

# To evaluate the efficacy of mobilization techniques in the management of adhesive capsulitis of shoulder joint (frozen shoulder). A Randomized Controlled trial.

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## Abstract:

**Background and Purpose:** The objective of this study was to evaluate the efficacy of mobilization techniques in the management of subjects with Adhesive capsulitis of shoulder joint (frozen shoulder).

**Subjects:** Forty subjects suffering from Adhesive capsulitis of shoulder joint (frozen shoulder) were recruited.

**Methods:** A randomized controlled trial was performed. The stipulated time period for the treatment was 4 weeks. Outcome measures included improvement in ranges of movements of shoulder joint and alleviation of level of pain on Visual Analogue Scale (VAS).

**Results:** Overall, All recruit showed improvement in stipulated time period, i.e. 4 weeks. However, significantly marked and noticeable improvement was evident in patients who were treated with mobilization techniques (group-A).

**Conclusion:** Among partakers suffering from Adhesive capsulitis of shoulder joint (frozen shoulder), mobilization techniques in collaboration with exercises and hot packs were found more effective than exercises and hot packs only.

**Key words:** Adhesive capsulitis, Frozen Shoulder (F.S), Mobilization techniques, Range of Motion (ROM), Visual Analogue Scale (VAS).

## 1 INTRODUCTION

The shoulder joint or girdle "The greatest mobile joint of the Body" comprises a few bony joints, or "articulations", which associate the upper limbs to the rest of the skeleton and provides an enormous range of motion.

H. A. Anton (1993) demonstrated that one of the commonly seen reasons of shoulder pain is frozen shoulder, mostly characterized by reduced range of motion about both active and passive movements. <sup>1</sup> Frozen shoulder, otherwise called Adhesive capsulitis (FS) influences the capsular lining of the shoulder joint. The capsule and related ligaments turned inflamed thickened furthermore contracted.

Its prevalence is 2% to 3%. <sup>1</sup> It might influence both sexes in the middle ages of life but usually starts between age 40 and 70. Codman first used the term frozen shoulder in 1930.<sup>1</sup> In accordance with data occurrence of frozen shoulder among diabetic patients is more than of 10%. Adhesive capsulitis (FS) is generally classified into two categories: primary, which is insidious and with no known cause and secondary which is due to prolong lack of mobility with history of backdrop of trauma<sup>8,11</sup> Clinically its presentation happens in three dissimilar phases. Painful Stage, characterized by pain and slight limitation of range of movement of shoulder joint. This frightful phase normally

keeps up 6-12 weeks.<sup>11</sup> Frozen or transitional phase, Pain might start to decline in this phase. However stiffness and limitation of ROM persists. This phase lasts 4-6 months.<sup>3</sup> Thawing phase, the slowly progressive, Moreover movement relentlessly enhances with the passage of time. This phase can persist more than 12 months.<sup>11</sup>

The two principles characteristic about frozen shoulder are pain and contracture. Shoulder pain associated with frozen shoulder will be progressive and at first felt usually at bed time or at terminal range.<sup>12</sup> One may complain of pain with combined movements i.e, abduction and external rotation or extension and internal rotation. Repetitive movements, anxiety, chill weather or vibrations are supposed to be some of the aggravating factors. In approximately 90% sufferers of frozen shoulder, manifestations usually last about 1-2 years prior to ease.<sup>6</sup>

The etiology of F.S involves contracture or tightness of capsule ligaments, and other periarticular structure.

The most common causes include thickening of synovial capsule, adhesions inside the subacromial or subdeltoid bursa, scarring of biceps tendon with obliterations of axillary folds secondary to it.<sup>7</sup>

In accordance with data FS reveals association as stated below:

The association for metabolic sicknesses is practically greatly referred to viewing existence of Diabetes (Both type 1 and 2). Additionally with thyroid disorders.<sup>2,10</sup>

Objective assessment of the shoulder joint is the key component of diagnosis. Correlations produced the middle of active movement also passive movement identifies contrasts for availability of degree of movement at the shoulder. Limitation of range and painful shoulder is the hallmark for frozen shoulder.<sup>3</sup>

Management of this syndrome mainly emphasizes alleviation of pain and restoration of joint movements. Usually, it starts with non-steroidal anti-inflammatory drugs (NSAIDs) and physical therapy. Gentle stretching exercises as a post to cryotherapy or thermotherapy, helps a great to the sufferers of frozen shoulder. Further activities incorporate low grade, high grade Mobilizations, Mobilizations with or without movement (Active alternately passive), mid-range Mobilizations, End Range Mobilizations Codman's exercises, strengthening exercises. A few of them might be advised to be practiced as home regimen. Over some cases, transcutaneous electrical nerve stimulation (TENS) might be indicated to alleviate pain. Another choice of treatment often is one or a series of cortisone injections (up to six).

