

COMPARATIVE STUDY BETWEEN TENS ALONG WITH PENDULUM EXERCISES VS US ALONG WITH PENDULUM EXERCISES IN TREATING FROZEN SHOULDER

Physiotherapy & Rehabilitation

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ABSTRACT

Introduction: Comparative study between tens along with pendulum exercises Vs us along with pendulum exercises in treating frozen shoulder. The term 'frozen shoulder' is often used injudiciously for any painful condition of the shoulder joint. Frozen shoulder is a clinical syndrome with painful restriction of both active and passive shoulder movements. The condition is aggravated by systemic problem like diabetes mellitus, cardiovascular disease and reflex sympathetic dystrophy. **Methodology:** This study includes 60 patient suffering from frozen shoulder and divide into two groups i.e ; Treatment given by TENS + Pendulum exercise (Group A) and treatment given by US + pendulum exercise (Group B). All the subjects were attended individually. **Results:** Result of this study shown that there is significant difference within group results and subjects treated with TENS along with pendulum exercise showed slightly more improvement as compared to the US along with pendulum exercise. **Conclusion:** The study concluded that the subjects treated with TENS along with pendulum exercise showed an additional benefit as compared to the US along with pendulum exercise.

KEYWORDS

Frozen shoulder, TENS,US, NPRS

INTRODUCTION:

FROZEN SHOULDER:-

Frozen shoulder is a clinical syndrome with painful restriction of both active and passive shoulder movements. The condition is aggravated by systemic problem like diabetes mellitus, cardiovascular disease and reflex sympathetic dystrophy.

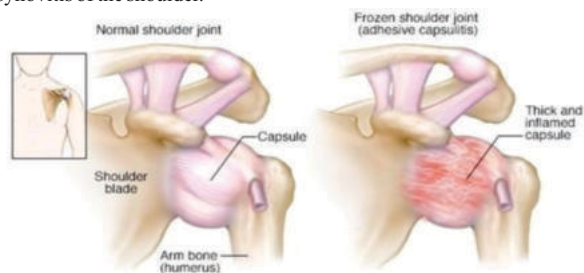
Adhesive Capsulitis, also known as frozen shoulder, is one of the most frequent pathologies in the middle-aged population. Frozen shoulder diagnosis has been used for many years in describing shoulder pain and limited range of motion, and was originally thought to be "peri-arthritis". Adhesive Capsulitis is characterized by pain, stiffness, and limited function of the glenohumeral joint, which adversely affects the entire upper extremity. The most common limitations in range of motion are flexion, abduction, and external rotation. Approximately 70% of frozen shoulder patients are women.

The condition occurs more commonly in people with diabetes and in people who've kept their arm immobilized for a long period of time. Symptoms may start gradually and resolve within one or two years. Treatment involves stretching and sometimes injecting corticosteroids and numbing medication into the joint capsule. In some cases, surgery is used to loosen the joint capsule.

In Adhesive capsulitis (Ac), joint capsule adheres to humeral head due to contraction of glenohumeral joint capsule. patient with AC have difficulty in activities involving either arm elevation or bringing it back (e.g., dressing, grooming, and performing overhead reaching activities) for a longer time period (several months or even year). Diabetes, immobilization of the shoulder, shoulder trauma, cervical disk disease, cardiovascular and pulmonary disease, hyperthyroidism, and autoimmune disease are the most common risk factor associated with AC.

The term 'frozen shoulder' is often used injudiciously for any painful condition of the shoulder joint. However, there are two known entities which must be differentiated and a proper diagnosis should be arrived at, since the treatment of each is different. These conditions are as follows: Painful shoulder: Any condition, around the shoulder, that causes pain and limitation of the movements of the shoulder may be included in this group. In this, there is no true contracture of the capsule of the shoulder joint. The various conditions include tendinitis of the

rotator cuff, sprain and of the rotator cuff, bicipital tenosynovitis and synovitis of the shoulder.



The patient has limitation of movements which is more due to pain rather than due to intra articular or capsular contractures. Radiograph may show areas of calcification around the shoulder indicating calcific tendinitis. Arthrography will rule out a capsular contracture. Magnetic resonance imaging (MRI) of the shoulder would help rule out tears in the rotator cuff. Treatment depends upon the primary lesion. Manipulation should not be undertaken.



