A STUDY TO COMPARE THE EFFECTIVENESS OF ULTRASOUND THERAPY WITH CRYOKINETICS AND SOFT TISSUE MASSAGE VERSUS ULTRASOUND THERAPY WITH SOFT TISSUE MASSAGE IN ACUTE SUPRASPINATUS TENDINITIS.

Corresponding Author: MANJULA.S, MPT, ASST PROF, SCHOOL OF PHYSIOTHERAPY, VISTAS, THALAMBUR, TAMIL NADU- 600130, INDIA

Co Author : Dr.P.SENTHIL SELVAM, PHD, PROF, HOD, SCHOOL OF PHYSIOTHERAPY, VISTAS, THALAMBUR, TAMIL NADU- 600130, INDIA

INTRODUCTION

Supraspinatus tendinitis or painful arc syndrome occurs in the shoulder. The shoulder joint owes its stability to the rotator cuff muscles which are four small muscles locatedaround theshoulderjointwhichhelpmovement,butimportantlytheirtendonsstabilizetheheadofthe humerus within the joint capsule[1].One of the most common overuse injuries that occur in the upper limb issupraspinatus tendinitis. Supraspinatus tendinitis is caused by repeated stress or over use injury[2].Tendinitis andpartialtearsinthesupraspinatustendoncausesa“painfularc“sinceasthepersonelevates hisarmsideways,thetendonbeginstoimpingeundertheacromionthroughthemiddlepartof the arc and this is usually relieved as the arm reaches 180[3].

Tendinopathy is a common painful condition with reduced functional capacity of the tendon associated with the histopathological findings showing failed healing response [4].Overuse or repetitive micro-trauma sustained in overhead position and repetitive motion at work place causes degenerative changes and contributes to supraspinatus tendinitis [5].Manual treatment consisted of deep friction massage on the supraspinatus muscle, scapular mobilization, glenohumeral joint mobilization, and proprioceptive neuromuscular facilitation techniques [6].

Supraspinatusmusclerunsalongthetopoftheshoulderbladeandinsertsviathetendon at the top of the arm (humerus bone). This muscle is used to lift the arm up sideways and also important in throwing sports as it is the muscle the hold the arm in the shoulder when you release what you are throwing[7].The supraspinatus tendinitis is caused by both extrinsic and intrinsic factors. The extrinsic causes are primary impingement, increased subacromial

loading, trauma, rotatorcuff overload, eccentric muscle overload, glenohumeral laxity, glenoid labral tear, muscle imbalance to poor posture, trapeziusparalysis.The intrinsic causes are acromial morphology, acromioclavicular arthrosis, coracoid impingement syndrome, prominent humeral greater tuberosity, ageing, impingement, primary tendinopathy, calcified tendinopathy [8].The calcifications of the shoulder resolved after ultrasound therapy, thus confirming the findings in earlier reports [9].

AIM OF THE STUDY:

The aim of the study is to compare the effectiveness of ultrasound therapy with cryokinetics and soft tissue massage versus ultrasound therapy with soft tissue massage in acute supraspinatus tendinitis.

OBJECTIVE OF THE STUDY:

The main objective of the study

- To find out the effect of ultrasound therapy along with cryokinetics and soft tissue massage in acute supraspinatustendinitis
- To find out the effect of ultrasound therapy along with soft tissue massage in acute supraspinatustendinitis
- To compare the effectiveness of ultrasound therapy along with cryokinetics and soft tissue massage over therapeutic ultrasound with soft tissue massage in reducing pain and improving shoulder function in patients with acute supraspinatustendinitis.

RESEARCH DESIGN AND METHODOLOGY:

An experimental study design was conducted with 40 patients within the age group of 30 to 60 years who fulfilled the inclusion and exclusion criteria.

INCLUSIONCRITERIA

1.AGE : 30-60

2. GENDER : Both male andfemale

3. Empty Can testpositive

4. Clinically diagnosed as acute supraspinatustendinitis.

5. Point tenderness at Greater tuberosity ofhumerus

EXCLUSION CRITERIA

1. Deep open wounds inshoulder
2. Peripheral vasculardiseases
3. Shoulderfractures
4. Cardiacpacemakers
5. Shoulderdislocation

OUTCOME MEASURES:

1. Visual analog scale (VAS)

AVisualAnalogScale(VAS)isameasurementinstrumentthattriestomeasure a characteristic or attitude that is believed to range across a continuum of values and cannot easily be directly measured. It is often used in epidemiologic and clinical research to measure the intensity or frequency of varioussymptoms.

