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To Compare the Effects of Maitland Mobilization with Conventional Physiotherapy in Adhesive Capsulitis

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ABSTRACT

Background: Adhesive capsulitis of shoulder affects from 2% to 3% of the general population and is seen commonly at age of 40-65 years. Adhesive Capsulitis is a syndrome defined as an idiopathic painful restriction of shoulder joint movement resulting in over-all restriction of the gleno-humeral joint.

Aim: The aim was to compare the effect of Maitland mobilization as an intervention to conventional physiotherapy in patients with adhesive capsulitis on pain, ROM (flexion, abduction, external rotation, internal rotation) and Shoulder pain, and Disability Index (SPADI).

Methods: The research design used was Randomised experimental study design. Thirty participants were allocated into two groups, participants with even serial number were allotted for conventional therapy group A and those with odd serial numbers were allotted for Maitland therapy group B. Conventional therapy protocol included Ultrasound to shoulder joint for 7 days and Shoulder Mobility Exercises which were given 1 session (20 repetitions) per day for 15 days. Maitland therapy protocol included Ultrasound to shoulder joint for 7 days and Maitland mobilisation technique and Shoulder Mobility Exercises which were given 1 session (20 repetitions) per day for 15 days. Pre and post intervention scores were measured in terms of NPRS, SPADI, and ROM of the shoulder joint. The Shoulder mobility exercises included full (available) ROM exercises for shoulder joint and capsular stretching exercises.

Conclusion: On the basis of this study, it can be concluded that there is a more significant increase in ROM, and SPADI score and a significant decrease in pain on NPRS by Maitland mobilization therapy along with conventional therapy as compared to conventional physiotherapy alone.

Key Words: Adhesive Capsulitis, Maitland's Mobilization, SPADI

INTRODUCTION

Adhesive Capsulitis is a syndrome defined in its purest sense as idiopathic painful restriction of shoulder movement that results in global restriction of the glenohumeral joint. The various synonyms for Adhesive Capsulitis are frozen shoulder, pericapsulitis, scapulo-humeral periarthritis, humeroscapular fibrositis, and periarthritis, stiff and painful shoulder. Adhesive Capsulitis of Shoulder affects from 2% to 3% of the general population and is seen commonly at age of 40-65 years. Adhesive capsulitis is a clinical diagnosis made from a history of the gradual onset of severe shoulder pain with the progressive limitation of active and passive glenohumeral movements.[1,2] Risk factors for frozen shoulder are diabetes, thyroid disorder, history of shoulder trauma, cervical radiculopathy, post-operative immobilization, and shoulder surgery[3]. Research suggests that the process is started with an inflammation of the lining of the joint within the shoulder. Gradually this area thickens and results in the shoulder becoming stiffer and more painful.[4]

Various authors have tried to characterize the natural course of the frozen shoulder but it still remains controversial. For example, Reeves in 1975 described the natural history of the frozen shoulder as a continuum of 3 phases: 1) painful (freezing) phase lasting 10–36 weeks, 2) stiff (frozen) phase lasting 4–12 months, and 3) recovery (thawing) phase lasting 5–26 months or more.[5]

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Cyriax described the typical capsular patterns of the glenohumeral joint in the frozen shoulder with the abduction more limited than the external rotation, and external rotation more limited than the internal rotation. The diagnosis of frozen shoulder is based upon a thorough history and physical examination without formal criteria. The most used criteria in previous studies to diagnose frozen shoulder are – insidious or minimal event resulting in onset, significant shoulder pain that interferes with successful activities of daily living, significant night pain, significant limitations of active and passive shoulder motion in more than 1 plane to less than 100% and 50% or greater than 30% loss of passive external rotation (at the side), painful end range motion in all movements, significant pain/weakness of the internal rotators, normal radiological appearance, and no secondary causes.[5-9]

Physiotherapy treatment of adhesive capsulitis includes conventional physiotherapy and joint mobilisation techniques. Conventional therapy includes the application of heat, ultrasound, and passive mobilisation exercise. Many mobilisation techniques are also used. Maitland mobilisation technique is one of them.[9]

