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Original Research Article

Effectiveness of Maitland Mobilizations Along with Kinesio Taping on Reducing Pain and Disability in Subjects with Periarthritis Shoulder

Nava Tejaswi Gaddam *[1], Roshni Shanavas Syed [2], Rama Krishna Sai Aremanda [3], Gireeshma Mallavarapu [4].

*[1] Department of Physiotherapy, SIMS College of Physiotherapy, Guntur, Andhra Pradesh, India.

[2] Department of Physiotherapy, SIMS College of Physiotherapy, Guntur, Andhra Pradesh, India.

[3] Department of Physiotherapy, SIMS College of Physiotherapy, Guntur, Andhra Pradesh, India.

[4] Department of Physiotherapy, SIMS College of Physiotherapy, Guntur, Andhra Pradesh, India.

ABSTRACT

Background: Frozen shoulder is a condition in which insidious and progressive pain and loss of active and passive mobility are manifested in the glenohumeral joint, presumably due to capsular contracture. Diabetes mellitus patients are more affected. Various methods were effective in treating frozen shoulder. The present study was done in frozen shoulder patients to determine the additional effect of Kinesio taping and Maitland mobilization in managing frozen shoulder. Frozen shoulder tends to develop in three phases, coming on slowly. Each stage may last several months.

Method: The present study included 30 subjects with frozen shoulder. The individuals were randomly divided into 2 groups. GROUP A-experimental group, which received Maitland mobilization and Kinesiotaping treatment, while GROUP B is the control group that received only Maitland mobilization. Both groups first received hot moist packs for 20 minutes and an ultrasound for 5 minutes. Exercises were advised. Subjects received 4 weeks of intervention for 3 days/week. Before and after the intervention, SPADI outcome measures were measured.

Result: There was a significant difference showing improvement in the mean of shoulder pain and disability index scale SPADI before and within the groups with $p<0.0001$. There was a statistical difference when post-intervention means were compared between the groups.

Conclusion: Maitland mobilization with Kinesiotaping reduces pain and disability in subjects with peri-arthritis shoulder.

KEYWORDS: Frozen shoulder, Maitland mobilization, Kinesiotaping, Shoulder pain and disability index scale (SPADI).

Address for correspondence: Dr. Nava Tejaswi Gaddam, Department of Physiotherapy, SIMS College of Physiotherapy, Guntur, 522001, Andhra Pradesh, India.
E-Mail: gaddamnavatejaswi@gmail.com

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INTRODUCTION

The term frozen shoulder describes the clinical entity in which a person has restricted passive mobility at the glenohumeral joint, which often results in a loss of active and passive range of motion and pain [1].

The mostcommon limitations in range of motion are flexion, abduction, and external and

internal rotation [2]. Frozen shoulder is also called as Adhesive capsulitis, Periarthritis, or Arthrofibrosis [3]. Frozen shoulder describes a pathological process in which the body forms excessive scar tissue or adhesions across the glenohumeral joint, leading to pain, stiffness, and dysfunction.

The term Frozen shoulder was first introduced by Codman in 1934. He described a frozen shoulder as a painful condition of insidious onset that was associated with stiffness and difficulty in sleeping on the affected side. Codman also identified the marked reduction in forward elevation and external rotation that are the hallmarks of the disease. Long before Codman, in 1872, the same condition had already been labelled "Peri arthritis" by Duplay. In 1945, Naviesar coined the term "Adhesive capsulitis". Frozen shoulder is a specific condition that has a natural history of spontaneous resolution and requires a management pathway that is completely different from such distinct shoulder conditions as rotator cuff tears or osteoarthritis [4].

It is a common condition that is often quoted by many studies to affect approximately 3% to 5% of the general population. The incidence of frozen shoulder is slightly higher in women than in male and is somewhat more common in the non-dominant arm. This condition most frequently affects persons aged between 40 to 60 years and rarely occurs in persons younger than 40 years of age [5]. About 12% of persons affected develop the condition bilaterally, indicating a constitutional predisposition [6]. The same shoulder is rarely affected subsequently. Individuals with Diabetes mellitus are more likely to be affected by frozen shoulder [7].

