

## Original Article

# EFFICACY OF ULTRASOUND WITH MAITLAND MOBILIZATION OVER SHORT WAVE DIATHERMY WITH MAITLAND MOBILIZATION IN IMPROVING THE FUNCTIONAL PERFORMANCE OF PATIENTS WITH PERIARTHRITIS SHOULDER

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## ABSTRACT

**Objective:** To investigate the effectiveness of ultrasound with Maitland mobilization over Short wave diathermy with Maitland mobilization in improving the functional performance of patients with Periarthritis of shoulder

**Design:** A simple randomized controlled clinical trial

**Setting:** The study was conducted in the department of physiotherapy in Ganga Hospital Coimbatore (India), Vinayaka Mission Hospital Salem (India).

**Subjects:** 30 patients were selected randomly from the population using simple random sampling procedure (Lottery Method) and were divided into two equal groups.

**Intervention :** The experimental group (n=15) were given Ultrasound with Maitland mobilization with 1 MHz in frequency, continuous mode and 1.5 W/cm<sup>2</sup> of intensity with 5cm<sup>2</sup> sized transducer for 10 minutes of treatment duration .The control group (n=15) were given Short wave diathermy with Maitland mobilization for period of 15 min with contra planar technique.

**Outcome measures:** The functional performance was measured using Shoulder Pain and Disability Index (SPADI) scale.

**Results:** In Group-A (Experimental Group ) and Group-B (Control Group), all data was expressed as mean  $\pm$  , SD and was statistically analysed using paired 't' test and independent 't' test to determine the statistical difference among the parameters at 0.5% level of significance. Statistical data of SPADI showed that, Group-A is significantly different from Group-B with p<0.05; i.e 95% of significance.

**Conclusion:** The post ultrasound Maitland mobilization is found more effective and beneficial than post SWD Maitland mobilization on shoulder functions in periarthritis.

**KEYWORDS:** Maitland mobilizations, Short wave diathermy, Ultrasound, Periarthritis, Glides.

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## INTRODUCTION

The shoulder is a complex anatomical joint that allows movement in many planes. Multi-plane wide arcs of movements are the results of the

intricate structural design. The dynamic force and stability to this complex is provided by precisely controlled muscular action. . The structure and organisation of these muscles provide a base

for a wide range of controlled purposeful daily activities like washing hair, washing back, putting an object on a high shelf.

Periarthritis is a common disabling and painful condition characterized by active and passive limitation of the shoulder range of motion (ROM). The term "Periarthritis" first described by a French doctor ES Duplay in 1872<sup>1</sup>. Shoulder motion and daily activities are restricted gradually, causing disability. Although the ROM varies depending upon which stage the patient presents, yet he or she still has limitations of passive ROM in a capsular pattern. Approximately 7% to 21% of the population suffers from painful or stiff shoulder<sup>2</sup>. It commonly affects women more frequently than men and peak age is 56 years<sup>3</sup>. Bilateral involvement occurs in 40% to 50%<sup>4</sup>. Patients with diabetes have high prevalence rate of 20% than the normal population.<sup>5</sup>

Various conventional treatments like Analgesics, Nonsteroidal anti-inflammatory (NSAIDs) drugs, physiotherapy modalities, exercises and advices are available to treat this condition. They mainly aim at relieving pain and improving range of motion (ROM).

Short-wave diathermy (SWD) is a deep tissue heating electrotherapeutic modality, which produces an oscillating electromagnetic field in the frequency range of 27.12 MHz. Therapeutic effects of these oscillations proven in their ability to decrease tissue viscosity and with these muscular and tendinous contractures. Additionally, the deep heating effect also induces an anti-inflammatory response, stimulate connective tissue repair, reduce joint stiffness, muscle spasm, pain and prepare tissue for passive stretching.<sup>6</sup>

Ultrasound (US), which is a deep tissue heating modality, can elevate tissue temperature. The physiologic response due to ultrasound therapy includes increased collagen tissue extensibility, pain threshold and enzymatic activity, along with changes in nerve conduction velocity and contractile activity of skeletal muscle<sup>7</sup>. A recent evidence-based guidelines conclude that the therapeutic US was effective in the treatment of calcific tendonitis of the shoulder, there was no evidence that it was beneficial for other forms

of shoulder pain (e.g. capsulitis, bursitis, and tendonitis).<sup>8</sup>

Maitland mobilization is a widely used therapeutic technique used to treat various intra articular and periarticular disorders. Grades I and II of Maitland mobilization techniques are primarily used for treating joints limited by pain. The oscillation may have an inhibitory effect on the perception of painful stimuli by repetitively stimulating mechanoreceptors that block nociceptive pathways at the spinal cord or brain stem levels. These nonstretch motions help to move synovial fluid to improve nutrition to the cartilage whereas Grades III and IV are primarily used as stretching manoeuvres<sup>9</sup>. Appropriate selection of mobilization technique for treatment can only take place after a thorough assessment and examination.

