Effect of ultrasound and four hourly cryotherapy application in the treatment of bicipital tendinitis- a randomised clinical trial

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ABSTRACT

The purpose of this appraisal was to consider the effect of ultrasound and four hourly cryotherapy application in the treatment of bicipital tendinitis. In this prospective randomized clinical assessment, Thirty individuals were enrolled in the group A, and thirty specific individuals were picked into the get-together B group. In group A, Ultrasound for 7 mins – 2:8 – 1.5 w/cm2 and for group B, Sham Ultrasound for 7 mins – 2:8 – 1.5 w/cm2 with cryotherapy for 20 min 4hourly given. Pain severity, Pressure Pain Threshold and functional disability were assessed in all participants before and after two weeks of treatment. Group A had 12 males, and 15 females and Group B had nine males and 18 females. Pre and post interventional mean and standard deviation for group A was 7.37+1.21 and 7.33+1.30. Whereas pre and post interventional mean and standard deviation for group B was 7.33+1.30 and 1.70+0.60. Pre interventional analysis of data of group A and B showed no significant difference. Whereas post interventional analysis of data showed an extremely significant difference between group A and group B. Results revealed that participants with bicipital tendinitis respond more favourably to ultrasound therapy with cryotherapy for 20min four-hourly than ultrasound alone.

INTRODUCTION

Tendinitis, which implies exacerbation of a tendon, is a kind of tendinopathy. Generally, tendinitis is suggested by the body part required as Achilles tendinitis, Bicipital Tendinitis or Patellar tendinitis, etc. The inflammation is due to too much stress on the tendon caused by performing repetitive movements. Healthy tendons are brilliantly white, are fibroblastic in texture and can withstand substantial mechanical loads. Over the top ligaments are depicted by changes in cell work, split of collagen social affairs, broadened development of the proteoglycan-water compose and neurovascular increment. As per the focal tainting, tendinopathies may give torment of variable length and power and with utilitarian failure, or they might be an asymptomatic finding on imaging systems.

Bicipital tendinitis, or biceps tendinitis, is a provocative system of the long pioneer of the biceps ligament and is a common reason behind shoulder torment because of its position and function. The
ligament is uncovered on the front shoulder as it encounters the humeral Bicipital territory and inserts onto the unmatched bit of the labrum of the glenohumeral joint. Bicipital tendinitis is every once in awhile chosen in relationship to have rotator sleeve contamination as an area of the impingement issue or associate to intra-articular pathology, for example, labral tears.

Ultrasound treatment has made sure about, noninvasive treatment for tendinitis. ‘Sportsinjuryclinic.net’ states that ultrasound animates the creation of collagen, the significant protein that makes up touchy tissues like ligaments and tendons, breathing life into recouping time. Ultrasound utilizes high recurrent sound to warm an area, developing blood deftly. It advances recuperating and decreases disturbance by making a histamine reaction in the body, reducing tendinitis.

US enables the creation of collagen, the essential protein that makes up ligaments and invigorates recouping time. US utilizes high recurrent sound to expand ligament microcirculation, developing blood agilely. It pushes fixing and lessens bothering by making a histamine reaction in the body, reducing tendinitis.

Cold packs are commonly utilized by clinicians, guides, and others, a significant part of the time as a between time treatment for some excellent conditions, in any case, the degree of temperature change related with this sort of therapy remains deficiently comprehended.

Cold pack treatment produces necessary temperature falls in cutaneous and subcutaneous shallow tissues without plainly changing the temperature of tissues at or more than 2.0 cm underneath the skin. The temperature propensities of the two layers of tissue adjust after treatment, demonstrating that the critical tissue underneath is, at any rate, one of the wellsprings of warmth used to re-warm the shallow cooled tissue. The last discovering underscores the centrality of the hemodynamic exchange among shallow and critical tissues. It offers a clarification for the decrease of misery, muscle fit, and oedema saw with cold treatment in two or three clinical conditions.

Substantial impacts of cryotherapy by and large join, diminished colleague cell hypoxic injury, reduced trouble and muscle fit. Through research, it was discovered that enormous decreasing of little extension vascular perfusion following 20 minutes of cryotherapy, an impact that gets turned around inside 4 hours after evacuation of the ice.