2. Shoulder pain and disability index(SPADI)

The Shoulder Pain and Disability Index (SPADI) is a self – administered questionnaire that consists of two dimensions, one for pain and the other for functional activities. The dimension consists of five questions regarding the severity of an individual's pain. Functional activities are assessed with eight question designed to measure the degree of difficult an individual has with various activities of daily living that require upper extremity use.

PROCEDURE:

Sampleswereselectedbasedontheinclusionandexclusioncriteria.Writteninformedconsent formwasobtainedfromthesubjects.Thestudyconsistsof40bothmaleandfemalewithacute supraspinatustendinitiswiththeagegroupbetween30-60yearswillbeassignedinto2groups.After explaining the subjects about the treatment pre- assessment will be taken prior to the commencement of treatment with self report outcome measure of VAS and shoulder pain and disability index. The total population group of (n= 40) is divided into 2 groups. Ultrasound therapy, cryokinetics soft tissue massage (n= 20), ultrasound therapy, soft tissue massage(n=20).

GROUP- A : 20 SUBJECTS-(ultrasound therapy, cryokinetics, soft tissue massage)

GROUP- B : 20 SUBJECTS-(ultrasound therapy, soft tissue massage)

METHODOLOGY

DescriptiveStatistics:

- Mean & Standard deviation for Continuous variables like Age, SPADI andVAS
- Frequency distribution for categorical variables likeGender

InferentialStatistics:

- Intra Group Analysis – Paired Samplest-test
- Inter Group Analysis – Independent Samplest-test

Paired Samples t-test

Hypotheses:

Null Hypothesis, H0: μd = 0(i.e., there is no significant effect of Treatment A (or B)in terms of measures such as SPADI
and VAS)

Alternate Hypothesis, H1:
μd>0(i.e.,thereissignificanteffectofTreatmentA(orB)intermsofmeasuressuchas SPADIand VAS)

Inthiscase, μd = mean difference between Pre and Post-testscores;
d = difference □ d = Post Test Score - Pre Test Score

Level of significance, α = 0.05
Test to be applied: Paired Sample t-test

Independents Samples t-test

Hypotheses:

Null hypothesis, H0: μ1 = μ2(That is, there is no significant difference between two treatments (A & B) in terms of changes in measures such as SPADI and VAS)

Alternative hypothesis, H1: μ1≠μ2(That is, there is significant difference between two treatments (A & B) in terms of changes in measures such as SPADI and VAS)

Level of significance: α = 5% or 0.05
Test to be applied: Independent Samples t-test

InferentialStatistics:

Intra-Group Analysis (Within Group Analysis) – TreatmentA

Testing the effect of Treatment A in decreasing the value of SPADI from Week 1 (Pre) to Week 4 (Post)

H0: There is no significant effect of Treatment A in decreasing the value of SPADI from Week 1 (Pre) to Week 4 (Post)

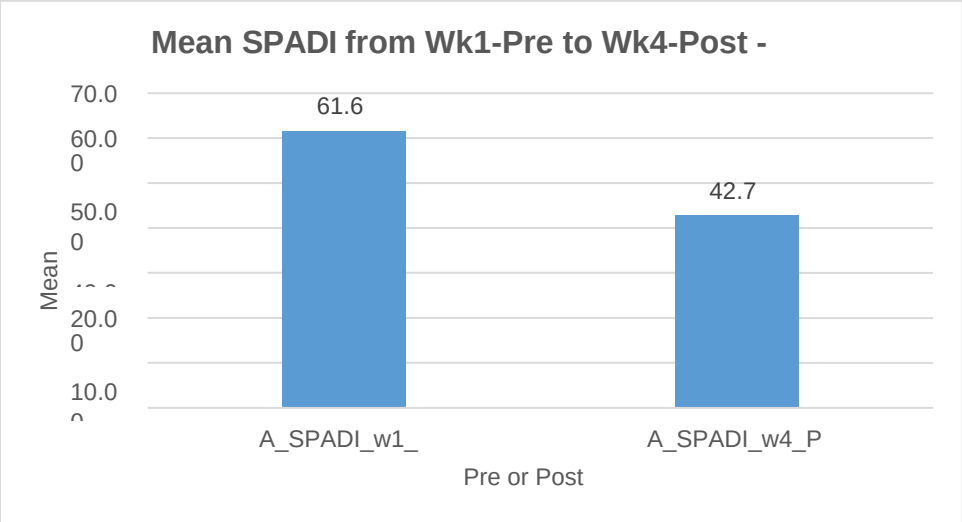
H1: There is significant effect of Treatment A in decreasing the value of SPADI from Week 1 (Pre) to Week 4 (Post)

