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 [8]. 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 [9]. MET is defined as the procedure that provides voluntary contraction 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 oedema [10]. 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 [11]. 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 [12]. 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 functions [13-17].

Materials and Methodology

Twenty (20) individuals diagnosed with periarthritis of glenohumeral joint were included in this study. Informed consent was obtained from subjects in written format before commencement of the study. The convenient sampling method was used for sampling. Male patients of age group 35-55 years included in study. The subjects were divided into two groups. Group A i.e., 10 subjects and Group B i.e., 10 subjects. The duration of study was 8 weeks (2 months). 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 in Group A were treated with Ultrasound coupled with Muscle Energy Technique and the subjects in group B were treated with ultrasound coupled with Maitland mobilization. The treatment was given for the total time period of 45 minute.

Exclusion Criteria: Malignancy in area of treatment, Infectious Arthritis, Metabolic Bone Disease, Neoplastic Disease, Fusion or Ankyloses, 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

Results

Table 1: Shows the comparative mean value, mean difference, standard deviation and standard Error between pre and post-test of Group A

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			

Table 2: Shows the comparative mean value, mean difference, standard deviation & SEM between pre and post-test in Group B

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			

Table 3: Shows the comparative mean value, mean difference, standard deviation and p value between pre and post-test of shoulder function Group A and Group B.

S. No.	Variables	N	Improvement		P value	Paired t value
			Mean difference	Standard deviation		
1.	Group-A	10	34.4	4.7144	0.0811	1.9639
2.	Group-B	10	30.2			

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

Readings of pre and post-test values of shoulder pain and disability of Group A and B given in table 1 & 2 respectively. The result showed that for Ultrasound coupled with Muscle Energy Technique, group A 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 SE 1.7074.

The result showed that for Ultrasound coupled with Maitland Mobilization group, 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 SE 1.0934. The paired T' value for comparative analysis is 1.9639 at 0.005 levels, and p value is 0.0811.

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

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 [18-22].

In this study the effect of scapular stabilization exercise in enhancing shoulder function was 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. In addition, the Ultrasound coupled with Maitland Mobilization 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 Ultrasound coupled with Muscle Energy Technique and Maitland Mobilization.

Conclusion

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.

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