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## A Study to Assess the Effectiveness of Moist Heat Therapy With Maitland Mobilization Versus Icepack With Maitland Mobilization In Frozen Shoulder.

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### Abstract:

**Background:** Frozen Shoulder is a condition, which is an insidious onset of painful stiffness of the glenohumeral joint, also called as adhesive capsulitis or periarthritis. This condition is characterized by the development of dense adhesions, joint capsule thickening and tissue degeneration, which leads to restricted range of motion, especially in the dependent fold of the capsule, rather than arthritic changes in the bone and cartilage. Risk factors associated with adhesive capsulitis include diabetes mellitus, thyroid disease, hypertension, hypercholesterolemia and post-operative heart diseases.

**Materials and Methods:** In this prospective controlled study, Sixty Patients who were diagnosed to have frozen shoulder were assessed for inclusion and exclusion criteria and randomly assigned into two groups. Each group consisted of 30 patients of both genders within the age group of 40-60 years. Group A received moist heat therapy with Maitland mobilization three times a week for 4 weeks, and the Group B received ice pack with Maitland mobilization technique for thrice a week for 4 weeks.

**Results:** It showed statistically significant improvement in shoulder range of motion and reduced in pain after 4 weeks of treatment. But Group A treated with moist heat therapy with Maitland mobilization shows better improvement in outcome measures as compared to group B treated with ice-pack with Maitland mobilization.

**Conclusion:** although there was significant improvement in both the groups, Group A shows better percentage improvement than group B under various measurements such as VAS, SPADI and ROM.

**Key Word:** frozen shoulder, Maitland mobilization, SPADI (shoulder pain and disability index), ROM(Range of Motion).

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### I. Introduction

The shoulder joint is a ball and socket variety of synovial joint, articulation takes place between the head of humerus and the scapula. A membrane (synovial membrane) lining the non-articulating surfaces constantly secrete and reabsorb a slippery lubricant, synovial fluid. The smooth cartilage covers the articulating surface that is enclosed offlexible fibrous capsule, this is attached at the margins of articulating surface. Frozen Shoulder is a condition, which is an insidious onset of painful stiffness of the glenohumeral joint, also called as adhesive capsulitis or periarthritis. The insidious onset usually occurs between the ages of 40-60, without a known cause in which there is a period of pain and restriction motion. moist heat therapy leads to increase tissue temperature on application of heat on the body and it increases blood flow which facilitates tissue healing by supplying oxygen, protein and nutrients at the site of injury. A 1°C increase in tissue temperature lead to 10% to 15% increase in local tissue metabolism. This aids the healing process by increasing both anabolic and catabolic reactions. which degrades and remove metabolic by-products of tissue damage and milieu for tissue repair. Cryotherapy decreases tissue temperature on application of any substance to the body that removes heat from the body. Ice pack decreases tissue blood flow by causing vasoconstriction, and reduces tissue metabolism, oxygen utilization, inflammation, and muscle spasm. Maitland Mobilization applies a passive oscillatory technique, classified from Grade I-IV with respect to intensity, to the shoulder in order to treat pain and stiffness. Grade I & II refers

to use in cases of severe pain. Meanwhile, Grade III & IV refers used for provoking a stretching torelieve joint stiffness by applying in a shortertissue

## II. Material and Methods

This prospective comparative study was carried out on Outpatient and inpatients department of physiotherapy and outpatient department of orthopedics in KIMS hospital and research Centre,Bangalore. Total 60 patients were selected for study.

**Study Design:**Two groups post randomized comparative parallel study.

**Study Duration:**12 months.

**Sample size:** 60 patients.

**Subjects & selection method:** Patients who were diagnosed to have frozen shoulder were randomly assigned into two groups. Each group consisted of 30 patients of both genders within the age group of 40-60 years. A pretreatment evaluation of pain status, shoulder range of motion and disability was done.

