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## **Different Influence of End Range Mobilization and Mobilization with Movement on Improving Motional Scope of Non Specific Frozen Shoulder**

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### **Abstract**

Limited joints are loss of active and passive mobility capability of a body joint resulting in disruption of daily activities. Limitations of movement in all directions are characteristic of frozen shoulder sufferers. This study aimed to examine the effect of end mobilization and mobilization with movement on increasing the scope of joint motion in frozen shoulder patients in Faisal Islamic Hospital Makassar from April to June 2017. The research method was Quasi Experiment with design of Two Groups Pre test- Post test. Population were all frozen shoulder patients who get physiotherapy treatment in Faisal Islamic Hospital Makassar. Sampling technique was done by purposive sampling then obtained the number of samples of 16 respondents. Divided into 2 groups, group 1 is 8 respondents who are given intervention of end range mobilization and group 2 that is 8 respondents who are given mobilization with movement intervention. Based on Wilcoxon test result in treatment group I end range mobilization for abduction shoulder movement with p value = 0,008 and shoulder exorotation with p value = 0,020 and shoulder endorotation movement with p value = 0,025. While in the treatment group II mobilization with movement for abduction movement shoulder with p value = 0.008 and shoulder exorotation with p value = 0,011 and shoulder endorotation movement with p value = 0,023. Both treatment groups had an effect on increasing the scope of joint motion in frozen shoulder patients. Based on the result of Mann-Whitney difference test obtained abduction movement shoulder p-value = 0,013 (p <0,05) and for shoulder parsing movement equal to p-value = 0,023 (p <0,05).

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Then there was the difference of effect between treatment I end range mobilization with treatment II mobilization with movement. But for endorotation movement shoulder got p-value = 0,074 which means there is no difference of influence between treatment I end mobilization range with treatment II mobilization with movement. It is concluded that mobilization with movement is more effective than end range mobilization in increasing the scope of joint motion for the limitations of shoulder abduction and shoulder exorotation in frozen shoulder patients. But for the limitations of shoulder endorotation there is no significant effect.

**Keywords:** End Range Mobilization; Mobilization With Movement; Scope of Movement; Goniometer.

## **1. Introduction**

Frozen shoulder also called adhesive capsulitis is a condition characterized by stiffness and pain in the shoulder joint. Things can get worse which is marked by the reduced area of shoulder movement. Frozen shoulder usually occurs on one shoulder, but can continue on the other side of the shoulder. Disorders in the shoulder joint in the form of pain both in active and passive movements and limited space will affect the daily life [1]. The term frozen shoulder was first used by Codman in 1934 to describe the condition of tendinitis due to cuff muscle rotator spasms or adhesions to joint or stock capsules. Frozen shoulder is a glen humeral joint stiffness caused by non-contractile tissue elements or a combination of non-contractile and contractile tissues undergoing fibroplasia, either passive or limited active motion and pain [2]. It is estimated that frozen shoulder patients is 2% of adults. Most at the age of 40 to 60 years, more in women and individuals suffering from hormonal diseases, immune diseases and systemic diseases. Adhesive capsulitis classification consists of primary adhesive capsulitis (idiopathic) and secondary adhesive capsulitis associated with post trauma or due to certain diseases [3, 4]. Meanwhile, based on the results of observation in Faisal Islamic Hospital Makassar, the number of patients who come for treatment and checked himself physiotherapy clinics quite a lot and many of them was the patients who come with pain and stiff shoulder complaints. Frozen shoulder sufferers themselves quite a lot, judging from the last three months of 23 people. (Physiotherapy of Islamic Hospital Faisal Makassar). In frozen shoulder pathophysiology stiffness occurs in the joint capsule. Where if there is a disruption in the joint capsule then the limitation of motion that occurs is a capsular pattern. The capsular pattern on the shoulder is more limited external rotation than the more restricted abduction of internal rotation. One of the inhibited movements is the abduction of the shoulder in which the abduction movement occurs arthrokinematic movement in the form of translation to caudal [5]. Goniometry is used to measure and record the ability of joint movement active and passive joints. Goniometry is also used to accurately describe the abnormal position of the joints [6]. The wide range of joint motion that can be performed is measured by a horse-and-a-goometer recorded in a degree scale according to the International Standards Orthopedic Measurements (ISOM) standards, while the scope of the joints motion measurements are projected based on the anatomical position of the human body and the motion field comprising: (1) the field of sagittal motion, measured is the flexion-extension motion, (2) the frontal motion field, the measured motion is the motion of abduction-adduction, (3) the horizontal motion plane, the measured motion is the rotational motion [7]. In this research will be discussed method of addition of wide shoulder joint motion or articulation glen humeral which experienced limitations or known by frozen shoulder or frozen shoulder. The method of recovery for manual addition of joint motion introduced by Maitland since 1983 is a joint mobilization method consisting of: (1) joint stretching or End Rane Mobilization (ERM)