Theabovehypothesisistestedbytheuseof**PairedSamplet-test**andthecorrespondingoutput is shownbelow: Output of Paired t-test:

t-Test: Paired Two Sample for Means

	A_SPADI_w1_Pre	***A_SPADI_w4_Post***

Mean		**61.60**	**42.75**
SD		**18.22**	**13.78**
Variance		331.83	189.99
Observations		20.00	20.00
Pearson Correlation		0.96	
Hypothesized	Mean		
Difference		0.00	
Df		19.00	
t Stat		**13.24**	
P(T<=t) one-tail		**0.000**	
t Critical one-tail		1.73	
P(T<=t) two-tail		0.000	
t Critical two-tail		2.09	



Result:

Test Statistic: t = 13.24 **P-value** = 0.000 < 0.05

Conclusion: Since the p-value (0.000) of the test statistic is **less than 0.05**, we **reject** the null hypothesis at 5% level of significance (t = 13.24, p < 0.05). In addition, the mean SPADI is **decreased** from Week1-Pre-test (61.60) to Week4-Post-test (42.75) in Group A. Hence, the evidenceissufficienttoconcludethatthereissignificanteffectof**TreatmentA**in**decreasing the value of SPADI** from Week 1 to Week4.

Testing the effect of Treatment A in decreasing the value of VAS from Week 1 (Pre) to Week 4 (Post)

H0:ThereisnosignificanteffectofTreatmentAindecreasingthevalueofVASfromWeek1 (Pre) to Week 4(Post)

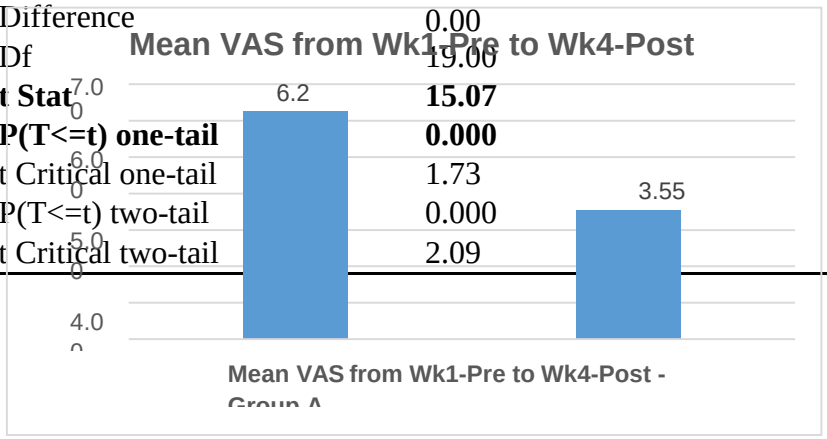
H1: There is significant effect of Treatment A in decreasing the value of VAS from Week 1 (Pre) to Week 4(Post)

Theabovehypothesisistestedbytheuseof**PairedSamplet-test**andthecorrespondingoutput is shownbelow:

Output of Paired t-test:

t-Test: Paired Two Sample for Means

	A_VAS_w1_Pre	***A_VAS_w4_Post***
Mean	**6.25**	**3.55**
SD	**2.00**	**1.47**
Variance	3.99	2.16
Observations	20.00	20.00
Pearson Correlation	0.94	
Hypothesized Mean Difference	0.00	
Df	19.00	
t Stat	**15.07**	
P(T<=t) one-tail	**0.000**	
t Critical one-tail	1.73	
P(T<=t) two-tail	0.000	
t Critical two-tail	2.09	



Result:

Test Statistic: t = 15.07,**P-value** = 0.000 < 0.05

Conclusion: Since the p-value (0.000) of the test statistic is **less than 0.05**, we **reject** the null hypothesis at 5% level of significance (t = 15.07, p < 0.05). In addition, the mean VAS is

decreased from Week1-Pre-test (6.25) to Week4-Post-test (3.55) in Group A. Hence, the evidenceissufficienttoconcludethatthereissignificanteffectof**TreatmentA**in**decreasing the value of VAS** from Week 1 to Week4.