Group A: Moist heat therapy for 10 minutes. Thrice a week for four weeks (12sessions). Maitland’s mobilization techniques in all the three planes ofshoulder. The glides given included glenohumeral caudal glide, glenohumeral caudal glide progression; glenohumeral posterior glide and anterior glide. Passive oscillatory movements is performed at the rate of 2-3 glides per second for 30 seconds is given for each glide and 5 sets each. The technique was applied for 3 times for 4 weeks total 12 session.

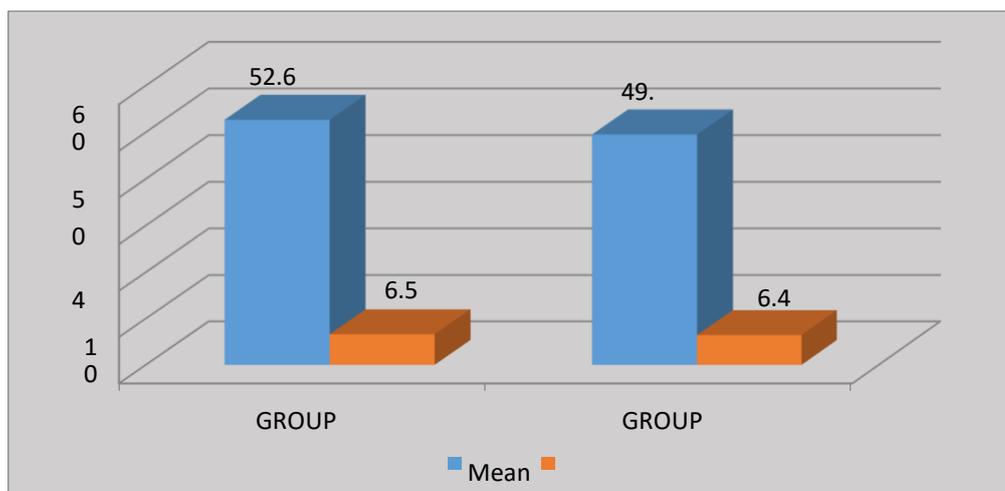
Group B: Ice pack for 10 minutes. Thrice a week for four weeks (12sessions) Maitland’s mobilization techniques in all the three planes of shoulder. The glides given included glenohumeral caudal glide, glenohumeral caudal glide progression;glenohumeralposteriorglideandanteriorglide and passive oscillatory movement is performed.

## III. Result

There is a significant difference in the measure of pain (V.A.S.), significant difference will be seen between measure of Range of motion of shoulder, and score of Shoulder Pain and Disability Index (SPADI) in subjects with frozen shoulder treated with moist heat therapy with Maitland mobilization when compared with the subjects treated with Ice-pack with Maitland mobilization. Hence, research hypothesis is accepted, moist heat therapy with Maitland mobilization showed better improvement in ROM than Ice-pack with Maitland mobilization. (P value = 0.0001\*).

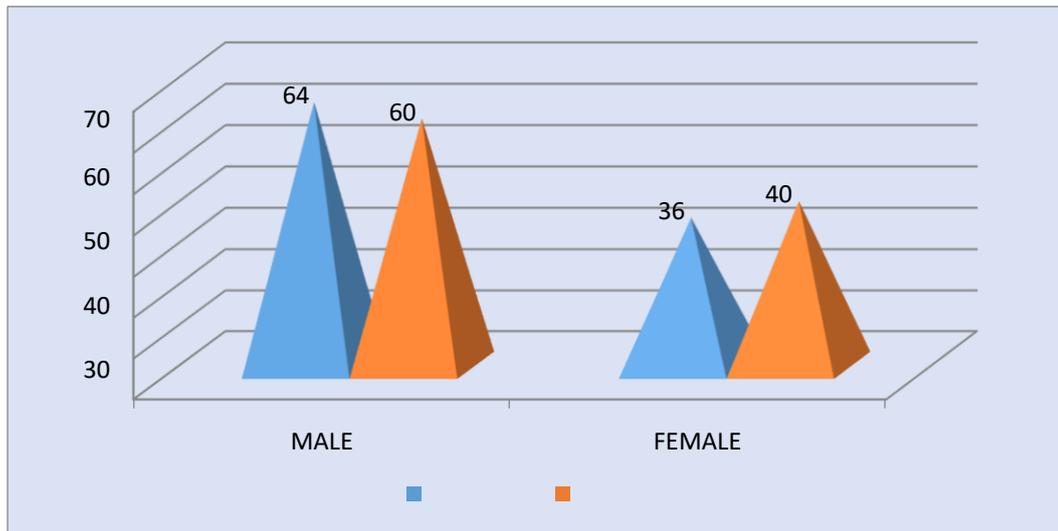
**Table 1 and Graph 1 -For Age Comparison of Group, A and Group B**