Fig :- 1.2 Thickening, Fibrosis and Shrinking of the capsule

Adhesive capsulitis or frozen shoulder: Capsular adhesions form as a result of inflammation in the capsule and synovial. The adhesions are more marked in the axillary fold. Neviaser and Neviaser (1987) have condition into four stages: (1) preadhesive stage, (2) acute adhesive stage, (3) stage of maturation and (4) chronic stage.

The exact cause of the capsular contracture is not known. However, relative immobility of the shoulder due to coronary artery disease, mastectomy or other operations over the chest and cervical spondylosis may precipitate frozen shoulder. Even not performing full shoulder stretches in our daily activities may lead to capsular contracture and thereby stiff shoulder in majority of individuals.

Adhesive capsulitis is classically characterized by three stages. The Length of each stage is variable, but typically the first stage lasts for 3 to 6 months, the second stage from 3 to 18 months, and the final stage from 3 to 6 months.

STAGES

First stage "freezing" phase: -

characterized by the onset of an aching Pain in the shoulder. The pain is usually more severe at night and with Activities, and may be associated with a sense of discomfort that radiates Down the arm. Often, a specific traumatic event is difficult for the patient to recall. As symptoms progress, there are fewer arm positions that are comfortable. Most patients will position the arm in adduction and internal rotation. This position represents the "neutral isometric position of relaxed tension for the inflamed glenohumeral capsule, biceps, and rotator cuff" Unfortunately, many of these patients are initially treated with immobilization.

Second Stage Progressive Stiffness Or "frozen" Phase: -

Pain at rest during this stage, leaving the patient with a shoulder that has restricted motion in all planes. Activities of daily living become severely restricted. Patients complain about their inability to reach into the back pocket, fasten the bra, comb the hair. When performing these activities, a sharp, acute discomfort can occur as the patient reaches the restraint of the tight capsule. Pain at night is a common complaint and is not easily treated with medications or physical modalities.

Final Stage Resolution Or "thawing" Phase:-

This stage is characterized by a slow recovery of motion. Aggressive treatment with physical therapy, closed manipulation, or surgical release may accelerate recovery, moving the patient from the frozen stage into the thawing phase, as long as ROM activities are practiced daily.



Fig:- 1.3 Frozen Shoulder Site Of The Pain

TENS is the application of low frequency current in form of pulsed rectangular current through surface electrodes on the patient's skin to reduce pain. A small battery operated machine is generally used to generate current. Which have specific stimulatory effect.

The effect and use of TENS depend upon gate control theory and pain modulation. Pain is an unpleasant disturbed sensation., which accompanies the activation of nociceptors. Pain is a subjective

phenomenon which multiple dimensions.

Pendulum circle are common shoulder exercise used early in physical therapy Rehabilitation. These exercises are called pendulum because they imitate the motion of a clock pendulum as it swings from side to side. Once a pendulum has started moving, gravity keeps it moving at a steady pace. The same concept is applied to the shoulder. Body weight is used to initiate movement of the humerus, and gravity assists the arm as it continues to move in a particular direction. Shoulder pendulum exercises increase range of motion without stressing the structures around the shoulder joint.

Ultrasound (US), which is a deep heat modality, has been used for more than 60 years in clinics. When US enters the body, it can exert effects on the cells and tissues via thermal and non thermal mechanisms. Ultrasound is effective in increasing the ROM of frozen usually diminishes shoulder.

AIM OF THE STUDY

The aim of this study is to compare between effectiveness of TENS along with pendulum exercise and US along with pendulum exercise on frozen shoulder and in reducing the pain.

NEED OF THE STUDY

To compare the effectiveness of TENS along with pendulum exercises vs US along with pendulum exercises in treating frozen shoulder.

OBJECTIVE OF THE STUDY

- To determine the effectiveness of TENS along with pendulum exercise in frozen shoulder.
- To determine the effectiveness of US along with pendulum exercises in frozen shoulder.
- To compare both modalities along with pendulum exercise in frozen shoulder.

STUDY DESIGN AND STUDY SETTING

Study Design:

Experimental pre test & post test design was used to carryout this study.

Study Duration:

The study will be conducted over a period of 6 week. Data collection will commence in July and conclude in December, allowing for sufficient time to recruit participants and gather injury-related information.