Patients with frozen shoulders should exhibit significant deficits in shoulder kinematics, including increased elevation and upward scapular rotation [8]. Eventually, patients with frozen shoulders develop the characteristic "shrug sign" during gleno humeral joint elevation, where the scapula migrates upward before 60 degrees of abduction. Frozen shoulders are not only related to capsular and ligamentous tightness but also fascial restrictions, muscular tightness and trigger points within the muscles.

Physiotherapy techniques used in this study are Maitland mobilization: The approach is based on a graded assessment and treatment system through passive oscillatory movements, rhythmic, graded in five levels that vary with the amplitude of the accessory movements normally present in the joints. Symptoms, movements and joint positions are tested in active movement, considering any change in amplitude, rhythm, reproduction and pain arc [9].

The Kinesio Taping: Based on the simple principle that the body has a built-in healing mechanism healthcare practitioners can help to positively influence their efficiency by removing barriers that impede them. The results are increased fluid flow through an injured area, better control over muscle contractions, reduced pain, and ultimately faster healing. This effect is modulated and coordinated by the nervous system by specifically stimulating the sensory-motor system [10].

AIM

The study aims to know the effectiveness of Maitland mobilizations along with kinesio taping and kinesio taping alone in subjects with frozen shoulder.

OBJECTIVES

The objective of the study is to determine the effectiveness of Maitland mobilization along with taping and Maitland mobilization alone on reducing pain and disability measured by using SPADI (shoulder pain and disability index scale) in subjects with frozen shoulders.

STUDY TYPE: Comparative study

SAMPLING METHOD: Simple random sampling

PLACE OF STUDY: OPD Sims College of Physiotherapy

SAMPLING CALCULATION: 30(15 in each group)

STUDY POPULATION: Subjects with PA shoulder.

INCLUSION CRITERIA:

Subjects are selected for the study if they fulfill the following criteria.

- Age: 40 to 60 years

- Both women and men
- Both left and right-handed people
- Sub-acute stage of adhesive capsulitis
- People with a capsular pattern of motor limitation

EXCLUSION CRITERIA:

- Patients having a history of: Shoulder girdle fracture, Glenohumeral dislocation, Concomitant cervical spine symptoms, past shoulder surgery, and Rotator cuff pathology.
- Secondary type of adhesive capsulitis
- Neurological disorders (e.g. Stroke, Parkinson's disease).
- Individuals with hypersensitivity to tape
- Individuals with uncontrolled diabetes
- Cardiopulmonary problems.

Outcome Measures: Shoulder Pain and Disability Index (SPADI)

Procedure: Researchers conducted a single-blind randomized clinical trial. They split patients into two groups at random. Group A (N=15) got Maitland mobilization with Kinesio tape, while Group B (N=15) received Maitland mobilization. Both groups also did exercises under supervision. An orthopedic specialist or rheumatologist diagnosed all patients with adhesive capsulitis before they joined the study. All participants (15 females and 15 males) were checked for the inclusion and exclusion criteria and received 10 intervention sessions, averaging 3 sessions per week. Before starting the dealing protocol, following approval from the SIMS College of Physiotherapy ethics committee, along with the collection of patient-informed consent forms. written consent was clarified and signed by the selected patients to declare their permission. Before the start of treatment involvement, all advantages and potential disadvantages are clearly explained to patients in the written consent form. In addition, the patients were instructed to avoid other treatments or medications at home. Method of assignment to study groups: The patients were randomly assigned to the Kinesio tape along with the Maitland group or only the Maitland group. Randomization was done using thirty cards inside a ball. The patients were asked to come and choose a card. Number one was Group A and number two was Group B.

Maitland Mobilization: For caudal glide, the patient was in a supine position with the arm abducted and externally rotated to the end range. In a standing or sitting position, the therapist held the proximal end of the humerus and maintained a lateral humeral distraction in its mid-range position.

For anterior glide, the patient was made to lie in a prone position, and at the end of the range of abduction and external rotation, lateral humeral distraction was given, and stretch mobilizations were performed by utilizing the subject's body weight and gravity to generate the mobilizing force.