Intra-Group Analysis (Within Group Analysis) – TreatmentB

Testing the effect of Treatment B in decreasing the value of SPADI from Week 1 (Pre) to Week 4 (Post)

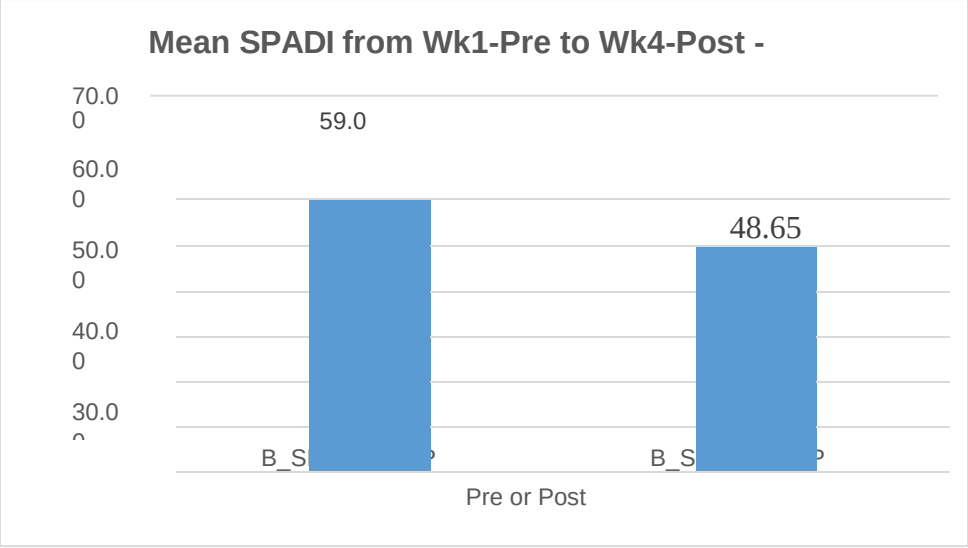
H0:ThereisnosignificanteffectofTreatmentBindecreasingthevalueofSPADIfromWeek 1 (Pre) to Week 4(Post)

H1: There is significant effect of Treatment B in decreasing the value of SPADI from Week 1 (Pre) to Week 4 (Post)

Theabovehypothesisistestedbytheuseof**PairedSamplet-test**andthecorrespondingoutput is shownbelow: Output of Paired t-test:

t-Test: Paired Two Sample for Means

	B_SPADI_w1_Pre	***B_SPADI_w4_Post***
Mean	**59.00**	**48.65**
SD	**18.30**	**16.35**
Variance	334.74	267.19
Observations	20.00	20.00
Pearson Correlation	0.95	
Hypothesized Mean Difference	0.00	
Df	19.00	
t Stat	**7.90**	
P(T<=t) one-tail	**0.000**	
t Critical one-tail	1.73	
P(T<=t) two-tail	0.000	
t Critical two-tail	2.09	



Result:

Test Statistic: t = 7.90 ,**P-value** = 0.000 < 0.05

Conclusion: Since the p-value (0.000) of the test statistic is **less than 0.05**, we **reject** the null hypothesis at 5% level of significance (t = 7.90, p < 0.05). In addition, the mean SPADI is **decreased** from Week1-Pre-test (59.00) to Week4-Post-test (48.65) in Group B. Hence, the evidenceissufficienttoconcludethatthereissignificanteffectoftreatmentBindecreasing the value of SPADIfrom Week 1 to Week4.