Population:

A quota sample of 60 subjects was chosen to take part in the study regarding the Frozen shoulder in pain relief. The subjects were chosen from inpatient department of various hospitals. The subjects were those who fulfilled the inclusion criteria and were ready to take the treatment on the daily basis; they were divided into 2 groups namely Group A & Group B. The group consisted of males and females .Having a mean age of (group A and mean age (group B).

Selection Criteria:

1. Inclusion Criteria:

- Age between 40 -65 years.
- Gender (both male and female).
- Person suffering from frozen shoulder (adhesive capsulitis).

2. Exclusion Criteria:

- Acromioclavicular joint tenderness
- Fractures of shoulder
- Dislocations of shoulder
- Subacromial bursitis
- Calcific tendinitis
- Shoulder trauma or injuries
- Inflammatory rheumatoid diseases
- Coagulation disorders.

Sampling Method And Sampling Size:

- Convenient Sampling
- 60 subjects were chosen to participate in this study and they were divided into 2 groups with 30 subjects each.

METHODOLOGY

Sample for convenience of 60 subjects those who fulfilled the inclusion

criteria were only allowed to take part in this study. The subjects were divided Randomly in two groups i.e ; Treatment given by TENS + Pendulum exercise (Group A) and treatment given by US + pendulum exercise (Group B). All the subjects were attended individually.

Firstly demographic date was collected and after that the patient were assessed with numerical pain rating scale along with Rang of motion. Assessment of the Group A was taken and they were treated for 6 days for 2 week & similarly assessment of Group B was taken and they were treated for 6 days for 2 week. After the treatment i.e. after 2 weeks they were again assessed.

Various subjects were approached and were thoroughly explained about the procedure, the potential benefit and risk factors. From those subjects –the ones who agreed and those who fell in the criteria for selection were selected with their consent.

Total 60 subjects were selected which were then divided into 2 groups randomly with each 30 subjects. The subjects were then evaluated for the pre test measures i.e. NPRS scale for better clarity & result at the end of the study. The duration of the treatment differed group wise –the subjects in group A were treated 6 days in a week for 2 weeks and the subjects in groups B were treated for 6 days in a week for 2 week.2

Group A TENS

The skin in the treatment area was first sterilized. Conductive rubber electrodes covered with a conductive gel in order to gain good skin contact replaced on the patient's skin. TENS for 10 mints given along with pendulum exercise. After the completion of the treatment they were again assessed with post test measures.2

TENS Parameters Pulse duration : 0.2ms. Frequency : 100HZ.

Treatment time : 10minutes.

Duration : 6 day in a week for 2 week.

Pendulum exercise Parameters:

Repetitions : 5 times. Duration : 6 day in a week for 2 week.

Group B Ultra sound

Using slow circular movements, the treating physical therapist applied the transducer head over the superior and anterior, posterior periarticular regions of the subject's glenohumeral joint, covering on painful area. And Aquasonic transmission gel was used. Then given the pendulum exercise. After the completion of the treatment they were again assessed with post test measures.2

US Parameters Intensity : 1.5 w/cm2. Mode : continuous.

Treatment time : 10 minutes.

Duration : 6 day in a week for 2 week .

Pendulum exercise Parameters:

Repetitions : 5 times . Duration: 6 day in a week for 2 week.

Based upon the individual the treatment data was collected and was recorded in the data collection forms. After that the recorded data was sent for the final analysis.

RESULT

Paired and Unpaired T test were used to analyze and compare the scores. The scores are: the score before intervention and score after intervention for both groups respectively. Total and individual scores of both the two occasions were compared with each other and a significance level of $p < 0.05$ was fixed.

This chapter deals with the results of data analysis of the PRE scores (pre intervention scores) and POST scores (scores obtained after two week of intervention) and there by interpreting there effect in the subjects.