#### **Aim for study:**

To find the effectiveness of ultrasound with Maitland mobilization over shortwave diathermy with Maitland mobilisation in improving functional performance of patients with periarthritis shoulder.

#### **Objectives:**

1. To find the effectiveness in application of ultrasound combined with Maitland mobilisation in improving functional performance of patients with periarthritis shoulder.
2. To find the effectiveness in application of shortwave diathermy combined with Maitland mobilisation in improving functional performance of patients with periarthritis shoulder.
3. To compare the effectiveness of ultrasound with Maitland mobilization over shortwave diathermy with Maitland mobilisation in improving functional performance of patients with periarthritis shoulder.

## **MATERIALS AND METHODS**

The study was conducted in the department of physiotherapy in Ganga Hospital Coimbatore (India); Vinayaka Mission Hospital Salem (India). The study was conducted for a period of two weeks. 30 patients were selected randomly by using simple random sampling procedure (Lottery Method) and were divided into two equal groups.

### **Inclusion Criteria:**

1. Unilateral periartthritis
2. Patients age between 40-60
3. Both sexes were included

### **Exclusion Criteria:**

1. History of uncontrolled diabetes mellitus
2. Patients with skin disorders
3. Patients under steroid therapy
4. History of any major trauma or surgery

### **Materials:**

1. Consent forms
2. Evaluation format
3. Ultrasound machine and conduction gel
4. Shortwave diathermy machine, electrodes and pads
5. Pillows and towels

### **Treatment and assessment technique:**

30 patients with confirmed diagnosis of periartthritis were selected based on inclusion and exclusion criteria. They were divided into two equal groups consists of 15 patients by simple random sampling procedure (Lottery Method).

The patients were explained about the treatment and assessment procedure and were taken their consent before group division.

Group A was given Ultrasound and Maitland mobilisation 5 sessions per week for a period of 2 successive weeks.

### **Procedure:**

#### **Application of Ultrasound**

The patients positioned comfortably to receive therapeutic ultrasound with parametric settings of 1 MHz in frequency, continuous mode and 1.5 W/cm<sup>2</sup> of intensity with 5cm<sup>2</sup> sized transducer for 10 minutes of treatment duration. After coating the skin with coupling media (Aquasonic gel), Ultrasound was delivered by moving the treatment head over the anterior, superior and posterior regions of the affected joint in slow, circular and overlapping fashion.<sup>10</sup>

#### **Application of Maitland Mobilisation<sup>9</sup>**

##### **Passive Accessory Movements**

The following passive accessory movements were tested and treated accordingly.

##### **Gleno-Humeral Joint:**

- Antero –Posterior glide
- Postero – Anterior glide
- Caudal glide
- Distraction or Lateral glide

##### **Sterno – Clavicular Joint:**

- Antero – Posterior glide
- Postero – Anterior glide
- Caudal glide
- Cephalad glide

##### **Acromio – Clavicular Joint**

- Antero – Posterior glide
- Posterior – Anterior glide
- Caudal glide
- Cephalad glide

### **Passive Physiological Movements**

The following passive physiological movements were tested and treated accordingly

- Flexion
- Extension
- Abduction
- Internal and External rotation

Group B was given Short wave diathermy and Maitland mobilisation for two weeks

### **Application of Shortwave**

Before start the treatment the therapist evaluated the safety measures of the shortwave diathermy device. Patient's thermal sensation of the treatment part was evaluated and all metal objects, materials, clothing and electronic devices from treatment part were removed. Patient was positioned in supine lying and short wave diathermy pads were applied in contra-planner (AP) method for 20 minutes on affected shoulder<sup>11</sup>. The spacing between the pads and treatment part is maintained by the placing of eight folded towels. Intensity was maintained and adjusted to produce comfortable warmth based on patient's feedback.

### **OUTCOMES MEASURES:**

The functional performance was measured using Shoulder Pain and Disability Index (SPADI) scale for the following aspects.

The SPADI is a disease specific, self – administered scale that measures the impact of shoulder pathology in terms of pain and disability. The scale consist of 13 items into two subscales: pain (5 items) and disability (8 Items). The total score was calculated out of 100.

## RESULTS AND TABLES

This study is to analyse the effect of Ultrasound over Shortwave diathermy in combined with Maitland mobilisation improving functional performance in peri arthritis shoulder.

