Original Research Article

EFFECT OF CYRIAX DEEP FRICTION MASSAGE VERSUS CRYOTHERAPY IN STAGE 1&2 OF ADHESIVE CAPSULITIS: A RANDOMIZED CONTROLLED TRIAL

ABSTRACT

Background: Adhesive capsulitis is one of the common pathologies of the Shoulder. The prevalence of a~~A~~dhesive capsulitis is estimated to be 2% to 5% of the general population. Several treatment techniques are existing for the improvement of adhesive capsulitis and C~~c~~yriax deep friction massage is a ~~recent~~ technique designed to improve adhesive capsulitis.

Objective: To evaluate the effect of Cyriax deep friction massage and conventional physical therapy with Cryotherapy and conventional physical therapy in stage 1 &2 of adhesive capsulitis.

Methods/design: The study is a randomized controlled trial which included 34 subjects of the age group 40-85, and were randomly assigned into two groups: group A (n=17) and group B (n=17). The Group A was given Cyriax deep friction massage with conventional physical therapy while group B was given Cryotherapy therapy with conventional physical therapy. Outcome measure were taken at baseline, and then taken on last day of sixth session by using VAS, ROM, and SPADI. The treatment was given for 6 sessions over a period of two weeks.

Results: Group A showed greater improvement after 2 weeks of intervention with a~~. i.e. greater~~ statistical significance ~~with~~ value ~~of p≤0.05~~ for SPADI, VAS and ROM.

Conclusion: ~~Based on the results, concludes that~~ Cyriax deep friction massage with conventional physical therapy has significant effect on pain, ~~a~~ range of motion and functional activity in patients with a~~A~~dhesive capsulitis.

Trial registration: prospectively registered in the clinical trial registry-India in the registration number of CTRI/2019/09/021375.

Key Words: Peri arthritic shoulder, Frozen shoulder, Soft tissue massage, Cold therapy

INTRODUCTION

Adhesive capsulitis is one of shoulder's most severe pathologies.[1] Duplay in 1872 was the first to describe frozen shoulder as Periarthritis. Codman in 1934 coined the term "Frozen shoulder." The term "Adhesive capsulitis" was coined by J.S. Naviaser in 1945.[2]

Adhesive capsulitis is defined as "a condition of uncertain etiology, characterized by significant restriction of both active and passive shoulder motion that occurs in the absence of a known intrinsic shoulder disorder".[3]

The prevalence of Adhesive Capsulitis is estimated to be 2% to 5% of the general population. In patients with diabetes and thyroid disease, prevalence may increase up to 10 % - 38%. Primary Adhesive Capsulitis most commonly affects individuals between 40 and 65 years of age and females have a higher incidence than males. Adhesive Capsulitis occurrence in one shoulder may increase the risk of shoulder involvement in contralateral side by 5% to 34%, and simultaneous bilateral shoulder involvement may occur as often as 14% of the time.[4] The movements of the shoulder are limited by capsular adhesions, contraction of soft tissues and an adherent axillary recess which hinder the humeral head mobility.[5]

Patients with Adhesive Capsulitis have ~~present with the~~ symptoms that ~~which~~ include severe pain which usually worsens at night, shoulder stiffness which is insidious in nature and partial or total loss of active and passive external rotation more limited than abduction and more limited than internal rotation.[3, 5] There are no relevant results in the history of patient, clinical evaluation or radiographic examination that can explain the lack of movement or pain.[3]

Adhesive Capsulitis can be either primary or secondary. Primary idiopathic Adhesive Capsulitis is often associated with other illness and conditions such as diabetes mellitus, patients suffering from chronic illnesses such as thyroid diseases and Parkinson's diseases are also considered to

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present a greater risk. Secondary adhesive capsulitis is associated with injury or immobilisation of the shoulder (e.g., subacromial impingement, -tendon tear of rotator cuff, biceps tenosynovitis, and calcium tendonitis) leading to discomfort and reduced movement in that shoulder.[3]

Neviser divided Adhesive Capsulitis into four stages. Pre-adhesive phase (0-3 months) where pain presents during both active and passive movements, Freezing stage (3-9 months) where high level of pain presents during the end range of movement, the Frozen stage (9-15 months) where pain is minimum with reduced joint range of motion at extreme level, and Thawing stage (15-24 months) where there is gradual and spontaneous recovery of shoulder mobility and function.[6]