MATERIALS AND METHODS

This prospective randomized clinical investigation was affirmed by the ethical committee. Participants, including both male & females who are clinically diagnosed by certified orthopaedic surgeon/Physiotherapist with Bicipital tendinitis with actual speed’s test, at an age between 18 to 40 were included. Exclusion criteria were who are contraindicated for application of Cryotherapy and US, Individual having Cryo-sensitivity, Systemic illness, Malignancy, Psychiatric illness. Written informed consents were given to all participants, and then they were randomly assigned to two groups by simple random sampling lottery method. Total of 57 participants was presented with bicipital tendinitis. Twenty-seven participants were enrolled in group A, and 27 other participants were enrolled in group B.

Outcome Measures Pain severity was questioned with 100-mm visual analogue scale (VAS) (a subjective scale). In this study “success rate” of treatment means the percentage of improvement of shoulder pain (at least 30mm VAS decrease).

SPADI scale used for Self-assessment of symptoms and function of the shoulder. All measures were obtained at baseline, at the end of the course of treatment. The assessments were carried out by the second author.

Statistical Analysis

Statistical Analysis Pain severity (VAS), Pressure Pain Threshold (Pressure algometer) and functional disability (SPADI) represented as mean SD and differences between two groups were assessed by unpaired t-test.

RESULTS

Total of 54 study subjects was included. Based on demographic characteristics and baseline findings there were no significant differences between the two groups at baseline.

Gender distribution in the study

Table 1 shows that a total of 54 subjects with bicipital tendinitis between age group 18-40 years was taken in this study. Out of 54 subjects, 33 females and 21 males were included. Group A had 12 males and 15 females and Group B had nine males and 18 females.

Side Affected Ratio

Table 2 reveals that Out of 54 subjects with bicipital tendinitis 44 were affected with the right side and ten were affected with the left hand. Group A had 23 right sides affected, and four left sides affected, and
### Table 1: Gender distribution

| Gender | Group A | Group B |
|--------|---------|---------|
| Males  | 12      | 9       |
| Females| 15      | 18      |
| Total  | 27      | 27      |

### Table 2: Total number of affected side

|        | Right | Left |
|--------|-------|------|
| Group A| 23    | 4    |
| Group B| 21    | 6    |
| Total  | 44    | 10   |

### Table 3: Comparison of pre and post visual analog scale within the groups

|        | Pre test | Post test | P Value | T Value | Significance |
|--------|----------|-----------|---------|---------|-------------|
|        | Mean ± SD| Mean ± SD |         |         |             |
| Group A| 7.37 + 1.21 | 4 + 0.87 | <0.0001 | 11.69   | Extremely significant |
| Group B| 7.33 + 1.30 | 1.70 + 0.60 | <0.0001 | 20.36   | Extremely significant |

### Table 4: Comparison of pre-pre and post-post visual Analog scale between groups

|        | Pre Test   | Post Test  |
|--------|------------|------------|
| Group A| 7.37 + 1.21 | 4 + 0.87   |
| Group B| 7.33 + 1.30 | 1.70 + 0.60 |
| P-Value| 0.9143     | <0.001     |
| T-Value| 0.108      | 11.177     |
| Interference | Not significant | Extremely significant |

### Table 5: Comparison of pre and post SPADI values Within the groups

|        | Pre test | Post test | P Value | T Value | Significance |
|--------|----------|-----------|---------|---------|-------------|
|        | Mean ± SD| Mean ± SD |         |         |             |
| Group A| 39.53 + 5.64 | 18.74 + 3.305 | <0.0001 | 24.45   | Extremely significant |
| Group B| 34.92 + 4.85 | 9.03 + 1.37 | <0.0001 | 30.54   | Extremely significant |

### Table 6: Comparison of pre-pre and post-post values of SPADI between the groups

|        | Pre test | Post test |
|--------|----------|-----------|
| Group A| 39.53 + 5.64 | 18.74 + 3.305 |
| Group B| 34.92 + 4.85 | 9.03 + 1.37 |
| P value| 0.002     | <0.0001   |
| T value| 3.219     | 14.087    |
| Interference | Very significant | Extremely significant |
Group B had 21 right sides affected, and six left sides affected subjects.

Table 3 elicit that pre interventional mean and standard deviation for group A was 7.37+1.21 and 7.33+1.30 for group B respectively. Whereas post interventional mean and standard deviation for Group A was 4 +0.87 and 1.70+0.60 for group B.

Intragroup statistical analysis revealed statistically reduction in pain post-intervention for both the groups. The analysis was carried out by paired t-test with extremely significant p-value as (p<0.0001) with t value of 11.69 for group A and group B the analysis was carried out by paired t-test with extremely significant p-value as (p<0.0001) with t value of 20.36.