	Mean	SD
GROUP A	52.66	6.59
GROUP B	49.5	6.42



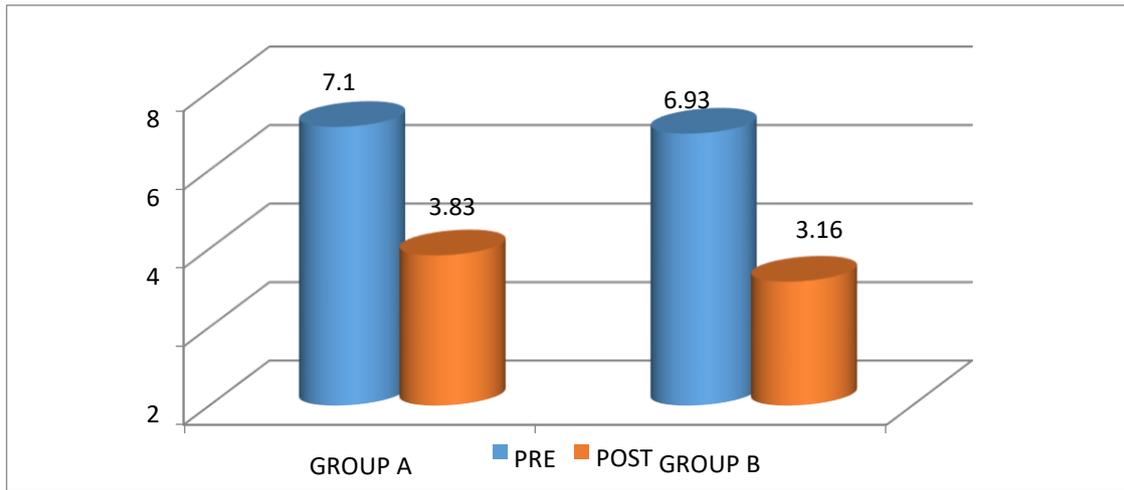
**Table 2 and Graph 2** -For Gender Comparison of Group, A and Group B.

	Male		Female	
	Number	Percentage	Number	Percentage
GROUP A	19	64%	11	36%
GROUP B	18	60%	12	40%