Hydrodilatation may also be used as a choice of treatment. If none of these works, manipulation under general anesthesia is usually advised. Surgical intervention may also be advised in chronic and severe cases.<sup>17</sup>

Educating patients helps greatly to overcome depression and encourages compatibility. Yet, it is worthy to note that the complete ROM may not recover. In the best of circumstances, the management of this shoulder pathology should remain continue to the stage of the disease.

Maitland, Mulligan, kaltenborn and some other manual therapists demonstrated different manual therapy strategies for modulating related consequences in human joints. In accordance with data specifically on demonstrated strategies, Maitland proved himself greatly effective as for as efficacy of the techniques is concerned.<sup>4</sup>

Maitland classified his technique into five grades: <sup>4</sup>

Grade I: Oscillations of small amplitude near to the start of the range.

Grade II: Oscillations of large amplitude up to the mid-range.

Grade III: Larger amplitude's movement touching the end limit of ROM.

Grade IV: Oscillations of small amplitude into the restricted range.

Grade V: Small amplitude, high velocity thrust at the end of restricted ROM.

## **Shoulder Mobilization Techniques to the Gleno-Humeral (GH) Joint:**

### **Antero-posterior movement**

Oscillatory glides to head of the humerus in an anterior-posterior direction in relation to the acromion process.<sup>5</sup>

### **Hand-behind –back**

This movement has got a great functional importance, purely depend on glenohumeral medial rotation, extension and, to some extent, adduction.<sup>5</sup>

### **Longitudinal movement caudad:**

Longitudinal gleno-humeral oscillations in caudal direction, in line with the patient's body.<sup>12</sup>

### **Postero-anterior movement:**

Oscillatory glides to the humeral head in a posterior to anterior direction in relation to the acromion process.<sup>5</sup>

**Lateral movement:** Lateral glides of humeral head in relation to the acromion and glenoid cavity.<sup>5</sup>

## **METHODOLOGY:**

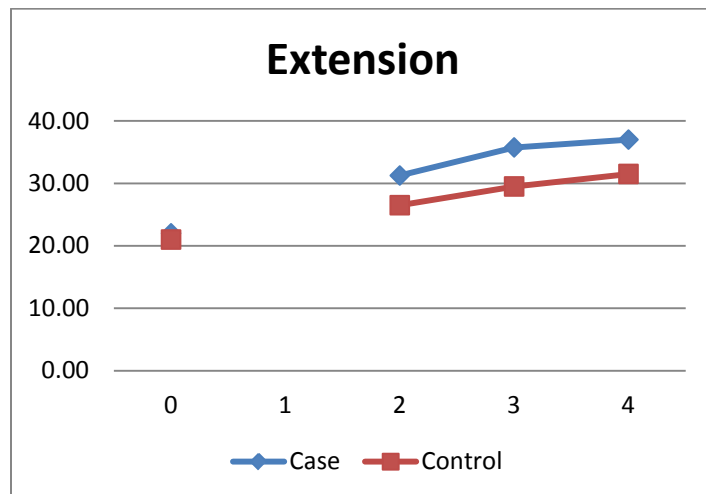
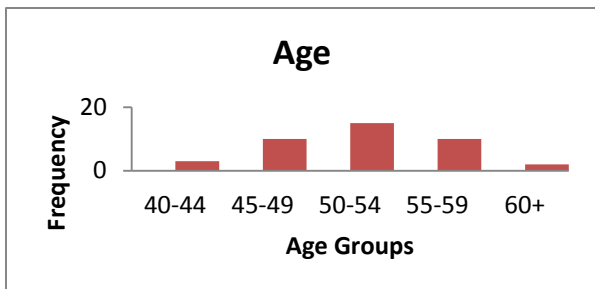
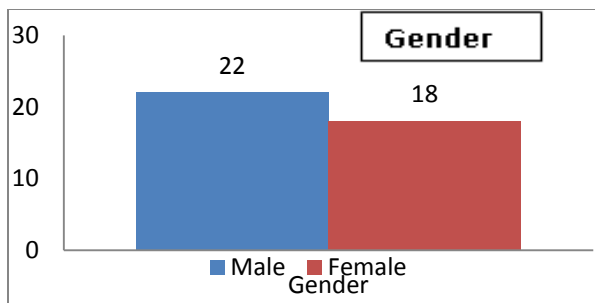
The research study was randomized controlled trial with experimental, different subject design. Subjects were individuals suffering from frozen shoulder (adhesive capsulitis) of shoulder joint, who were randomly selected and equally distributed into two groups. Sample size in the research study was 40 including both male and female subjects of age between 35 to 60 years, suffering from adhesive capsulitis (FS) in any of the three stages of frozen shoulder were recruited randomly

