ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Published by JK Welfare & Pharmascope Foundation Journal Home Page: www.ijrps.com

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

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Article History:

Received on: 20 May 2020
Revised on: 25 Jun 2020
Accepted on: 27 Jun 2020

Keywords:

Ultrasound, Cryotherapy, Bicipital Tendinitis, Application

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.

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ISSN: 0975-7538

DOI: https://doi.org/10.26452/ijrps.v11i3.2673

Production and Hosted by

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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 lig-

ament 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 with100-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 Mean ± SD	Post test Mean ± SD	P Value	T Value	
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 Mean ± SD	Post test Mean ± SD	P Value	T Value	
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	Extrmely 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 was39.53+5.64 and 34.92+4.85for group B respectively. In contrast, post interventional mean and standard deviation for Group A was 18.74+3.305and 9.03 + 1.37for 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 both the 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/cm^{2}and for group B, Ultrasound for 7 mins – 2:8 – 1.5 w/cm^2 with cryotherapy for 20 min 4hourly), 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 sidebicipital 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 dives 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 ligaments introduce around the shoulder joint. Somebody experiencing bicipital tendonitis may feel torment 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, electrical activation, and pleasing ultrasound. Of these three treatment decisions, therapeutic ultrasound might be the best in decreasing the aggravation considering 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 inflammation has decreased, the patient may begin exercises to regain strength and range of motion.

For visual analogue scale, For intragroup comparison(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 staggeringly 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 significant difference seen with P values of 0.002 for SPADI. While on comparing the post-treatment values, 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 benefits with increased local blood flow, pain relief in both acute and chronic pain and expanded injury correcting, decrease in muscle fit, broadened extensibility of collagen strands and an ace provocative reaction and it is surveyed that warm impacts happen 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 shoulder joint.

One of the literature said Focused ultrasound could create a pressure change at a precise location, triggering 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 application solidify quick vasoconstriction with reflexive 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 essential 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 nociceptors and the conduction speed of anguish nerve signals (Nadler *et al.*, 2001).

An assessment (Ho *et al.*, 1994) utilizing bone filtering nuances that the utilization of an ice wrap to one knee for 20 minutes reduces vein dissemination framework by 38%; delicate tissue circulatory 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.

ACKNOWLEDGEMENT

Nothing to Report.

Conflict of interest

None To Disclose.

Sources of funding

KIMDSDU Karad.

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