Paired and Unpaired t-test was used to compare the performance of the subjects after the subjects received their treatment using NPRS. The analysis of POST NPRS showed a significant improvement after

Trance cutaneous electrical nerve stimulation Along with Pendulum exercise. Post NPRS calculations [$X_2 = 2.9$ $SD_2 = 1.3$] as compared to Pre NPRS calculations [$X_1 = 5.4$ $SD_1 = 0.91$] with T value = 4.98.15

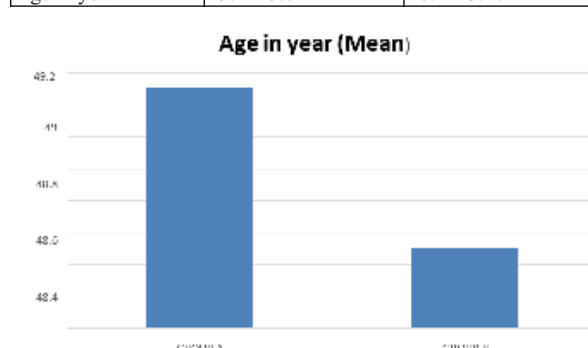
The analysis of POST NPRS showed a significant improvement after ultrasound therapy along with . The Post NPRS calculations [$X_2 = 3.3$ $SD_2 = 1.26$] as compared to Pre NPRS calculations [$X_1 = 6.3$ $SD_1 = 0.78$] with T value = 6.42.15

The Post NPRS scores were more significant in both the groups as compared to the Pre NPRS scores.

Thus, an overall analysis of score show maximally improved occurred with Trance cutaneous electrical nerve stimulation along with pendulum exercise with T value = 5.07 for NPRS scores as compared to ultrasound along with pendulum exercises T value = 6.41 for NPRS scorer. Showed marked improvement in the ability of the subject.

Table: 5.1 Comparisons Of Age In Group A And Group B

Variables	Group A	Group B
Age in year	49.1 $\pm$ 3.6	48.1 $\pm$ 3.20

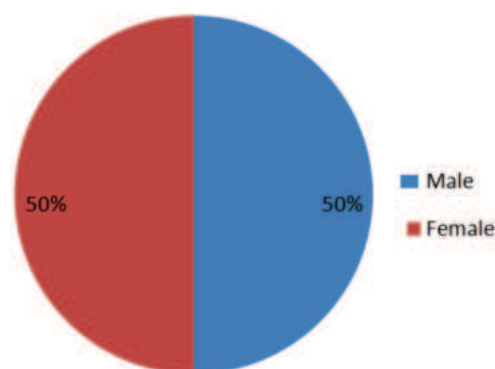


Graph: 5.1 Comparisons Of Age In Group A And Group B

Table: 5.2 Gender Ratio In Group A

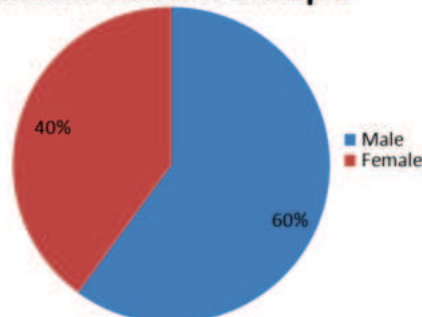
SR.NO	Group A	Total(10)
1	Male	15
2	Female	15

Gender ratio in Group A



Graph : 5.2 Gender Ratio In Group A

Gender ratio in Group B



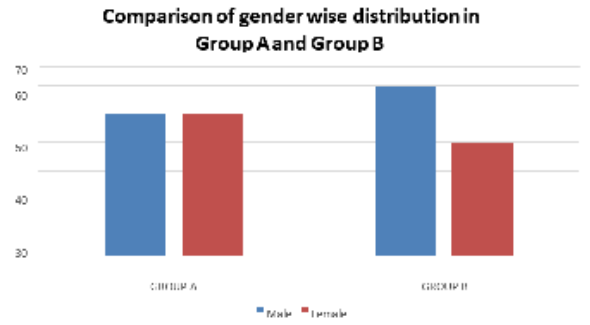
Graph: 6.3 Gender Ratio In Group B

Table: 5.3 Gender Ratio In Group B

SR. NO	Group B	Total(10)
1	Male	18
2	Female	12

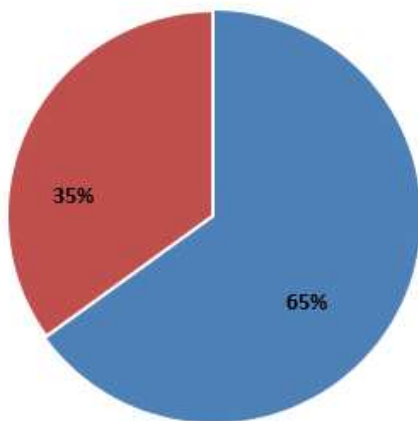
Table: 5.4 Comparison Of Gender Wise Distribution Between Group A And Group B