For posterior glide, the patient was made to lie in a supine position, and at the end of the range of internal rotation and adduction, lateral humeral distraction was given and stretch mobilizations were performed by utilizing the subject's body weight and gravity to generate the mobilizing force [11].

The glides were administered at a rate of 2-3 glides per second for 30 seconds per glide, and each glide was administered for 5 sets to improve external rotation. The technique was applied three times a week for 10 sessions [12].

Kinesio taping

KT with an I stripe over the supraspinatus was first administered after the patient was asked to adduct, extend, and internally rotate the shoulder while doing contralateral neck flexion. The anchor was then attached below the greater tuberosity without tension. Along the scapula's spin, the remaining tape strip was placed, and it ended without stress.

The Deltoid receives a second KT (Y-strip). The first tail of the anchor was applied to the anterior deltoid when the arm was externally rotated and abducted horizontally. The arm was in horizontal adduction and internal rotation as the second tail was applied to the posterior deltoid. Both tails end up with no tension.

The third KT-I-strip for the teres minor muscle should be placed loosely on the lower facet of the bigger tuberosity. The patient was

instructed to flex the arm, then abduct it horizontally, and internally rotate it. At the inferior angle of the scapula, the end of the tape was attached without stretching. The mechanical correction approach was used to apply the fourth KT strip, which made up the second KT application, at 50% to 75% tension. At the location of the shoulder's reported soreness, an I-strip (cut down the middle) was applied from the coracoid process anterior to the posterior deltoid with downward pressure by the tape [13].

RESULTS

The results of the study revealed that Maitland mobilization along with kinesio taping showed significant improvement in subjects with frozen shoulders. Where group A i.e. Maitland mobilization along with kinesio taping showed a difference with p value<0.0001 in shoulder pain and disability index scale (SPADI).

Table 1: Analysis of mean scores of pre-test and post-test values on pain and disability with Shoulder pain and disability index (SPADI) scale in group A

TEST	MEAN	STANDARD DEVIATION	T-VALUE	P-VALUE
PRE-TEST	84.35	4.046	19.3	<0.0001
POST-TEST	55.58	4.116		

Interpretation: The above table and graph show the mean value changes within group A from pre and post-tests were found to be statistically significant. (p<0.0001)

Table 2: Analysis of mean scores of pre-test and post-test values on pain and disability with Shoulder pain and disability index (SPADI) in Group B

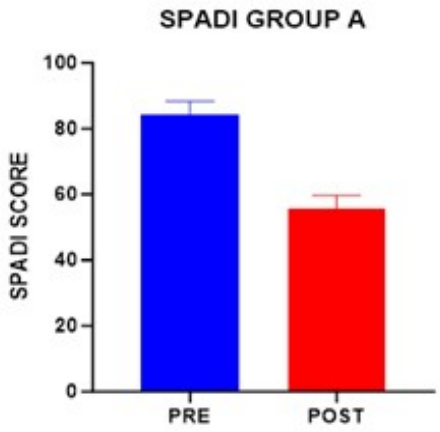
TESTS	MEAN	STANDARD DEVIATION	T-VALUE	P-VALUE
PRE-TEST	83.48	4.569	7.98	<0.0001
POST-TEST	69.79	4.826		

Interpretation: The above table and graph show mean value changes within group B from pre and post-test were found to be statistically significant. (p<0.0001)

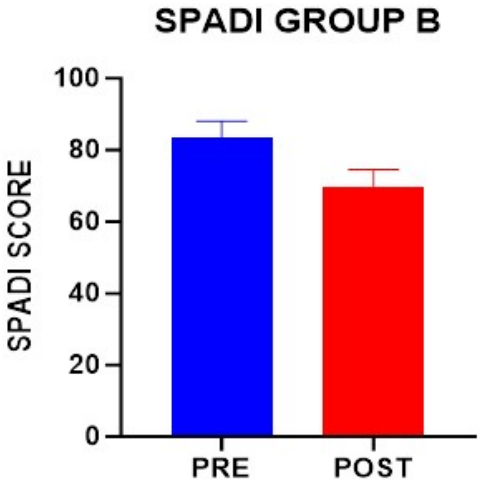
Table 3: Analysis of mean scores on post-test values of pain and disability with Shoulder pain and disability index (SPADI) scale in Group A and B.