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Many treatments have been employed in the management of Adhesive Capsulitis. Analgesics, corticosteroid injection, and anti-inflammatory drugs are the main medical interventions for pain management.[7] In chronic cases of restriction, arthrographic distention, surgical capsular release or manipulations under anesthetic have been endorsed.[8] The main focus of physiotherapy is to reduce pain, improve range of motion and strengthen weakened muscle and eventually prevent and treat functional impairment. Different physiotherapy treatments for adhesive capsulitis include pendulum exercises, active and passive stretching, muscle strengthening exercises, resisted exercises and joint mobilizations.[7]

Cyriax deep friction massage is one of the most important manipulative ~~techniques which~~techniques, which was introduced by James Cyriax and Russel. On the other hand, it ~~Cyriax deep friction massage~~ is a technique mostly used by the physical therapist for soft tissue injuries affecting muscle, ligament, and tendon. Cyriax rationale and principle for maintaining the mobility within connective tissue structures of ligament, tendon, and muscle by preventing from adherent scar formation.[9] Cyriax was found to be effective in supraspinatus tendonitis and tennis elbow-.[10,11]

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Cryotherapy is a form of thermotherapy that helps in reduction of pain, inflammation, edema, tissue temperature, metabolism, muscle stiffness, and nerve conduction velocity by reducing the temperature of the underlying tissue by withdrawing heat from the body causing an analgesic effect. Cooling agents are the first-aid step~~measure~~ after any trauma and are used in the rehabilitation of musculoskeletal and neuromuscular dysfunction. Cryotherapy primary goal is to reduce the total amount of tissue damage, muscle spasm, swelling, and pain to reduce

disability and helps in functional activity.[12, 13] Cryotherapy was found to be effective in shoulder impingement, rotator cuff tendinopathy, and low back pain.[12,14,15] However the comparison between these two techniques has not been conducted in adhesive capsulitis till date.

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METHODOLOGY

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The study was conducted between March 2019 to February 2020 in the department of physiotherapy, in a tertiary hospital of Mangalore, India. Obtaining ethical clearance from the Institutional Ethical Committee of Nitte Institute of Physiotherapy, patients diagnosed with adhesive capsulitis by the Orthopaedician were recruited from Justice K. S. Hegde Charitable Hospital Mangalore and were screened based on inclusion and exclusion criteria. The aim of the study was clarified, and documented consent of the subjects being screened was obtained. The subjects were randomly allocated by block randomization with opaque sealed envelope into two groups: Group A (Cyriax deep friction massage with conventional physical therapy intervention) and Group B (Cryotherapy with conventional physical therapy intervention). Outcome measure were taken at baseline, and then taken on the sixth session using Visual Analogue Scale (VAS), goniometer and, Shoulder Pain and Disability Index (SPADI). The participants wereas treated for 6 sessions over a– period of two weeks under the supervision of the therapist.

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Group A: CYRIAX DEEP FRICTION MASSAGE

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Participants in this group received conventional physiotherapy treatment (Figure 1), these are aActive assisted Range of Movement (ROM) exercise (Codman pendulum exercises, sShoulder wheel ex, fFinger ladder exercise, oOverhead pulley exercise, wWall finger climbing), sStrengthening exercises, sScapular stabilization exercises.[2] Exercise protocol was done for 3 sets with 10-repetitions and sShoulder joint capsule stretching done for 4 times with the holding time of 15-second. Followed by subjects in this group received Cyriax manipulation (deep friction massage) based on Cyriax principal (Figure 2). The patient was made to sit upright in an armless chair. The therapist used his index finger reinforced by the middle finger and used short strokes (<2 cm) to move the superficial portion of the posterior joint capsule back and forth over

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the deeper portion. The friction was applied over the posterior joint capsule by to and fro horizontal movement of the hand along the sagittal plane at a rate of one to two cycles per second for the duration of two minutes. Cyriax deep friction massage for supraspinatus muscle, Infraspinatus muscle and subscapularis smuscle.[16] ~~Interventions were given for 6 sessions over a period of two weeks.~~

~~Outcome measure will be re-evaluated and pre and post scores are compared.~~

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~~**Figure 1: Illustration of conventional physical therapy**~~

Figure 1: Illustration of conventional physical therapy

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~~**Figure2: Illustration of Cyriax deep friction massage**~~

Figure2: Illustration of Cyriax deep friction massage

Group B: CRYOTHERAPY

Participants in this group received conventional physiotherapy treatment same as group A (Figure 3). Followed by subject in this group received cryotherapy. In this treatment, two cold packs containing silica, covered with vinyl. The temperature of the cold pack should be maintained at -5°C. The position of the patient is supine lying. Clothing was removed from the shoulder region and cold pack wrapped in a damp towel. Initially, the cold pack should place over the anterior aspect of the shoulder, and the other one is placed across the posterior part of the shoulder. Patients in group B received cold pack treatment, 6 sessions over a period of 2 weeks, for 20 minutes. Duration of the treatment session was for 45 minutes per session for each group. Outcome measure were re-evaluated and pre and post scores were compared.[12]