Testing the effect of Treatment B in decreasing the value of VAS from Week 1 (Pre) to Week 4 (Post)

H0:ThereisnosignificanteffectofTreatmentBindecreasingthevalueofVASfromWeek1 (Pre) to Week 4(Post)

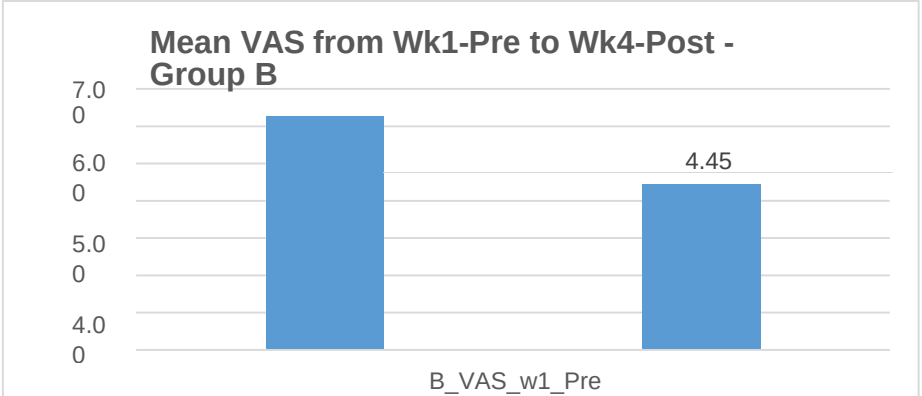
H1: There is significant effect of Treatment B in decreasing the value of VAS from Week 1 (Pre) to Week 4(Post)

Theabovehypothesisistestedbytheuseof**PairedSamplet-test**andthecorrespondingoutput is shownbelow:

Output of Paired t-test:

t-Test: Paired Two Sample for Means

	B_VAS_w1_Pre	***B_VAS_w4_Post***
Mean	**6.25**	**4.45**
SD	**1.83**	**1.57**
Variance	3.36	2.47
Observations	20.00	20.00
Pearson Correlation	0.95	
Hypothesized Mean Difference	0.00	
Df	19.00	
t Stat	**13.08**	
P(T<=t) one-tail	**0.000**	
t Critical one-tail	1.73	
P(T<=t) two-tail	0.000	
t Critical two-tail	2.09	



Mean

Result:

Test Statistic: t = 13.08,**P-value** = 0.000 < 0.05

Conclusion: Since the p-value (0.000) of the test statistic is **less than 0.05**, we **reject** the null hypothesis at 5% level of significance (t = 13.08, p < 0.05). In addition, the mean VAS is **decreased** from Week1-Pre-test (6.25) to Week4-Post-test (4.45) in Group B. Hence, the evidenceissufficienttoconcludethatthereissignificanteffectof**TreatmentB**in**decreasing the value of VAS** from Week 1 to Week4.

Inter-Group Analysis (Between GroupAnalysis)

Comparing the effect of Treatments A and B in terms of changes in SPADI from Week 1 (Pre) to Week 4(Post)

H0: There is no significant difference between Treatments A and B in terms of average change in SPADI

H1: There is significant difference between Treatments A and B in terms of average change in SPADI

The above hypothesis is tested by the use of Independent Samples t-test.

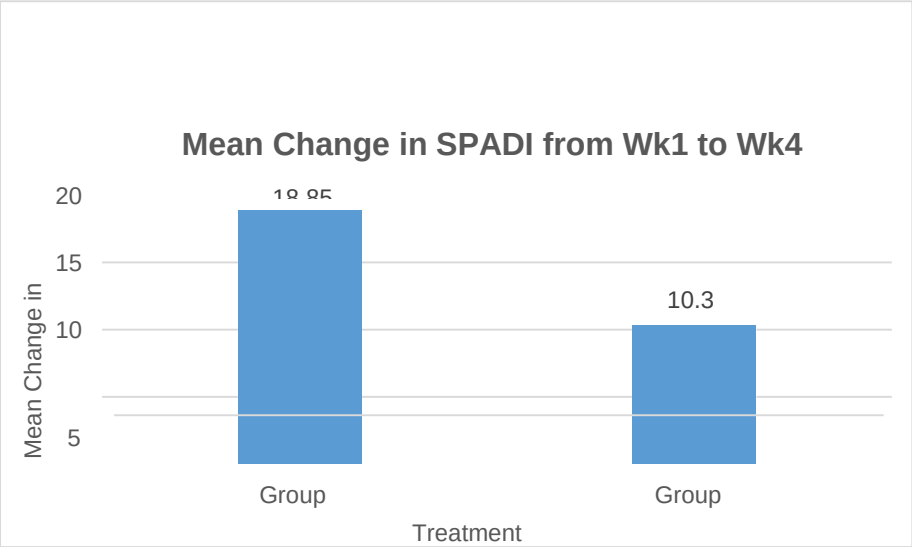
Test to be applied: Independent Sample t-test