Ultrasound (US) which is a deep tissue heating modality can elevate tissue temperature.[13] The physiologic response due to ultrasound therapy includes increased collagen tissue extensibility, pain threshold, and enzymatic activity, along with changes in nerve conduction velocity and contractile activity of skeletal muscle. Maitland technique includes the application of accessory oscillatory movements to treat stiffness which is mechanical in nature. The techniques aim to restore motion of spin, glide, and roll between joint surfaces and are graded according to the amplitude. Grade l and ll of Maitland mobilisation techniques are primarily used for treating joints limited by pain whereas grade lll and lV are primarily used as stretching manoeuvres.[10]

The aim of the study was to compare the effect of Maitland mobilization as an intervention to conventional physiotherapy in patients with adhesive capsulitis on pain, ROM (flexion, abduction, external rotation, internal rotation) and Shoulder pain, and Disability Index (SPADI).

MATERIAL AND METHODS

Total of 30 participants fulfilling the inclusion criteria were selected & allocated into 2 groups. The subjects were randomly assigned into two groups of 15 each. They were grouped alternately. Patients with even serial numbers were allotted for conventional therapy group A and those with odd serial numbers were allotted for Maitland therapy group B. The inclusion criteria for the study included subjects diagnosed with adhesive capsulitis having limited ROM of shoulder abduction, internal rotation, external rotation and flexion, age group 40 years and above, both male and female subjects with bilateral or unilateral adhesive capsulitis. The exclusion criteria included subjects with rotator cuff tears or other shoulder ligament injuries, H/O arthritis related to shoulder, malignancy, adhesive capsulitis secondary to fractures, dislocation, reflex sympathetic dystrophy, neurological disorder. Conventional therapy protocol included Ultrasound to shoulder joint for 7 days and Shoulder Mobility Exercises which were given 1 session (20 repetitions) per day for 15 days. Maitland protocol included Maitland's mobilisation technique along with conventional therapy protocol

The patients received the following grades of Maitland's mobilisation-

Grade I - Intensity of small amplitude, applied at the beginning of the joint ROM.

Grade II - Intensity of slightly larger amplitude applied from the beginning of the joint ROM to the middle.

Grade III - Intensity of large amplitude applied from the middle of the joint ROM to the beginning of the restriction

Grade IV - Applied against the tissue resistance at small amplitude to the restricted part of the joint.

The Shoulder mobility exercises included full (available) ROM exercises for the shoulder joint and capsular stretching exercises

DATA ANALYSIS AND RESULTS

Descriptive statistics such as mean and standard deviations were calculated to describe all the variables. The paired t-test and the unpaired t-test were used to verify differences between pre- and post-intervention. There was a significant reduction in the Pre- and Post-intervention scores for VAS and SPADI and a significant increase in ROM of shoulder joint in both the groups.

But there was a more significant reduction in pain on NPRS and SPADI SCORE and a more significant increase in range of motion, in GROUP B i.e. Maitland mobilisation group, as compared to group A i.e. Conventional therapy group.

	Conventional Therapy Group A				Maitland mobilisation Group B				Between groups	
			Paired t test				Paired t test		Unpaired t test	
	Pre intervention Mean ± SD	Post intervention Mean ± SD	Mean Difference	p value	Pre intervention Mean ± SD	Post intervention Mean ± SD	Mean Difference	p value	t value	p value
Pain on NPRS	6.4 ± 1.72	3.5 ± 1.55	2.9	<0.0001	8.2 ± 1.37	3.2 ± 1.28	5	<0.0001	8.4	<0.0001
Flexion ROM	125.9 ± 23.4	146.3 ± 18.6	20.4	<0.0001	120.2 ± 14.2	160.7 ± 8.9	40.5	<0.0001	6.8	<0.0001
Abduction ROM	111.7 ± 24.1	134.1 ± 20.6	22.4	<0.0001	112 ± 20.6	149.6 ± 16.7	37.6	<0.0001	5.7	<0.0001
Internal Rotation ROM	38 ± 10.5	52.6 ± 9.8	14.6	<0.0001	36.1 ± 10	62.7 ± 6.6	26.6	<0.0001	8.1	<0.0001
External Rotation ROM	39.8 ± 14.6	53.7 ± 16.8	13.9	<0.0001	32.2 ± 13.3	59.2 ± 14	27	<0.0001	5.1	<0.0001
SPADI	69.5 ± 21.5	39.2 ± 18.6	30.3	<0.0001	74.0 ±13.2	23.4 ± 8.1	50.6	<0.0001	6.0	<0.0001

DISCUSSION

The findings of the present study showed that there was a significant reduction in the Pre- and Post-intervention scores for NPRS and SPADI and a significant increase in ROM of the shoulder joint in both the groups.