Subjects of any medical complication i.e, hepatitis, cancer, as a complication of stroke, head injury or spinal cord injury, diagnosed case of osteoporosis, dementia or Alzheimer's disease or suffering from post-surgical complications, amputation, nerve palsy, paralysis of upper limb, recurrent dislocation or instability were not recruited

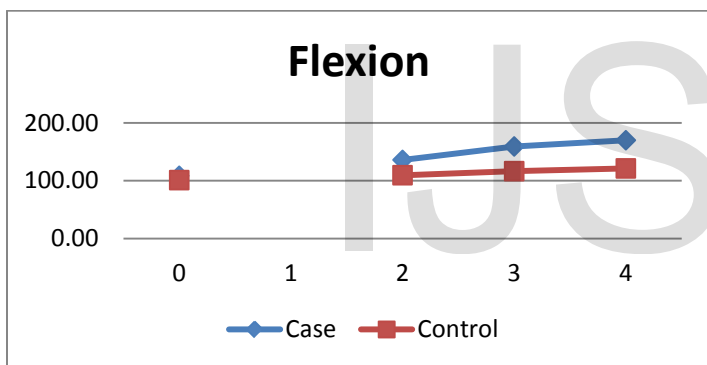
The research study was conducted in different hospitals of Karachi. The duration for the study was six months. The apparatus used was goniometer and the data was collected through assessment form. The data was analyzed with SPSS for Windows, version 20.0. for both the case and control group, using the data at baseline, 2<sup>nd</sup> week, 3<sup>rd</sup> week, and 4<sup>th</sup> weeks.

## **RESULTS**

Forty subjects, 22 men and 18 women of age between 35 to 60 years were recruited and randomly assigned to 2 groups.



Basic Characteristics of Subjects with Frozen Shoulder in the 2 Intervention Groups (n=40)

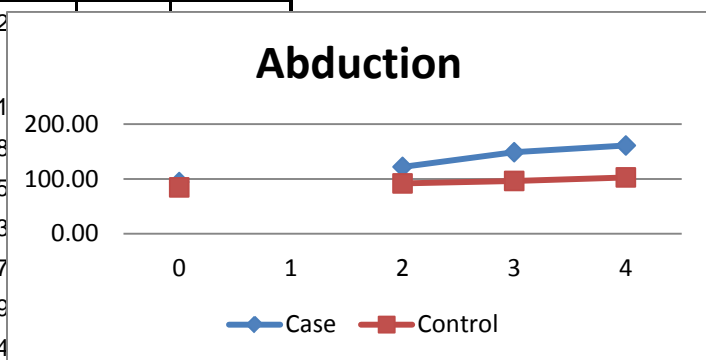


Descriptive

	N	Mean	Std. Deviation	Std. Error
Extension At baseline	1	22	9.787	2.188
	2	21	8.826	1.974
Total	40	21.5	9.213	1.457
Extension At week 2	1	31.25	7.048	1.576
	2	26.5	8.288	1.853
Total	40	28.88	7.965	1.259
Extension At week 3	1	35.75	5.911	1.322
	2	29.5	8.414	1.881
Total	40	32.63	7.844	1.24
Extension At week 4	1	37	4.974	1.112
	2	31.5	7.273	1.626
Total	40	34.25	6.751	1.067