Output of Independent Samples t-test:

t-Test: Two-Sample Assuming Equal Variances

		A_SPADI_w14_Diff	***B_SPADI_w14_Diff***
Mean		**-18.85**	**-10.35**
SD		**6.37**	**5.86**
Variance		40.56	34.34
Observations		20.00	20.00
Pooled Variance		37.45	
Hypothesized Difference	Mean	0.00	

Df	38.00
t Stat	**-4.39**
P(T<=t) one-tail	0.000
t Critical one-tail	1.69
P(T<=t) two-tail	**0.000**
t Critical two-tail	2.02



Result:Test Statistic: t = 4.39,**P-value** = 0.000 < 0.05

Conclusion: Since the p-value (0.000) of the test statistic is less than 0.05, we reject the null hypothesis at 5% level of significance (t = –4.39, p < 0.05). In addition, the mean reduction in thevalueofSPADIfromWeek1(pre) toWeek4(post)byTreatmentA (18.85)ismorethan that of Treatment B (10.35). Hence, the evidence is sufficient to conclude that the Treatment AiseffectivethanTreatmentBindecreasingthevalueofSPADIfromWeek1(pre)toWeek4 (post).

Comparing the effect of Treatments A and B in terms of changes in VAS from Week 1 (Pre) to Week 4(Post)

H0: There is no significant difference between Treatments A and B in terms of average change in VAS

H1: There is significant difference between Treatments A and B in terms of average change in VAS

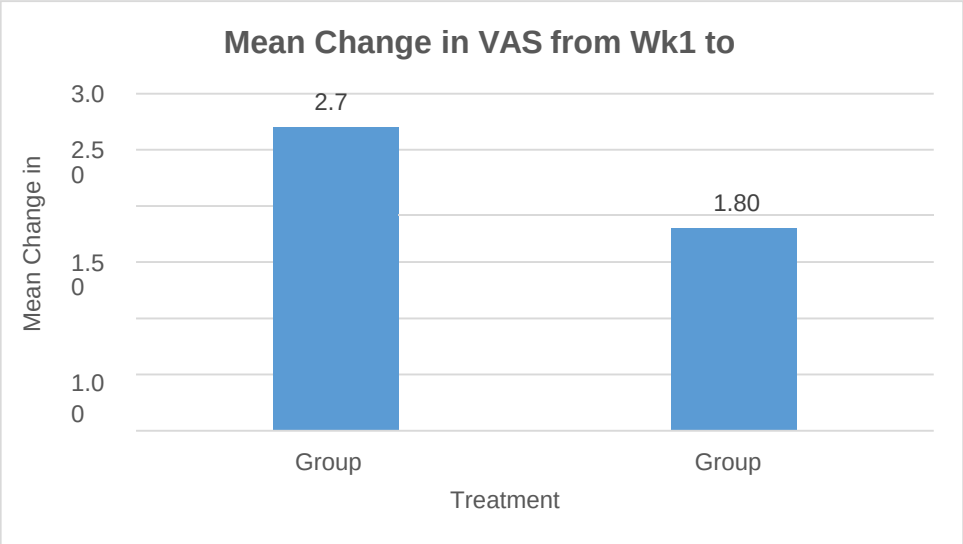
The above hypothesis is tested by the use of Independent Samples t-test.

Test to be applied: Independent Sample t-test

Output of Independent Samples t-test:

t-Test: Two-Sample Assuming Equal Variances

		A_VAS_w14_Diff	***B_VAS_w14_Diff***
Mean		**-2.70**	**-1.80**
SD		**0.80**	**0.62**
Variance		0.64	0.38
Observations		20.00	20.00
Pooled Variance		0.51	
Hypothesized	Mean		
Difference		0.00	
Df		38.00	
t Stat		**-3.98**	
P(T<=t) one-tail		0.000	
t Critical one-tail		1.69	
P(T<=t) two-tail		**0.000**	
t Critical two-tail		2.02	



Result:

Test Statistic: t = –3.98,**P-value** = 0.000 < 0.05

Since the p-value (0.000) of the test statistic is less than 0.05, we reject the null hypothesis at 5% level of significance (t = –3.98, p < 0.05). In addition, the mean reduction in thevalueof**VASfromWeek1(pre)toWeek4(post)**byTreatmentA(2.70)ismorethanthat of Treatment B (1.80). Hence, the evidence is sufficient to conclude that the Treatment A is effectivethanTreatmentBindecreasingthevalueof**VASfromWeek1(pre)toWeek4(post)**.

