

## Comparative Study of Cryotherapy versus Ultrasound in Acute Phase of Supraspinatus Tendinitis

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### Introduction

Supraspinatus probably had the most written on it in regards to the impingement syndrome and related shoulder pathology. It can be affected by trauma but also undergoes chronic degenerative changes leading to tendinopathies and rupture.<sup>1</sup>

Supraspinatus tendinitis is a painful lesion of the supraspinatus tendon, here the pain is located over the lateral aspect of arm with well-defined trigger points on the muscle belly over the supraspinatus notch and at the insertion.

A narrowing of the subacromial outlet by spur formation in coraco acromial ligament and the under surface of the anterior third of acromion define the relative progression of the impingement syndrome<sup>2</sup>.

All of these factors results in increase in pressure on the rotator cuff, which can lead to chronic wearing and subsequent tearing of the rotator cuff tendon.

Supraspinatus, Infraspinatus and the Subscapularis muscle comprise the rotator cuff or musculo tendinous cuff. These muscles are considered to be a part of the cuff because the inserting tendons of each muscle of the cuff blend with and reinforce the Glenohumeral capsule, most

importantly all these have action lines that significantly contribute to the dynamic stability of Glenohumeral joint.<sup>3</sup>

The SST canal forms a rigid and inextensible ring, if the muscle increases in size as a result of scar or an inflammatory process, it cannot glide through the canal without sticking and causing pain.

When the rotator cuff is damaged, the degenerated and ruptured Supraspinatus tendon no longer lies between the humeral head and The coraco-acromial arch. Direct contact between these two structures is responsible according to modern authors for the pain associated with abduction in the syndrome of rotator cuff rupture.<sup>4</sup>

Shoulder pain is the 3rd most common cause of musculoskeletal disorder after Low back pain and cervical pain. The annual incidence is estimated at 10 cases per 1000 population, peaking at 25 cases per 1000 population in a age category of 42-46 years.<sup>32-34</sup> In cadaver studies, the incidence of full thickness tear varies from 18-26%.

The incidence of partial thickness tear varies from 32-37% after age 40 years. In a study it is found that both males and females are equally affected with Supraspinatus tendinitis. Rotator cuff disease is more

common after age of 40 years. Various studies have shown the medical and surgical interventions in treatment of SST. Medical interventions like Non-steroidal anti-inflammatory drugs (NSAIDs), Subacromial corticosteroids and Bupivacaines supra scapular nerve block. Surgical interventions like Arthroscopic Sub-rominoplasty, Electrothermal arthroscopy, subacrominal decompression and for secondary impingement the surgical treatment is stabilization procedure a Capsulorrhaphy is done.

Many physiotherapy treatments are in use for or in treatment of Supraspinatus tendinitis. Some of them are:

Hot/Cold pack application

Ultrasound therapy

Iontophoresis / Phonophoresis

Deep friction massage

Low level laser therapy

Short wave diathermy

In this study Cryokinetics and Ultrasound Therapy is used and comparison between the effectiveness of both the interventions is done. Cryokinetics is a systematic combination of cold application to numb the injured body part and graded progressive, active exercises. 23 Using cold applications during rehabilitation of acute sprains, strains, contusions and muscle injuries appear to have begun at Brooke Army Hospital in early 1960's. In 1964 Grant and Hayden described their treatment for some Musculo-skeletal injuries with a new method that they termed Cryokinetics referring to a combination of cold and exercise. Ice was used to anesthetize the injured body part, this took from 3 to 20 minutes and was ceased when patient reported numbness. Once numbed the body part was exercised with active movements, if discomforts recurred the ice was reapplied. In 1967 Moore et al 5 presented case studies involving athletic rehabilitation

with Cryokinetics and discussed possible mechanics to account for quicker rehabilitation and concluded that the success of Cryokinetics was due to early exercise's and that the role of cold was only to decrease pain and thereby allow earlier and more intense normal active exercise. Cryotherapy is thought to decrease edema formation via induced vasoconstriction. Reduce secondary hypoxic damage by lowering the metabolic demand of the injured Tissue. 6-7 cooling skin surface temperature to below approximately 15°C from normal body temperature is also thought to exert a localized analgesic effect by inhibiting the nerve conduction velocity. 8-9 Thus facilitating earlier and more aggressive therapeutic exercise after muscle injury.10-11 Cold application diminishes pain so that active exercise is possible. Cold doesn't remove the pain sensation mechanism rather it removes residual pain.