TESTS	MEAN	STANDARD DEVIATION	T-VALUE	P-VALUE
POST-TEST	55.58	4.116	8.674	<0.0001
POST-TEST	69.79	4.826		

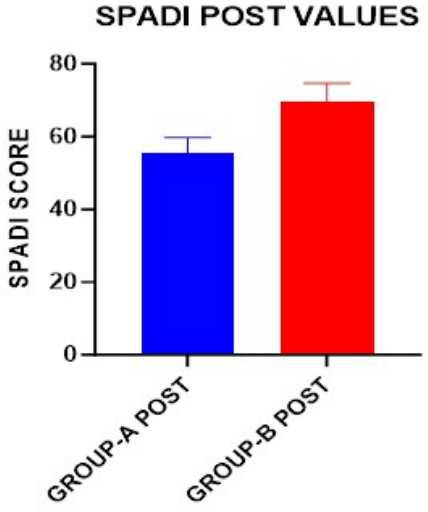
Interpretation: The above table and graph show mean value changes within post-test values were found to be statistically significant. (p<0.0001)



Graph 1: Comparison of mean scores of pre-test and post-test values on pain and disability with Shoulder pain and disability index (SPADI) scale in Group-A.



Graph 2: Comparison of mean scores of pre-test and post-test values on pain and disability with Shoulder pain and disability index (SPADI) in Group B



Graph 3: Comparison of mean scores of post-test values on pain and disability with Shoulder pain and disability index (SPADI) scale in Group-A and B.

DISCUSSION

The purpose of the study is to find the effectiveness of Maitland mobilization along with kinesio taping on reducing pain and disability in subjects with frozen shoulder.

In this study, 30 patients were taken. In group A (n=15), Maitland mobilization along with taping was performed on the patients. In group B (n=15), Maitland mobilizations without taping were performed on the patients. Both groups have shown significant improvement in function which was assessed by the shoulder pain and disability index (SPADI) scale. Better improvement in reduction of pain and disability was seen in group A which received Maitland mobilization along with kinesio taping.

In subjects with frozen shoulder, there is an improvement in the reduction of pain and disability of the shoulder in group A from pre mean 84.35 to post mean 55.58 and in group B from pre mean 83.48 to post mean 69.79.

In this study, the SPADI before and after 10 sessions of interventions (3session / wks.) were compared between two groups: the Kinesio Tape and Maitland Mobilization (KT+MM) group (Group A), and the MM alone group (Group B). Both groups received exercise under supervision. Noticeable clinical improvements were evident in the reduction in pain scores in both groups and group A significantly showed more improvement in the reduction of pain and disability.

It is well established by various studies that the most common reason for frozen shoulder is that some form of exercise program is done by the patient who actually does the muscle stiffness and the patient other than the exercise training which usually goes away within about a year. Moving one's arm in certain angles that are free of pain using motors inside the body called mechanoreceptors is the time only when one can do exercises that make one feel better avoiding the 'mechanotransduction' response[14,15].

SPADI scores. Both groups have shown statistically significant differences in shoulder pain and disability index score (SPADI), proving the improvement in shoulder function in both groups after having undergone intervention. This result correlates with previous studies that studied the effects of Maitland's end-range mobilization (ERM) and exercises on subjects with adhesive capsulitis and found that besides pain and ROM, function also improved [16].

Several reasons may account for pain reduction through the Maitland mobilization. One of these possible reasons is the neurophysiological effects of stimulating type II mechanoreceptors while inhibiting type IV nociceptors. It also provokes Golgi tendon organ activity at the end of joint mobilization and causes reflex inhibition of muscle. Another way is through oscillations, and rhythmic rhythm, which is also responsible for circulation perfluoraceae, It helps in the representation of tactile cues and as a consequence correction of scapular position. Kinesiotaping, if routinely applied, can result in the decrease of fascial contraction that happens during soft tissue injury, and at the same time, the fascia can be reorganized during chronic injury [16]. Kinesio Tape has expanding and contracting properties which provide gentle sensory stimulation to various types of sensory receptors in the skin during movement. This activates the spinal inhibitory system through stimulation of touch receptors and activates the descending inhibitory system to decrease pain via the Gate Control Theory, proposed by Melzack and Wall, and help to decrease pain. Joint function was improved by stimulating the proprioceptors in the joints with the application of tape.