DISCUSSION: In Group-A, the treatment was more effective for the 37 year old male who is an IT professional who responds the treatment and then improved in reducing disability and pain by takingthetreatmentfor4weeksand3sessionperweekbyultrasoundtherapywithcryokinetics and soft tissue massage (SPADI and VAS). In Group-A, the treatment was not much effective for the age of 65 who

is an housewife who doesn't reduces their disability and pain by taking SPADI and VASscale.In Group-B , the treatment was less effective for the age 33 year old female patient, working as an dance teacher taking the treatment ultrasound therapy and soft tissue massage reduces their pain and disability (SPADI and VAS). In Group-B, the treatment was not much effective for the age 53 male patient, working as an traffic police taking the treatment ultrasound therapy and soft tissue massage doesn't reduces their pain and disability (SPADI and VAS).

Inthisstudyultrasoundtherapy,cryokineticsandsofttissuemassageshowedbeneficial results in the results in the treatment of acute supraspinatus tendinitis so Group A has shown improvement than Group B which is provedstatistically.Between the patients interviewed, both males and females in both groups are almost equally affected with acute supraspinatus tendinitis with 50% of males and females in Group A and 50% of males and females in Group B.Inrelationtoagethisstudyshowingthatthepatientsincidencewithacutesupraspinatus tendinitis is more in the age group of 30-60 years.Gimblett PA et al (1999) stated that deep friction massage is an effective means of treating with soft tissue lesions.Brosseauetal(2002)statedthatsofttissuemassageisnoteffectiveforcontrollingpain in tendinitis because that showed significant improvement in VASscore.Hijioka et al stated that 60% of the shoulders showed degeneration at the subacromial surface likely due to friction with the under force of acromion.Zeisig et al and Connell et al reported that despite the presence of decreased structural defects on ultrasound the impingement was not reliably correlated with clinical gains.

RESULT: It is concluded that the Treatment of Group A patients who are treated with ultrasound therapy with cryokinetics and soft tissue massage is more effective than treatment of Group B patients who are treated with ultrasound therapy with soft tissue massage in acute supraspinatus tendinitis.

CONCLUSION: Hence therapeutic ultrasound with cryokinetics and soft tissue massage (GROUP A) showed significant improvement than therapeutic ultrasound with soft tissue massage (GROUP B) in reducing pain and enhancing functional performance in patient with acute supraspinatus tendinitis.

REFERENCES:

1. H.B. Shiva Kumar, Chanappa. T.S, Pradeep Kumar Reddy, Jayashree Dey, journal of evolution of Med and Dent science, A comparative study between the efficacies of ultrasoundtherapywithcryokineticsversusultrasoundtherapywithsofttissuemassage (deep friction massage) in acute supraspinatus tendinitis, volume 3, issue 15,2014.
2. Muktamath. U., Muktamath.V, Maniazhagu. D, Journal of Exercise Science and Physiotherapy, Effect of Phonophoresis on Supraspinatus tendinitis in abducted position and adducted and internally rotated position of college men, volume 5, issue 1, 2009
3. Kshitija Bansal, S. Padamkumar, Indian Journal of Physiotherapy and Occupational Therapy, A Comparative study between the efficacy of therapeutic ultrasound and soft tissue massage (deep friction massage) in supraspinatus tendinitis, volume 5, issue 2, 2011
4. John George, ShyanCh'ng Li, Zulkarnain Jaafar, and Mohamad Shariff A.Hamid, Comparative effectiveness of ultrasound-guided intratendinous prolotherapy injection

with conventional treatment to treat focal supraspinatus tendinosis,2018.