But there was a more significant reduction in pain on NPRS and SPADI SCORE and a more significant increase in range of motion, in GROUP B *i.e.* Maitland mobilization group, as compared to group A *i.e.* Conventional therapy group.

The relief of pain in the Maitland's group could be attributed to a multitude of beneficial effects of mobilisation such as the initiation of local physiological mechanisms as well as additional central mechanisms. Gosling A P stated that small amplitude oscillatory and distraction movements stimulate the mechanoreceptors and the proprioceptors. As a result of manipulation, the oscillation may have an inhibitory effect on the perception of painful stimuli by repetitively stimulating mechanoreceptors associated with the myelinated alpha-beta, alpha delta fibres at the spinal cord or brain stem level. These non-stretch motions result in a decrease in pain and an increase in range of motion. A theory given by Melzack and Wall states that movement may trigger segmental inhibitory mechanisms causing relief of pain.[11] All the evidence suggest that the mobilisation movement provides the hypoalgesic stimulus.

The increase in ROM in the Maitland group is in accordance with various previous studies. The graded mobilizations that are conducted at the beginning of the available range of motion (ROM) treat the pain through neural structures activation, whereas elongation of the connective tissue occurs when the graded mobilizations are applied at the end of the available ROM.[10,13] A study stated that during mobilization, the oscillatory movements are believed to produce mechanical effects, such as an increase in fiber glide, the realignment of collagen, and the breakup of adhesions, which help to restore normal mobility.[14] A study done by A Joseph Threlkeld suggests that Mobility might also be improved by restoration of the interstitial fluid content of connective tissue structures to normal levels, thereby re-establishing normal frictional resistance between the bundles and adjacent structures.[13] The relief of pain and increased ROM in the Maitland's group could be due to the combined effect of Maitland's mobilisation, Ultrasound therapy, and mobility exercises.

Ultrasound therapy may cause analgesia due to the thermal and non-thermal effects. Relief of pain may occur due to the resolution of inflammation or altered permeability of cell membrane to sodium, which may lead to the alteration of electrical activity or pain threshold. Ultrasound helps in the resolution of inflammation by increasing the blood supply, white blood cells, and removal of waste products.[15]Another mechanism may be via stimulation of mechanoreceptors in the tissues which reduces the appreciation of pain at a peripheral level (pain gate theory). Analgesia produced by ultrasound allows cautious early use of the part and makes the condition more tolerable. The mechanical effect helps to remove the exudate and reduces adhesion formation, also breaks down adhesions formed between adjacent structures.[16] A study done to see the effectiveness of therapeutic ultrasound in adhesive capsulitis showed significant improvements in the ROM and functional ability in the Ultrasound group as well as the sham Ultrasound group when compared with the differences between pre- and post-treatment values

of shoulder ROM. But there was no significant difference in values when compared between the two groups.[17]

The beneficial effect of the mobility exercise in improving shoulder functional performance can be attributed to the following reasons. One potential reason reducing the pain may be the stimulation of the mechanoreceptors by repeated end-range movements (pain gate theory).[18] A research showed that with the exercises, there occurs activation of non-opioid substances such as serotonin, norepinephrine, dopamine, and GABA.[11] Also during the mobility exercises the joint is repetitively brought to full available ROM. Thus, there occurs stretching of the joint capsule leading to increased ROM. This study's results were matched with a study done by Derya Celik which showed that glenohumeral ROM exercises lead to a significant reduction of pain and a significant increase in ROM in patients with frozen shoulder.[12]

The rationale behind the improvement in functional independence in both the groups might be due to ease in pain and increased range of motion, consequently lessened suffering in daily activities, pain with specific everyday jobs, and difficulty in lifting and movement of the arm.

CONCLUSION

On the basis of this study, it can be concluded that there is a more significant increase in ROM, and SPADI score, and a significant decrease in pain on NPRS by Maitland mobilization therapy along with conventional therapy as compared to conventional physiotherapy alone.

Limitation: The patient could not be followed up for further relief of symptoms after 15 days of treatment resume. The sample size was small, thus a study can be done with larger sample size.

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