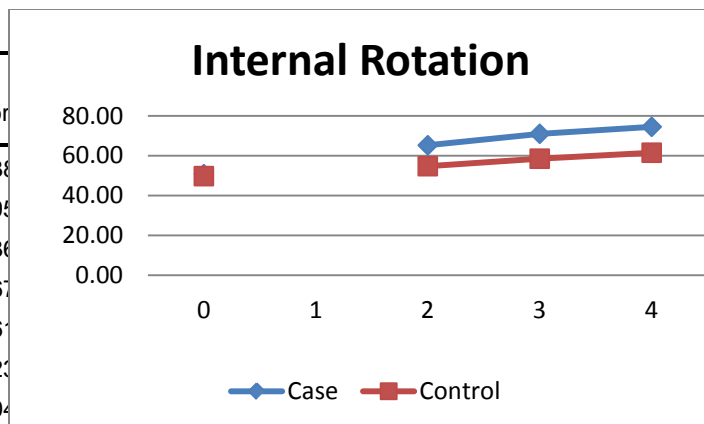
Descriptives

	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Flexion At baseline	1	108.5	29.607	6.62		
	2	101	26.388	5.9		
Total	40	104.75	27.941	4.41		
Flexion At week 2	1	136	30.332	6.78		
	2	109.5	26.651	5.95		
Total	40	122.75	31.214	4.93		
Flexion At week 3	1	159.25	18.657	4.17		
	2	116.5	30.826	6.89		
Total	40	137.88	33.183	5.24		
Flexion At week 4	1	170	12.566	2.81	140	180
	2	121.25	30.213	6.756	65	180
Total	40	145.63	33.63	5.317	65	180

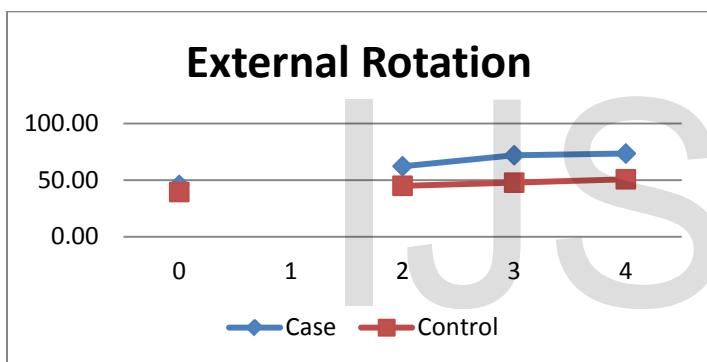


**Descriptives**

		N	Mean	Std. Deviation	Std. Error
Abduction At baseline	1	20	94.25	36.392	8.138
	2	20	84.5	25.021	5.595
	Total	40	89.38	31.219	4.936
Abduction At week 2	1	20	122	35.63	7.967
	2	20	91.75	25.766	5.767
	Total	40	106.88	34.3	5.423
Abduction At Week 3	1	20	148.75	30.43	6.804
	2	20	96.25	27.042	6.047
	Total	40	122.5	38.911	6.152
Abduction At week 4	1	20	161	28.636	6.403
	2	20	102.75	30.97	6.925
	Total	40	131.88	41.675	6.589