~~**Figure 3: Illustration of Cryotherapy**~~

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Figure 3: Illustration of Cryotherapy

STATISTICAL ANALYSIS

SPSS software 16.0 was used to ~~assess~~calculate the data obtained. Independent sample t test was used ~~for Group A and Group B~~ to compare the pre and post measurements for VAS, SPADI and ~~Goniometer for~~ shoulder ROM., W~~w~~ithin the group comparison was analyzed by using paired t test. The p-value less than 0.05, was considered significant for the study.

RESULTS

Chi square test has been used to test gender homogeneity by group. The obtained p value was > 0.05 and hence gender was equally distributed according to groups. Independent sample "t" test was used to assess the homogeneity of baseline characteristics based on a group. The obtained p values are > 0.05 for most the characteristics, except SPADI (p = 0.006) and hence there exists a homogeneity between groups and base-line characteristics

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other than SPADI. Paired "t" test was used to compare all outcome measures for each group. The obtained p values are < 0.05 for all comparisons and hence there was a difference in outcome measures before and after interventions, for each group (Table 1). Independent sample “t” test was used to find the difference in effectiveness (pre – post) of intervention on each outcome between the groups. The obtained p values are < 0.05 for all the comparison and hence there was a difference in the effectiveness between the groups (Table 2).

Table 1: Comparison of the outcome measures for each group

		Group A				Group B			
		Mean	S.D.	"t"	p value	Mean	S.D.	"t"	p value
VAS	Pre	5.74	1.06	13.76	< 0.001*	5.12	0.928	12.583	< 0.001*
	Post	2.68	0.98			3.32	0.847		
SPADI	Pre	45.71	8.03	19.478	< 0.001*	38.76	5.403	11.175	< 0.001*
	Post	32.53	6.36			35.29	5.241		
FLEXION AROM	Pre	114.71	23.01	11.994	< 0.001*	129.12	23.864	9.161	< 0.001*
	Post	144.47	16.43			146	20.77		
FLEXION	Pre	119.	23.0	11.801	<	134.	23.8	8.98	<

PROM		71	1		0.001*	12	64	4	0.001*
	Post	149.41	16.38			150.88	20.709		
ABDUCTION AROM	Pre	99.71	14.63	12.991	< 0.001*	109.41	17.667	8.497	< 0.001*
	Post	129.12	14.50			126.65	18.638		
ABDUCTION PROM	Pre	104.71	14.63	12.991	< 0.001*	114.41	17.667	8.433	< 0.001*
	Post	134.12	14.50			131.59	18.568		
EXT ROTATION AROM	Pre	144.47	16.43	22.642	< 0.001*	146	20.77	18.056	< 0.001*
	Post	66.47	6.06			62.06	8.757		
EXT ROTATION PROM	Pre	149.41	16.38	22.713	< 0.001*	150.88	20.709	18.819	< 0.001*
	Post	71.47	6.06			66.76	8.828		

(* Significant)

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Table 2: Between group comparison of the effectiveness (Pre – post) of outcome measures

		Mean(difference)	S.D(difference)	"t"	p value
VAS	Experimental	3.06	0.92	4.789	< 0.001*
	Control	1.79	0.59		
SPADI	Experimental	13.18	2.29	13.039	< 0.001*
	Control	3.47	1.28		
FLEXION AROM	Experimental	29.76	10.23	4.168	< 0.001*
	Control	16.88	7.60		
FLEXION PROM	Experimental	29.71	10.38	4.13	< 0.001*
	Control	16.76	7.69		
ABDUCTION AROM	Experimental	29.41	9.33	4.006	< 0.001*
	Control	17.24	8.36		
ABDUCTION	Experimental	29.41	9.33	4.018	<

PROM	Control	17.18	8.40		0.001*
EXT ROTATION AROM	Experimental	17.35	5.89	3.167	0.003*
	Control	11.47	4.89		
EXT ROTATION PROM	Experimental	17.41	5.82	3.304	0.002*
	Control	11.18	5.16		

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-DISCUSSION

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The study aimed to evaluate the Cyriax deep friction massage and cryotherapy given with conventional physical therapy in stage 1&2 adhesive capsulitis with respect to pain, ~~a~~ range of motion and functional activity.