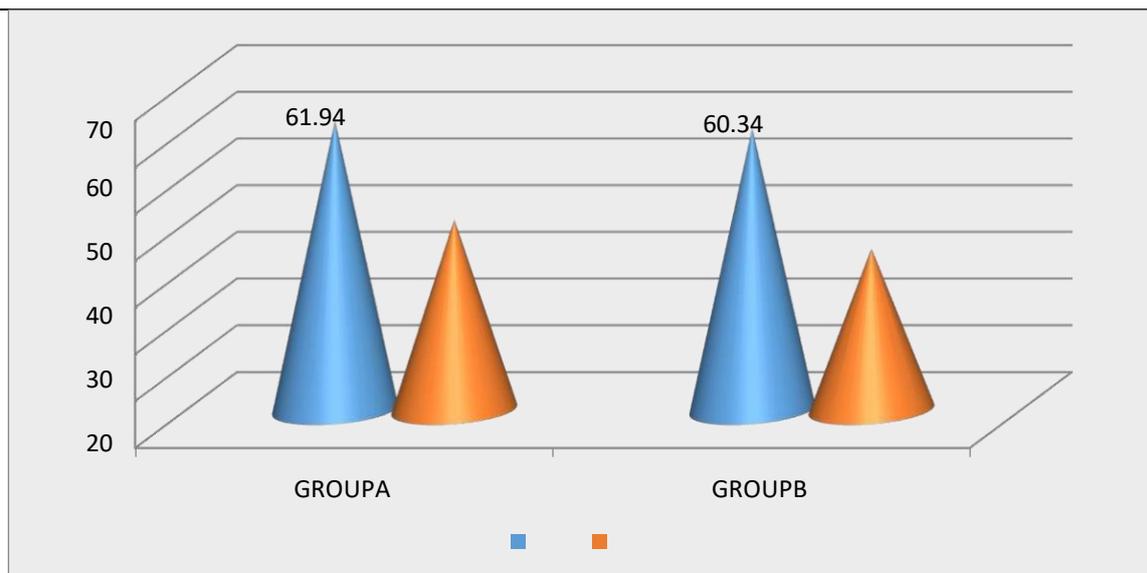
**Table 3 and Graph 3** -For VAS within group A, within group B and comparison between group A & group B.

		GROUP A		GROUP B		P value(independent t test)-
		MEAN	SD	MEAN	SD	
VAS	PRE	7.1	1.29	6.93	1.28	0.61
	POST	3.83	1.14	3.16	1.17	0.02*
P value (within group)- paired t Test		0.0001*		0.0001*		
% Reduction		53.9%		45.6%		



**Table 4 and Graph 4** -For SPADI within group A, within group B and comparison between group A and group B

		GROUP A		GROUP B		P value- independent t test
		MEAN	SD	MEAN	SD	
SPDAI	PRE	61.94	10.64	60.34	10.51	0.56
	POST	40.78	8.74	34.57	9.06	0.009*
P value (within group)- paired t test			0.0001*	0.0001*		
% Reduction			65.8%	57.29%		



For all shoulder range of motion within Group A and within Group B showed improvement in both active and passive range of motion ( $p=0.0001$ ). And when comparison between Group A & Group B for both active and passive range of motions Moist heat therapy with Maitland mobilization (GROUP A) is better than Ice-pack with Maitland mobilization (GROUP B) methods showed significant improvements( $p<0.05$ ).

#### IV. Discussion

This study was conducted to compare the effect of moist heat therapy with Maitland mobilization versus ice pack with Maitland mobilization in subjects with frozen shoulder. In the present study, the researcher had selected 60 subjects, both male and female between the age group of 40-60 years with frozen shoulder. Patients were assessed for inclusion and exclusion criteria and were equally distributed into two groups. The age distribution was analyzed as shown the mean value of age in Group A was 52.66 and in Group B was 49.5. Further the present study was supported by Abhay Kumar, Suraj Kumar from Physiotherapy Department, Patna, India in the year 2012.

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SPADI VAS for group A with pre mean and standard deviations were  $7.1 \pm 1.29$ , which reduced to  $3.83 \pm 1.14$  and p value 0.0001 with 53.9% reduction. For group B with pre mean and standard deviations were  $6.93 \pm 1.28$ , which reduced to  $3.16 \pm 1.17$  and p value 0.0001 with 45.6% reduction. When comparing percentage reduction in pain between the groups, there was a significant difference between group A and group B. Further, the present study was supported by another study by Abhay Kumar, Suraj Kumar from Physiotherapy Department, Patna, India in the year 2012.

for group A with pre mean and standard deviations were  $61.94 \pm 10.64$ , which reduced to  $40.78 \pm 8.74$  and p-value 0.0001 with 65.8% reduction. For group B with pre mean and standard deviations were  $60.34 \pm 10.51$ , which reduced to  $34.57 \pm 9.06$  and p-value 0.0001 with 57.29% reduction. Further, the present study was supported by Sun Wook Park, Department of Physical Therapy, Faculty of Health Science, Eulji University; in the year 2014.