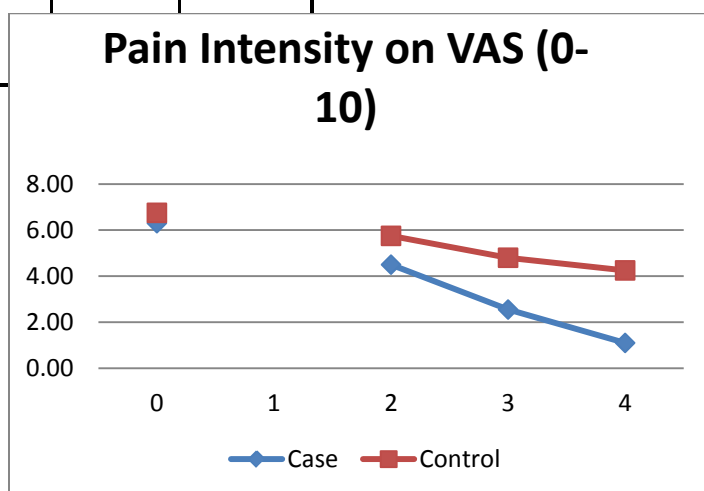


		N	Mean	Std. Deviation	Std. Error
Internal Rotation at baseline	1	20	50.75	23.967	5.359
	2	20	49.75	20.097	4.494
	Total	40	50.25	21.837	3.453
Introt_Aw2	1	20	65.25	21.056	4.708
	2	20	54.75	20.097	4.494
	Total	40	60	21.001	3.32
Int.rot_Aw3	1	20	71	21.921	4.902
	2	20	58.5	20.844	4.661
	Total	40	64.75	22.042	3.485
Int.rot_Aw4	1	20	74.5	20.449	4.573
	2	20	61.5	22.07	4.935
	Total	40	68	22.008	3.48



**Descriptives**

		N	Mean	Std. Deviation	Std. Error
External Rotation at baseline	1	20	45.75	17.938	4.011
	2	20	39.5	18.057	4.038
	Total	40	42.63	18.045	2.853
External Rotation at week 2	1	20	62.25	20.227	4.523
	2	20	45	19.057	4.261
	Total	40	53.63	21.273	3.364
External Rotation at week 3	1	20	72	18.736	4.19
	2	20	47.75	19.767	4.42
	Total	40	59.88	22.631	3.578
External Rotation at week 4	1	20	73.5	19.201	4.294
	2	20	50.75	20.214	4.52
	Total	40	62.13	22.614	3.576



Results of this study shows greater consistency with the data by Vermeulen et al., 2000, Vermeulen et al., 2006 and Vermeulen et

al., 2002, and furnish that the mobilization techniques in collaboration with exercises and hot packs (case group) were

proved more effective.<sup>13,14,15</sup>

Although exercises followed by hot packs might extend the adhesive capsule, we believe that the adhesive capsule and associated stiff periarticular structures can only be stretched effectively by mobilization techniques in collaboration with exercises and hot packs. The findings also suggest that mobilization techniques in collaboration with exercises and hot packs (case group) could facilitate scapula-humeral rhythm in

sufferers of adhesive capsulitis (FS). Overall, subjects in both groups showed improvements over a period of 4 weeks. Statistically marked and noticeable changes were evident in patients of case group. In short, the findings favored and further proved the efficacy of mobilization techniques in collaboration with exercises and hot packs.

**Descriptives**

		N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Intensity of Pain at baseline	1	20	6.3	1.342	0.3	4	9
	2	20	6.75	1.251	0.28	4	8
	Total	40	6.53	1.301	0.206	4	9
Intensity of Pain at week2	1	20	4.5	1.67	0.373	1	8
	2	20	5.75	1.333	0.298	1	8
	Total	40	5.13	1.62	0.256	1	8
Intensity of Pain at week3	1	20	2.55	1.146	0.256	0	4
	2	20	4.8	1.881	0.421	0	7
	Total	40	3.68	1.913	0.303	0	7
Intensity of Pain at week4	1	20	1.1	1.21	0.27	0	4
	2	20	4.25	1.86	0.416	0	7
	Total	40	2.68	2.223	0.352	0	7

**CONCLUSION:**

**DISCUSSION:**

This study shows positive findings. There was a great improvement in terms of mobility and overall functional status at 4 weeks in subjects treated with the mobilization techniques (case group). Among the two above stated treatment options, mobilization techniques in collaboration with exercises and hot packs (case group) were proved more effective than exercises and hot packs (control group) only, in the improvement in ranges of movements of shoulder joint. The findings show greater consistency with the previous data by Vermeulen et al., 2000 and Vermeulen et al., 2006, showing relief followed by mobilization among sufferers of frozen shoulder.<sup>13,14</sup> Significant reduction in the intensity of level of pain on Visual Analogue Scale (VAS) was also noticed likewise Mangus BC et al., 2002.<sup>9</sup> Moreover, mobility, scapulohumeral rhythm facilitated followed by mobilization with movement regimen, in accordance with the study done by Vermeulen et al., 2002.<sup>15</sup>

Mobilization techniques facilitate the capability of the shoulder capsule to be extensible as well as stretch the stiff periarticular soft tissues to promote relief among sufferers of frozen shoulder.

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