Sr.No	Gender	Group A	Group B
1	Male	15	18
2	Female	15	12

**Graph: 5.4** Comparison Of Gender Wise Distribution Between Group A And Group B**Table: 5.5 Mean And Sd Of Pre And Post NPRS In Group A**

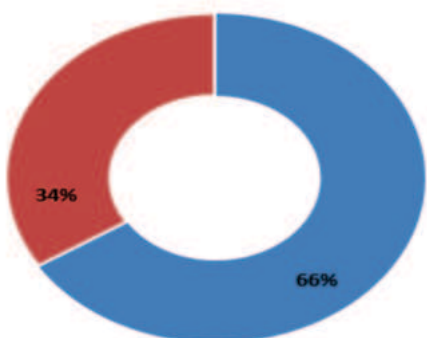
Variable	Group A
Pre NPRS	5.4 ± 0.91
Post NPRS	2.9 ± 1.3

Mean values of NPRS in Group A

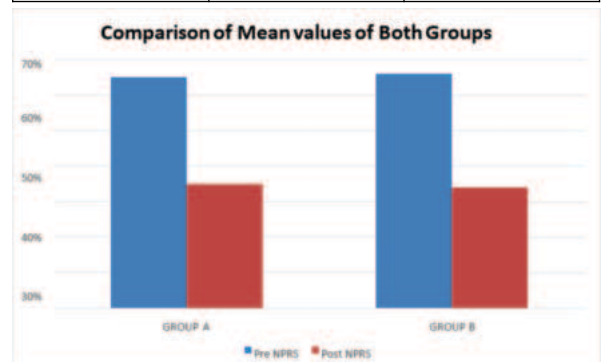
**Graph: 5.5** Mean And SD Of Pre And Post NPRS In Group A**Table: 5.6 Mean And SD Of Pre And Post NPRS In Group B**

Variable	Group B
Pre NPRS	6.3 ± 0.78
Post NPRS	3.3 ± 1.26

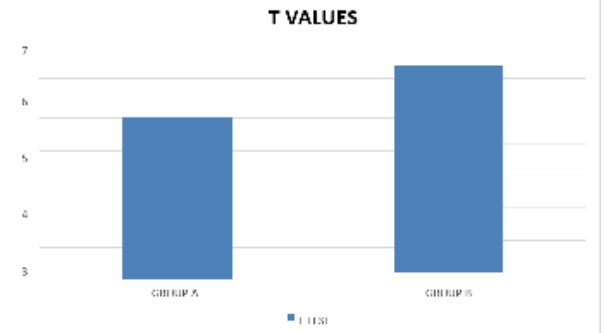
Mean values of NPRS in Group B

**Graph: 5.6** Mean And SD Of Pre And Post NPRS In Group B**Table: 5.7 Mean And SD Of Pre And Post NPRS Between Group A And Group B**

Variable	Group A	Group B
Pre NPRS	5.4 ± 0.91	6.3 ± 0.78
Post NPRS	2.9 ± 1.3	3.3 ± 1.26

**Graph: 6.7** Mean And SD Of Pre And Post NPRS Between Group A And Group B**Table: 5.8 Comparison Of T Values And P Values Obtained From Group A And Group B**

Variable	Group A	Group B
T value	5.06	6.41
P value	0.000041	0.00001

**Graph: 5.8** Comparison Of T Values And P Values Obtained From Group A And Group B

DISCUSSION

The Frozen shoulder and their improvement has been studied for over many years; however comparatively little work has been conducted to study the effect of TENS with pendulum exercise vs Ultrasound with pendulum exercise for reducing Frozen shoulder pain. The assessment was taken on NPRS score is commonly used for the identification for Frozen shoulder pain.

CONCLUSION

The research showed that TENS along with pendulum exercise reduce the Frozen shoulder as compared to the US along with pendulum exercise. Also it improves the strength of the muscles and provide relaxation and also reduce the pain in shoulder. Furthermore, no adverse effect of any increase in pain intensity was reported. The study concluded that the subjects treated with TENS along with pendulum exercise showed an additional benefit as compared to the US along with pendulum exercise.

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