ACTIVE ABDUCTION for group A with pre mean and standard deviations were  $99.63 \pm 16.41$ , which increased to  $138.5 \pm 18.55$  and p-value being statistically significant 0.0001 with 139.01% increase. For group B pre mean and standard deviations were  $94.8 \pm 12.29$ , which increased to  $129.23 \pm 13.7$  and p-value 0.0001 with 136.3% increase. When comparing percentage increase in active abduction ROM between the groups, there was a significant difference between group A and group B. and PASSIVE ABDUCTION for group A with pre mean and standard deviations were  $105.73 \pm 16.16$ , which increased to  $143.26 \pm 18.40$  and p-value

being statistically significant 0.0001 with 135.4% increase. For group B with pre mean and standard deviations were  $98.63 \pm 12.60$ , which increased to  $132.3 \pm 13.86$  and p-value 0.0001 with 134.13% increase.

ACTIVE FLEXION for group A with pre mean and standard deviations were  $102.73 \pm 15.81$ , which increased to  $145.56 \pm 18.98$  and p value being statistically significant 0.0001 with 141.69% increase. For group B, pre mean and standard deviations were  $98.4 \pm 11.94$ , which increased to  $136.97 \pm 12.21$  and p value 0.0001 with 139.19% increase. When comparing percentage increase in active flexion ROM between the groups there was a significant difference present between group A and group B in increasing in active flexion ROM; showing that group A (141.69%) is better than group B (139.19%). PASSIVE FLEXION for group A, pre mean and standard deviations were  $105.73 \pm 16.16$ , which increased to  $1407.2 \pm 15.83$  and p-value being statistically significant 0.0001 with 142.16% increase. For group B, pre mean and standard deviations were  $102.33 \pm 12.09$ , which increased to  $142.63 \pm 12.60$  and p-value 0.0001 with 139.38% increase. When comparing percentage increase in passive flexion ROM between the groups, there was a significant difference present between group A and group B in increasing in passive flexion ROM; showing that group A (142.16%) is better than group B (139.38%).

ACTIVE EXTENSION for group A, pre mean and standard deviations were  $27.66 \pm 6.80$ , which increased to  $45.33 \pm 7.04$  and p-value being statistically significant 0.0001 with 163.88% increase. For group B, pre mean and standard deviations were  $24.43 \pm 3.45$ , which increased to  $39.2 \pm 5.70$  and p-value 0.0001 with 160.48% increase. When comparing percentage increase in active extension ROM between the groups, there was a significant difference present between group A and group B in increasing in active extension ROM; showing that group A (163.88%) is better than group B (160.48%). PASSIVE EXTENSION for group A with pre mean and standard deviations were  $31 \pm 6.86$ , which increased to  $48.7 \pm 7.33$  and p-value being statistically significant 0.0001 with 157.09% increase. For group B, pre mean and standard deviations were  $28.73 \pm 4.34$ , which increased to  $43.3 \pm 5.70$  and p-value 0.0001 with 150.7% increase.

When comparing percentage increase in passive extension ROM between the groups, there was a significant difference present between group A and group B in increasing in active extension ROM; showing that group A (157.09%) is better than group B (150.7%)

ACTIVE EXTERNAL ROTATION for group A with pre mean and standard deviations were  $25.73 \pm 4.82$ , which increased to  $46.06 \pm 7.79$  and p value being statistically significant 0.0001 with 179.02% increase. For group B, pre mean and standard deviations were  $33.46 \pm 5.48$ , which increased to  $57.56 \pm 14.69$  and p-value 0.0001 with 172.03% increase. When comparing percentage increase in active external rotation ROM between the groups, there was a significant difference present between group A and group B in increasing in active external rotation ROM; showing that group A (179.02%) is better than group B (172.03%). PASSIVE EXTERNAL ROTATION for group A, pre mean and standard deviations were  $30.13 \pm 5.94$ , which increased to  $51.03 \pm 8.07$  and p value being statistically significant 0.0001 with 69.3% increase. For group B, pre mean and standard deviations were  $37.2 \pm 9.21$ , which increased to  $61.46 \pm 14.16$  and p value 0.0001 with 165.2% increase. When comparing percentage increase in passive external rotation ROM between the groups, there was a significant difference present between group A and group B in increasing in passive external rotation ROM; showing that group A (169.3%) is better than group B (165.2%).