5. PraveenaThiruvasagar, International Journal of Scientific and Research Publications, Effectiveness of ultrasound therapy in combination with manual therapy and shoulder exercises for Sub Acromial Impingement Syndrome, volume 3, issue 2,2013.
6. Alok Kumar Rai, Comparative study of laser and ultrasound therapy on supraspinatus tendinitis, 2005.
7. GowdhamaKumaranSivakumarandArulChelviVasudevan,SupraspinatusTendinitis and physical therapy management,2018.
8. CelalBurakErdogmus, Karl Ludwig Resch, Martin Funovics, Franz Kainberger, New EnglandJournalofMedicine,Ultrasoundtherapyforcalcifictendinitisoftheshoulder, volume 340, issue 20,1999.
9. JJLuime,BWKoes,IJMHendriksen,AlexBurdorf,APVerhagen,HSMiedema,JAN Verhaar,ScandinavianJournalofRheumatology,Prevelanceandincidenceofshoulder pain in the general population: A systemic review, volume 33, issue 2,2004
10. Gamze Senbursa, Gul Baltaci, O. Ahmet Atay, Acta Orthopaedics et traumatologica turcica, The effectiveness of manual therapy in supraspinatus Tendinopathy,2011.
11. Guido Spargoli, International Journal of Sports physical therapy, supraspinatus tendon pathomechanics: a current concepts review, volume 13, issue 6,2018.
12. ShabanaKhan,SharickShamsi,SamihaAbdelkader,IndianJournalofPhysiotherapy and Occupational Therapy, A comparative study of effectiveness of ultrasound and massage combined and massage alone in treatment of supraspinatus tendinitis, volume 6, issue 4,2012.
13. Daniel P Pope, Peter R Croft, Christina M Pritchard, Alan J Silman, Prevalance of shoulder pain in the community: the influence of case definition,1997.
14. TurgayEfe, Markus Felentreff, Thomas Stein, Nina Timmesfeld, Biomedizinische Technik/BiomedicalEngineering,Extracorporealshockwavetherapyfornon-calcific supraspinatus tendinitis 10- year follow- up of a randomized placebo- controlled trial, April2014.
15. .Vecchio, M. Cave, V. King, A.O. Adebajo, M. Smith, British Journal of Rheumatology, A Double- blind study of the effectiveness of low level laser treatment of rotator cuff tendinitis, volume 32, issue 8,1993.
16. KUMAR, G. MOHAN, et al. "THE EFFECT OF ULTRASOUND AND STRETCHING EXERCISE VERSUS ULTRASOUND AND STRENGTHENING EXERCISE TO RELIEVE PAIN AND TO IMPROVE FUNCTIONAL ACTIVITY IN LATERAL EPICONDYLITIS." International Journal of Physiotherapy & Occupational Therapy (TJPRC: IJPOT) 2.1 (2016): 9-16.
17. RAJALAXMI, V., G. MOHANKUMAR, and K. RAMANATHAN. "EFFECTIVENESS OF PLANTAR FASCIA STRETCHING Vs CONTRAST BATH COMBINED WITH ULTRASOUND IN PLANTAR FASCIITIS." BEST: International Journal of Humanities, Arts, Medicine and Sciences (BEST: IJHAMS) 4.12 (2016) 71-78
18. Mozhi¹, J. Kavin, C. Susila, and Jain Vanitha. "COGNITIVE BEHAVIORAL THERAPY (CBT) VS RELAXATION THERAPY (RT) ON FATIGUE AND QUALITY OF LIFE AMONG TEACHING PROFESSIONALS WITH CHRONIC

FATIGUE SYNDROME." IMPACT: International Journal of Research in Humanities, Arts and Literature (IMPACT: IJRHAL)6.7 (2018) 253-258

19. Saidunnisa, Begum, Shariff Atiqulla, and Ghufran Ayman. "Prevalence of Polycystic Ovarian Syndrome among Students of RAK Medical and Health Sciences University United Arab Emirates." International Journal of Medicine and Pharmaceutical Science (IJMPS) 6.1 (2016) 109-118.
20. KUMAR, MUTHU, and SIBICHEN MATHEW. "CHALLENGES OF SPORTS SHOE BRAND PREFERENCE (SYNDROME) IN DELHI-NATIONAL CAPITAL REGION OF INDIA." International Journal of Textile and Fashion Technology (IJTFT) 9.6 (2019) 1-8
21. ALTOWERQI, ZAYED M., ZAINAL ABIDIN BIN ZAINUDDIN, and HESHAM SAYED AHMED. "PREVALENCE OF METABOLIC SYNDROME AMONG FORMER ATHLETES." International Journal of Mechanical and Production Engineering Research and Development (IJMPERD) 10.3 (2020) 7135-7140