### **Objective**

To investigate the effectiveness of two physical therapy interventions in acute phase of Supraspinatus Tendinitis.

### **Study design**

A pre and post treatment group design (both cryotherapy and Ultrasound Therapy treatment group). Patients divided into two groups Group A and Group B.

Group A treated by Cryotherapy and Group B treated by Ultrasound Therapy.

### **Source of Sample**

All patients coming to Shri Ram Smarak Institute Of Medical Sciences, Hospital, Bareilly In Physiotherapy Department with clinical diagnosis of Supraspinatus Tendinitis by an Orthopaedician and who are fulfilling the Inclusion and Exclusion criteria.

### **Inclusion Criteria**

Subjects with supraspinatus tendinitis who are under analgesics.

**Age group:** 30-50 yrs.

**Exclusion Criteria**

Adhesive capsulitis, Cervical disorders, Fibromyalgia, Rheumatoid Arthritis, Hemiplegia, Thoracic outlet syndrome, Cold hyper-sensitivity, Haemoglobineuria, Anesthetic skin, cardiac conditions, Cold Utricaria

**Method**

For this study, 60 patients with SST of both sexes were taken. Patients were randomly divided in to Group A and Group B. Group A were treated with Cryokinetics for 30 minutes. Group B were treated with US Therapy for 8 minutes. Both the groups were treated 5 times per week for four weeks. Patients were evaluated with VAS and 1 RM on day 1st, 15th day and end of 4th week. The values were compared to see which Group has better improvement. The values are statistically analyzed to determine their effect in reducing pain and improving muscle strength.

**Cryotherapy**

The subject is in comfortable supine position. Cryopack is applied around the involved shoulder covering superior-posterior, superior and anterior aspects. Treatment was given for 20 minutes following which active exercises were given for 5-7 minutes. Again Cryopack was applied for 5 minutes then another set of active exercises were given. Exercises include active flexion, extension and abduction of the involved shoulder for ten repetitions.

**Ultrasound**

In U.S group, the subject is in comfortable sitting position in a chair with the proper back support. Skin and transducer was coated with acoustic gel. U.S was then applied to superior-anterior aspect of involved shoulder by the therapist. The applicator is moved in small concentric circular movements. The transducer head was applied to the therapy region at right angle to ensure maximum

absorption. Pulsed ultrasonic waves with a ratio of 1:1 with 1 MHZ frequency and 0.8 W/cm2 are applied with a 3cm diameter applicator. Ultrasound therapy lasted for 8 minutes in each session.

Both the treatments were given 5 times a week for 4 weeks.



Figure 1

**Results**

This study concludes that Cryokinetics gives better response and is more effective than Ultrasound Therapy in reducing pain, increasing muscles strength and enhancing functional performance in SST patients.

In comparison with VAS for pain and 1 RM for muscle strength Group A and Group B showed improvement. Group A showed significant improvement than Group B.

In VAS scale outcome based on the difference of pre and post assessment score is more in Group A with  $P < 0.001$ .

In 1RM outcome based on difference of pre and post assessment score is more in Group A with  $P < 0.001$ .