In Group-A (Experimental Group ) and Group-B (Experimental Group ), all data was expressed as mean ± , SD and was statistically analysed using paired ‘t’ test and independent ‘t’ test to determine the statistical difference among the parameters at 0.5% level of significance.

Paired ‘t’ test was used to examine the changes in dependent variables from baseline to after completion of intervention in each group.

The pre-test mean value of SPADI in Group-A is 70.73 (SD=10.92) and post-test is 19.26 (SD=3.78). ‘t’ value = 22.59, p<0.05.

The pre-test mean value of SPADI in Group-B is 70.26 (SD=11.46) and post-test is 28.8 (SD=6.06). ‘t’ value =24.53, p<0.05.

The independent ‘t’ test is done to calculate the significance of difference in SPADI scores between Group-A and Group-B. The mean of differences in SPADI scores between pre and post- test in Group-A is 51.86 (SD=8.74) and in Group B is 41.8 (SD=6.47), t= 3.58.

Thus from above statistical data of SPADI, Group-A is significantly different from Group-B with p<0.05; i.e 95% of significance. Hence we reject the null hypothesis.

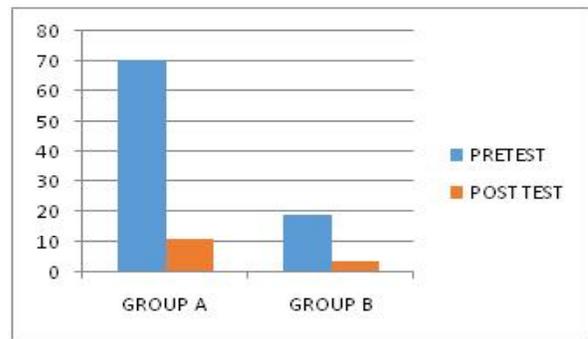
**Table 1:** Comparison of Pre and Post-test values of SPADI scores in Group A and Group B.

SPADI score	Group A			Group B		
	Mean	SD	P value	Mean	SD	P value
Pre test	70.73	10.92	<0.05	70.26	11.46	<0.05
Post test	19.26	3.78		28.8	6.06	
T value	22.59			24.53		

**Table 2:** Comparison of Pre test and Post test differences in SPADI scores in Group A and Group B.

Mean of differences in SPADI scores Pre test and Post test	Mean	SD	T value	P value
Group A	51.86	8.74	3.58	<0.05
Group B	41.8	6.47		

**Graph 1:** Showing the Pre-test and Post-test differences in SPADI scores in Group A and Group B.



## DISCUSSION

In this study efficacy of ultrasound with Maitland mobilisation over Shortwave Diathermy with Maitland mobilisation in improving the functional performance of the patients with peri arthritis shoulder the results shown that Ultrasound with Maitland mobilisation was more effective and beneficial.

The beneficial effect of Ultrasound in improving shoulder functional performance can be attributed to the non-thermal effects and thermal effects.

Cytokines play a vital role in regulation of injury repair and stimulating tissue healing and remodelling. The non-thermal effect of ultrasound results in increase in release of cytokines by both vasodilatation and activation of adhesion molecules by signal transduction pathways.<sup>12-16</sup>

A number of reports have demonstrated that ultrasound has been proven for its beneficial effects by modulating vasodilatation, lymphocyte adhesion, mast cell degranulation, phagocytic proliferation of T-cells, osteoblasts and a number of protein associated with inflammation and repair.<sup>17-20</sup>

It also helps in breaking of the adhesions which are leading to joint restriction by the mechanical energy within the Ultrasound wave and the shearing force of the wave combined to produce mechanical properties that effect the molecular structures within the cell.

Many research studies have proven that ultrasound may interact with one or more components of inflammation and also accelerates fibrinolysis.<sup>21-22</sup>

Application of Ultrasound penetrates into deep

structures to produce its thermal or non-thermal effects<sup>23</sup>, by the thermal effect of Ultrasound it increases the collagen and tendon extensibility thereby it increases the range of motion in patient with adhesive capsulitis<sup>24</sup>. Vermeulen HM et al (2000) described that Maitland Mobilisation plays major role in decreasing symptoms of perirthritis of shoulder<sup>25</sup> and if the thermotherapy applied prior to joint mobilisation can increase the extensibility of connective tissue leading to increased range of motion<sup>26</sup>. Researches proved that by the application of shortwave diathermy increase the blood supply and increases tissue extensibility.<sup>27</sup>

## CONCLUSION

In this study, we conclude that application of Maitland mobilisation can be combined with Ultrasound than Shortwave diathermy to give greater functional performance in patients with periarthritis of shoulder.

**Conflicts of interest:** None

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