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The result of the current study propose that, both two groups produced statistically significant result on comparison of the pre-post values on~~f~~ VAS, SPADI, and Range of motion within the each group. On comparison between the two groups, Cyriax deep friction massage ~~and conventional physical therapy~~ group revealed better results in improving pain, functional activity, and range of motion.

In the present study, when compared with the control group, the VAS score, ROM for the experimental group showed significant impact with P<0.05. This finding correlates with the study conducted by Fusan Guler-Ulser .et al (2004) to evaluate early reaction in adhesive capsulitis with two separate treatment approaches between mobilization exercise and physical therapy and Cyriax of deep friction massage. The outcome measure used by the study was VAS and~~,~~ SPADI. This study demonstrated that in the initial stages of the adhesive capsulitis procedure~~.~~ Cyriax rehabilitation approach offers a quicker and better response by decreasing pain and increasing ~~,~~ROM ~~range of motion~~ and functional ability than conventional physical therapy method.[7] T~~t~~herefore this study was taken up to evaluate what effect Cyriax deep friction massage has in Adhesive capsulitis.[7]

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In the current study, SPADI showed significant impact with P<0.05 for the experimental group as compared to the control group. The same is supported by a Comparative study conducted in by Krishna et al (2016) was done to evaluate the efficacy of deep friction massage and ultrasound therapy to reduce pain and disability in subjects with acute supraspinatus tendinitis. Group A received cryotherapy and ultrasound, and Group B delivered an ultrasound and deep friction massage. The outcome measure used by the study was VAS, SPADI. The study concluded that therapeutic ultrasound with cryokinesis and therapeutic ultrasound with a deep friction massage were effective in treating supraspinatus tendonitis.[10]

In the present study the SPADI and~~,~~ ROM for the experimental group showed significant impact with P<0.05 when compared to the control group. This finding correlates with a~~A~~ c~~C~~omparative study ~~in~~ conducted by ~~–~~Sah .et al (2017), that was done to compare the efficacy of Gong's mobilization and Cyriax (deep friction massage) manipulation in subjects with Frozen shoulder. One group deal with the Gong's mobilization and another group deal with Cyriax manipulation. The outcome measure used by the study was SPADI, and ROM by goniometer. The study concluded that Gong's mobilization and Cyriax manipulation are equally successful in enhancing abduction of the shoulder and reducing the functional deficit.[16]

Between the group analyses, even cryotherapy alone showed improvement in the present study. The results of this~~is~~ study supports the result conducted by the study of Dupuis et al (2018). This study included 44 participants with acute tendinopathy of the rotator cuff, who were randomly assigned either the exercises or the cryotherapy group. Symptoms and functional limitations were assessed at weeks 0, 2 and 6 using self-questionnaires, while the acromio-humeral length, shoulder power and active ROM~~motion range~~ were assessed at 0 and 2 respectively. The study concluded that there was statistically significant improvement in symptoms and function in each group.[14]

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Between the group analyses even cryotherapy alone showed improvement in the present study. This study supports the result conducted by Srivastava. et al (2018), that was done to evaluate the efficacy of Mobilization with Movement (MWM) and cryotherapy in subject with shoulder impingement syndrome. For six sessions, both participants were assigned either of the two groups undergoing MWM or cryotherapy treatment along with impairment-activities and randomized using block randomization procedure. The outcome measure used by the study was VAS, Goniometer and SPADI. The study concluded that after six therapy sessions, pPain and disability scores decreased significantly and ROM ~~scores~~ improved in both groups.[12]

Hence, it can be concluded that both the interventions i.e., Cyriax's deep friction massage with conventional therapy as well as cryotherapy with conventional physical therapy is effective in Adhesive capsulitis with respect to pain, functional activity and range of motion. However, Cyriax was slightly better than the cryotherapy group. Thus, this study clinically implicates that the use of Cyriax deep friction massage with conventional therapy is beneficial in controlling Adhesive capsulitis when compared to cryotherapy with conventional physical therapy.

CONCLUSION

In this study, all the selected outcome measures differed between before and after the interventions in both the group. It indicated that the selected interventions are effective in improving the outcome measures. The current study results shows that Cyriax deep friction massage with conventional physical therapy versus cryotherapy with conventional physical therapy revealed better results on improving pain, range of motion and functional activity. On comparison between the groups, Cyriax deep friction massage with conventional physical therapy demonstrated better results in improving pain, range of motion and functional activity.

ETHICAL CLEARENCE

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The study has been approved by the institutional ethics committee

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