In this study, Table 4 pre and post interventional mean and standard deviation for group A was 7.37+1.21 and 7.33+1.30, whereas pre and post interventional mean. The standard deviation for group B was 7.33+1.30 and 1.70+0.60. Intergroup analysis was carried out by unpaired t-test. Pre interventional analysis of data of group A and B showed no significant difference with a p-value of (p= 0.9143) and t value of 0.108. In contrast, post interventional analysis of data showed an extremely significant difference with a p-value of (p<0.0001) and t value of 11.17 in group A and group B.

Table 5 reveals that In this study pre interventional mean and standard deviation for group A was 39.53+5.64 and 34.92+4.85 for group B respectively. In contrast, post interventional mean and standard deviation for Group A was 18.74+3.305 and 9.03+1.37 for group B. Intra group statistical analysis revealed statistically increase in functional activity intervention ally for both the groups. The analysis was carried out by paired t-test with extremely significant p-value as (p<0.0001) with t value of 24.45 for group A and for group B the analysis was carried out by paired t-test with extremely significant p-value as (p<0.0001) with t value of 30.54.

Table 6 reveals that Intergroup statistical analysis of data was carried out by unpaired t-test. Analysis of pre interventional data was very significant between the both groups with a p and t value of 0.0023.219, respectively. Statistics showed that post interventional data was extremely significant with a p-value <0.0001 and t value of 14.087.

**DISCUSSION**

The present clinical trial aimed to study the effect of ultrasound and four hourly cryotherapy application in the treatment of bicipital tendinitis. The result of this study was focused on pain relief and functional disability of bicipital tendinitis.

Fifty-four participants were taken and divided into two groups, 27 participants in each group. Group A received ultrasound 7 mins – 2.8 – 1.5 w/cm² and for group B, Ultrasound for 7 mins – 2.8 – 1.5 w/cm² with cryotherapy for 20 min 4 hourly, for one week. The selected parameters were a visual analogue scale for pain intensity and SPADI scale for functional disability. Data were collected at baseline (day 0) and after six weeks of treatment to evaluate the changes in the mentioned parameters.

The present study showed 54 participants completed research and added in the study. 61% of females and 39% of males were diagnosed with bicipital tendinitis between age group 18-40 years.

In the study, 77% of participants were diagnosed with right side bicipital tendinitis, and 23% of participants were diagnosed with left side bicipital tendinitis. Group A had 12 males and 15 females. Group B had 9 males and 18 females.

The present study focused on ultrasound and four hourly cryotherapy application in the treatment of bicipital tendinitis combination of order to relieve pain and improve quality of life by improving the functional disability of bicipital tendinitis.

A pre-treatment outcome measure using a visual analogue scale and SPADI scale Score were done. The specific treatment protocol was followed as per the group for one week, and the post-treatment outcome using a visual analogue scale and SPADI scale Score were documented accordingly. A treatment program was designed, and proper ergonomic advice was given.

Here Intra Group comparison (within-group) was analyzed statistically using Paired t-test, inter Group comparison (between-group) was analyzed statistically by using Unpaired t-test. Intra Group comparison was analyzed statistically using a Paired t-test for visual analogue scale and SPADI scale.

The biceps muscle is formed from two heads (short and long head) that run along the anterior aspect of the arm bone (humerus). Precisely when the muscle is abused through irksome exercises, it can cause an unprecedented scene of tendonitis, or aggravation of the ligaments. This happens most all things considered in ladies in their mid 40’s, at any rate, may affect either sexual heading at any grown-up age.

Bicipital tendonitis from the beginning causes torment when the arm is inside or remotely turned. The devastation begins in the main piece of the shoulder by then diver to the biceps muscle. This can be confusing now and then, due to where the destruction is felt. A few people may overpower
it as a shoulder issue in any case the bicep liga-
mants introduce around the shoulder joint. Some-
boby experiencing bicipital tendonitis may feel tor-
ment and uneasiness when driving, brushing their
teeth, or coming to overhead.

Treatment of this condition ought to be gotten ready
for helping unsettling influence, taking out handles,
and reestablishing ordinary degree of improvement
to the shoulder and arm. Meds combine ice, elec-
trical activation, and pleasing ultrasound. Of these
three treatment decisions, therapeutic ultrasound
might be the best in decreasing the aggravation con-
sidering its entering properties. The ultrasound
waves appear at the hurt zone where they increment
the spread and separate associations.