ACTIVE INTERNAL ROTATION for group A, pre mean and standard deviations were  $28.43 \pm 7.92$ , which increased to  $45.76 \pm 8.96$  and p-value being statistically significant 0.0001 with 160.9% increase. For group B, pre mean and standard deviations were  $26.03 \pm 5.48$ , which increased to  $40.06 \pm 6.08$  and p value 0.0001 with 153.89% increase. When comparing percentage increase in active internal rotation ROM between the groups, there was a significant difference present between group A and group B in increasing in active internal rotation ROM; showing that group A (160.9%) is better than group B (153.89%). PASSIVE INTERNAL ROTATION for group A, pre mean and standard deviations were  $28.7 \pm 5.94$ , which increased to  $43.8 \pm 6.76$  and p value being statistically significant 0.0001 with 57.5% increase. For group B, pre mean and standard deviations were  $31.26 \pm 8.63$ , which increased to  $49.5 \pm 8.95$  and p value 0.0001 with 43.75% increase. When comparing percentage increase in passive internal rotation ROM between the groups, there was a significant difference present between group A and group B in increasing in passive internal rotation ROM; showing that group A (57.5%) is better than group B (43.75%).

The biophysical effects of temperature elevation of body tissue to a therapeutic level between 40" and 45" C: include increased local blood flow and metabolism, superficial vasodilation, mild inflammation, elevated pain threshold, increases extensibility of connective tissue and decreases muscle spindle firing rate. Thermotherapy is generally soothing and psychologically relaxing, thereby favorably modifying emotional response to pain and further reducing painful muscle spasm. And in Local cooling is often more effective in providing pain relief, especially in acute conditions. It acts primarily by decreasing metabolic activity and thus leads to a reduction in inflammatory response, as well as to a decrease in nociceptor excitability and muscle contractility, which serves to decrease painful muscle spasm.

Synovial fluid viscosity is known to decrease with increasing temperature. It has been postulated that the subjective symptom of joint stiffness may be related to increased synovial fluid viscosity. Relief of joint stiffness is done by thermotherapy.

Maitland mobilization controls pain through neurophysiological effects by stimulating type II mechanoreceptors. Mechanical force leads to mobilization may include breaking realigning collagen, breaking of adhesion, increasing fiber glide when specific movements stress the specific parts of the capsule.

## V. Conclusion

This study was concluded that moist heat therapy with Maitland mobilization and ice pack with Maitland mobilization in subjects with frozen shoulder both groups showed improvement in their VAS, SPADI and Range of motion of shoulder. However, GROUP A clearly shows the better percentage improvement against GROUP B under various measurement such as VAS SCALE, SPADI and RANGE OF MOTION.

Limitation of the study:

1. Number of subjects was less.
2. The study was of long duration.
3. No control group was taken.
4. No groups had similar patients with the same degree of involvement.
5. There was age variation from 40-60 years.
6. Patients built were variable.
7. Marked amount of tissue resistance, if experienced while applying the glide, was not taken into consideration.
8. Proper strengthening program was not followed after mobilization sessions due to lack of time.

Suggestion and recommendation for further study:

1. Further studies should be conducted in larger sample size.
2. As this study was done only for a longer duration, further study should be conducted with short term follow up sessions to know the effectiveness of the treatment.
3. Control group can be taken.
4. Both groups should have subjects with similar degree of involvement.
5. Age variation should be reduced.
6. Patients with similar should be selected.
7. Mobilization sessions should be followed by a proper strengthening program.

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