Stasinopoulos and Johnson stated that the suggested treatment plan for supervised exercise should involve exercise at least three times per week for four weeks as well as exercise at home for at least three months. Shanmugam et al. compared the effect of Maitland mobilization with and without Kinesio tape intervention for individuals with frozen shoulder and found that VAS, SPADI score, and ROM improved significantly in both groups after 4 weeks and 10 sessions of treatment, similar to our findings. The results showed that KT plus Maitland mobilization

(MM) showed better improvement than MM alone [17].

(Kumar et al). compared the effect of MM+exercise (EX) with EX alone and found that the addition of the Maitland mobilization technique to the combination of EXs has proven its efficacy in relieving pain and improving ROM and shoulder function. This study supports the effect of exercise for patients with idiopathic shoulder capsulitis, similar to our findings that showed significantly improved outcomes in both groups.

There was a systematic review done by Lu et al. that proved the effect of exercise and showed that exercises within the pain free range of motion stimulate mechanoreceptors and decrease pain. Exercises within a pain-free range also move the synovial fluid, thus decreasing inflammation and decreasing pain [15].

After analysis, the results of this study indicated that the Maitland mobilization technique combined with a supervised exercise protocol is effective and cost-efficient for treating idiopathic shoulder adhesive capsulitis. Both groups showed significant improvements in pain intensity (VAS), all ROM, and the SPADI score in Group B.

These findings strongly support the findings of previous studies, which investigated shoulder motion, pain, and function using mobilization and exercises on a single case design and concluded that all four movements improved, though more gain in motion was observed when mobilizations were added. On the other hand. claimed that Kinesio taping is superior to conventional therapy and mobilization in terms of relieving pain, improving range of motion, and reducing impairment in patients with adhesive capsulitis [16].

The above studies are similar to the present study supporting that maitland mobilization along with kinesio taping and Maitland mobilization alone are beneficial in reducing pain and disability, but maitland mobilization along with kinesio taping is more effective than maitland mobilization alone which helps improve joint range of motion in frozen shoulder patients.

CONCLUSION

The present study concludes that 4 weeks of Maitland mobilization along with kinesio taping (group A) and Maitland mobilization alone (group B) both show significant effects in reducing disability in subjects with frozen shoulder. The results suggest that reducing pain and disability in Maitland mobilization along the kinesio taping group has a better outcome when compared to Maitland mobilization alone in subjects with frozen shoulder.

LIMITATION

- Small sample size
- After the tenth session, the effect of intervention techniques was not assessed.
- Previous history of adhesive capsulitis of the shoulder was not taken into consideration.
- Further follow-ups of the patients were not taken.

ABBREVIATIONS

KT- kinesio taping

SPADI- Shoulder Pain and Disability Index

Authors Contribution

Nava Tejaswi Gaddam: Contributed towards the selection of the topic, Research Process, Research Design, Data Collection, and Manuscript Drafting.
Roshni Shanavas Syed: Research Process, Research Design, Data Collection, and Manuscript Drafting.
Rama Krishna Sai Aremanda: Research Design, Statistical Research Analysis, Discussion and Editing.
Gireeshma Mallavarapui: Data collection, Research process, Discussion.

ORCiD:
Nava Tejaswi Gaddam:
https://orcid.org/0009-0006-8083-2115
Roshni Shanavas Syed:
https://orcid.org/0009-0005-2345-9767
Rama Krishna Sai Aremanda:
https://orcid.org/0009-0004-8428-4449
Gireeshma Mallavarapu:
https://orcid.org/0009-0001-4313-1188

Conflicts of interest: **None**

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