Therapeutic ultrasound’s fixing properties can be
redesigned by applying a subject easing at the site,
in a framework called phonophoresis. Through
phonophoresis, the directing is “pushed” by the
ultrasound waves with an ultimate goal to improve
the upkeep of the medication. Once the inflamma-
tion has decreased, the patient may begin exercises
to regain strength and range of motion.

For visual analogue scale, For intragroup compar-
ison(within group) shows that there was a hugely
significant difference in Group A (P<0.0001) and
Group B (P<0.0001). For Inter Group comparison
(between Groups). This shows that pre-treatment
there was no significant difference seen with P
values of 0.9143. While on separating the post-
treatment respects, the outcomes between the two
Groups utilizing unpaired test uncovered that there
was staggering fundamental capability seen with the
P-value <0.0001.

For SPADI, for intragroup comparison, it shows that
there was an extremally significant difference seen
with Group A(P= <0.0001) and Group B (P<0.0001). Likewise,
for Inter Group comparison (between Groups)
pre-treatment, there was a statistically sig-
nificant difference seen with P values of 0.002 for
SPADI. While on comparing the post-treatment val-
ues, the results between the two Groups using unpaired ‘t’ test revealed that there was a hugely
significant difference seen with the P= <0.0001 for
SPADI.

The given treatments were significantly effective,
but Group B showed considerable improvement as
compared to Group A. The current study commonly
used ultrasound as conventional treatment for both
the groups one of the study suggested (Kaltenborn
and Kahanov, 2007) that ultrasound showed ben-
efits with increased local blood flow, pain relief in
both acute and chronic pain and expanded injury
correcting, decrease in muscle fit, broadened exten-
sibility of collagen strands and an ace provocative
reaction and it is surveyed that warm impacts hap-
pen with a climb of tissue temperature to 40-45 C
for at list 5 min (Prentice, 1999; Young and Dyson,
1990). The present study focused on a combination
of ultrasound and four times cryotherapy to relieve
pain and improve functional mobility of the should-
er joint.

One of the literature said Focused ultrasound could
create a pressure change at a precise location, trig-
ning the endothelium of targeted blood vessels
to release nitric oxide. This chemical signal causes
smooth muscle relaxation and the dilation of blood
vessels (Oerlemans et al., 2013). This is a reversible
strategy, and veins return to their stand-out size not
long after the finishing of the attracted ultrasound
treatment with no perpetual wickedness to focused
tissue (Maruo et al., 2004; Yang et al., 2009).

The physiologic impacts of Cryotherapy applica-
tion solidify quick vasoconstriction with reflex-
ive vasodilation, diminished near to ingestion and
enzymatic turn of events, and diminished oxygen
request. Cold rots muscle shaft fibre action and
moves back nerve conduction speed; it is a great part
of the time used to diminish spasticity and muscle
guarding. It is reliably used to mitigate the torment
of minor wounds, comparatively as decline muscle
irritating. The utilization of ice packs in treatment
diminishes the circulatory framework most quickly
near the start of the cooling period, (Prentice, 1999)
this occurs because of vasoconstriction, the essen-
tial reflex canny turn of events.

Cryotherapy treatment lessens the temperature of
the skin and significant tissues to a criticalness of 2
to 4 cm. It decreases the request edge of tissue noci-
ceptors and the conduction speed of anguish nerve
signals (Nadler et al., 2001).

An assessment (Ho et al., 1994) utilizing bone fil-
tering nuances that the utilization of an ice wrap
to one knee for 20 minutes reduces vein dissemina-
tion framework by 38%; delicate tissue circula-
tory framework by 26%; and bone take-up, which
reflects changes in bone course framework and
digestion, by 19%. In this assessment, Continuous
cryotherapy has been appeared to impact damaged
tissue protectively.

A creature report (Merrick et al., 1999) discussed
that with a significant injury to a muscle, optional
hypoxic injury to the joining tissue was moved back
with five hours of productive cryotherapy. Moving
back of the pace of preparing diminishes the speed
of oxygen use, coming about tissue hypoxia, and
another tissue injury. In another appraisal (Myrer
et al., 1998), both ice pack and cold whirlpool treat-
ment for 20 minutes diminished lower leg muscle temperatures at a relative rate and assists with decreasing unsettling influence.

CONCLUSION

Various conservative approaches are used in treating bicipital tendonitis. Still, this study concluded that in bicipital tendinitis the effect of ultrasound and four hourly cryotherapy application were more effective in decreasing pain and improving quality of life than using ultrasound only and thus alternate hypothesis is accepted. That there is a significant effect of ultrasound and four hourly cryotherapy application in the treatment of bicipital tendinitis approved.

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Conflict of interest

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