Table 1

Gender	Group A		Group B	
	No	%	No	%
Male	14	46.7	16	53.3
Female	16	53.3	14	46.7
Total	30	100.0	30	100.0

Samples are gender matched with  $P=0.605$

Table 2

Age distribution of patients studied

Age in years	Group A		Group B	
	No	%	No	%
21-30	3	10.0	5	16.7
31-40	15	50.0	14	46.7
41-50	12	40.0	11	36.7
Total	30	100.0	30	100.0

Samples are age matched with P=0.876

Table 3

VAS	Day 1	Day 15	4 <sup>th</sup> week	%change at 4 <sup>th</sup> week
<b>Group A</b>				
No pain	0	0	06(20.0%)	+20.0%
Mild Pain	0	15(50.0%)	24(80.0%)	+80.0%
Moderate pain	12(40.0%)	14(46.7%)	0	-40.0%
Severe pain	16(60.0%)	1(3.3%)	0	-60.0%
<b>Group B</b>				
No pain	0	0	0	0.0
Mild Pain	0	3(10.0%)	12(40.0%)	+40.0%
Moderate pain	12(40.0%)	24(80.0%)	17(56.7%)	+16.7%
Severe pain	18(60.0%)	3(10.0%)	1(3.3%)	-56.7%

Analogue Scale analysis

**Discussion**

The aim of this study is to compare these two interventions in reducing pain and increasing muscles strength and enhancing functional performance in SST.

Group A was treated with Cryotherapy and Group B was treated with Ultrasound Therapy. Group A has been shown more improvement than Group B, which is proved statistically.

The data revealed that Cryotherapy is significantly more efficient in reducing pain. These results are consistent with those of Moore et al (1967) who presented a case study on athletic rehabilitation with Cryotherapy and discussed possible mechanics for a quicker rehabilitation, and with those of Grant and Hayden (1964) who discussed benefits of Cryotherapy.

Between the patients interviewed, both Males and Females in both Groups are almost equally affected with Supraspinatus Tendinitis. With 46.7% of Males in Group A and 53.3% in 6 Group B. 53.3% of Females in Group A and 46.7% in Group B. In relation to age this study is

showing that the patient’s incidence with SST is more in the age group of 31-40 years.

Percentage distribution of patients with regards to age in Group A is 10.0% at the age group of 21-30 years, 50.0% at the age group of 31 -40 years, 40% at the age group of 41-50 years. In group B it is 16.7% at the age group of 21-30 years, 46.7% at the age group of 31-40 years and 36.7% at the age group of 41-50 years. According to Andre Roy, MD (2006), shoulder pathologies increases as age progresses.

Discussing techniques of physiotherapeutic treatment Souza (1994) believes that modalities as Cryotherapy, Electrotherapy and Exercise can have great value on Shoulder lesions treatment. In this study Cryokinetics was found to be better than ultrasound therapy. In Group A the VAS score at pre assessment was 6.90 and was decreased to 1.24+/-0.86. In Group B the VAS score at preassessment was 6.70+/-1.51 and was decreased to 4.03+/-1.38 at the end of 4th week. The outcome based on % change was found to be more in Group A.

According to Lex B Verdijk (2009) 1RM is the reliable and valid measuring tool for shoulder problems. In this study Group A the 1RM score at preassessment was 0.90+/-0.40 and was increased to 1.97+/-0.39 at the end of 4th week. In Group B the 1RM score at preassessment was 1.05+/-0.49 and was increased to 1.47+/-0.39 at the end of 4th week. Outcome based difference of pre and post assessment score is more in Group A when compared to Group B. That shows 1RM is improving in case of SST with Cryokinetics.

The good improvement of VAS scale is seen in Group A patients.

The good improvement of 1RM is seen in Group A patients.

The study concluded that Cryokinetics gives better response and is more effective than US in reducing pain and enhancing functional performance in SST patients.

The good improvement of VAS and 1RM is seen in the age group of 31-40 years.

In VAS scale outcome based on the difference of pre and post assessment score is more in Group A with  $P < 0.001$ .

In 1RM outcome based on difference of pre and post assessment score is more in Group A with  $P < 0.001$ .

### Conclusion

This study concludes that Cryokinetics gives better response and is more effective than Ultrasound Therapy in reducing pain, increasing muscles strength and enhancing functional performance in SST patients.

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