techniques, and (2) rolling and gliding motion techniques on joints or Mobilization With Movement (MWM) [8].ERM is a passive movement method consisting of: (1) passive oscillation motion with 2-3 repetitions per second, (2) passive stretching motion with oscillation. Oscillation is the passive motion of the joint with large or small amplitude performed when the joint surface is in distraction and compression state. The oscillation motion may be arthrokinematic or osteokinematic motion [7]. ERM technique with rhythmic oscillations will stimulate the type 2 mechanisms and inhibit the type 4 nociceptors, thus blocking nociceptive pathways at the spinal and brainstem levels, so that pain is not perceived. Reduced pain can make it easier for the patient to move his shoulder joint [8]. The basic principle of ERM technique is to stretch periarticular tissue around the shortened joints so as to restore joint joints. Stretching on periarticular tissue causes remodeling of the periarticular tissues through abnormal cross-link release between collagen fibers and will stimulate collagen tissue responses to increase tensile strength by collagen synthesis and other extracellular components. Collagen tissue in an irregular position (cross-link) changed its position to be straight again in accordance with the direction of tension received. This can restore collagen tissue back to normal and can maintain periarticular tissue extensibility around joints and maintain joint mobility [9].The technique of Mobilization With Movement (MWM) is a manual therapeutic technique used for pain management in joint hypo mobility conditions. This technique is a combination of rolling and gliding motion in the humeral cap that is part of the artrokinematic and osteokinematic motion performed actively or passively until the boundary of the actual position of the joint [10]. MWM application follows the laws of concave and convention, mobilization of the shoulder joint here will be discussed about articular mobilization related to the joint play movement mechanism that is roll glidin, gliding humery motion with roll-gliding either passively or active will cause the muscles and tissues around the shortened joint to become outstretched. This will stimulate the first proprioceptors of the muscle spindle (MS) and the second proprioceptors, ie golgi tendon organ (GTO), this will cause the soft tissue to become shortened and adhesive to become stretched causing impulse transmission inhibition to second-order neurons resulting in pain perceived [11], with not perceived pain, it will facilitate the patient to move the shoulder joint. The aimed of this research is to know the effect of end range mobilization and mobilization with movement toward increasing the scope of joint motion on non specific frozen shoulder.

## **2. Methods and Materials**

### ***2.1. Research design***

This study was conducted at Faisal Islamic Hospital Makassar in March to June 2017. The type of this research is experimental using Quasi Experimental design and using two-group pre test and post test design method. The first group will receive intervention treatment in the form of ERM. The second group will receive intervention treatment in the form of MWM.

### ***2.2. Population and sample***

The study population were all frozen shoulder syndrome patients who received physiotherapy treatment at Faisal Makassar Islamic Hospital. The sample in this study was taken by purposive sampling technique, based on inclusion and exclusion criteria as follows:

### **2.3. Inclusion criteria**

1. Frozen shoulder patients who get physiotherapy treatments at Faisal Islamic Hospital Makassar.
2. Limitations of shoulder joint motion capsular pattern is known by doing physiotherapy examination.
3. Has undergone frozen shoulder under one year.
4. Not following physical activity such as gymnastics or therapy outside treatment.
5. Willing to be a sample in research until completion and willing to cooperate until the study ends.
6. Be able to understand the instructions given.

### **2.4. Exclusion criteria**

1. There are neurological disorders in the shoulder area.
2. Cancer of the cervical region and shoulder region.
3. Fracture of the cervical region and shoulder region.
4. Diabetes mellitus is not controlled.
5. Spinal cord lesions of cervical region.
6. Uncontrolled hypertension.
7. Have a cognitive impairment (can not be invited to cooperate and take orders).

### **2.5. Sample**

All samples obtained based on the above criteria were 16 people who were then divided randomly into 2 treatment groups, where treatment group 1 received treatment action in the form of ERM Exercise and Group II was given treatment action in the form of MWM Exercise.

### **2.6. Collecting Data and Procedure Intervention**

#### **2.6.1. Data Collection Procedures**

At the beginning of the study, all samples measured the width of the joint motion, using a goniometer.

The measurement procedure as follows:

1. Tools used:
  - a. 360° Goniometer
  - b. Seats (stul)
  - c. Bed exercise
  - d. Towel
  - e. The measurement result
  - f. Notebook
  - g. Pen

2. Implementation:
  - a. Patients are instructed to lie on a bed or sit.
  - b. The sample measured the scope of joint motion with the goniometer in the abduction position, external rotation and internal rotation.
  - c. The measured joint is free of clothes.
  - d. Provide an explanation and sample measurements to be performed.
  - e. Provide passive movement first to produce relaxation of soft tissue structure of the glenohumeralis joint region.
  - f. The axis of motion is determined by palpating the major tuberculus according to the expected angular motion.
  - g. The static goniometer limbs are placed parallel and the longitudinal axis of the moving body segment. Make sure the axis of the goniometer is exactly on the axis of joint movement.
  - h. The patient is actively asked to apply his arm in the direction of movement on the shoulder to get the value actively
  - i. Physiotherapy self-infuses the patient's arm for passive measurements.
3. Evaluation: the results of the measurement of joint motion in the recorded assessment.

#### ***2.6.2. Interventions Procedures and Implementation***

1. End Range Mobilization in the first group using grade II and III oscillation techniques

The patient is given an intervention in the sleeping position supine on the bed and the physiotherapy is on the side of the disturbed or frozen shoulder patient. Physiotherapy cuffs the arm up towards the limited movement and in the position of the limitations are given grade II and III oscillations.

- a. grade II is a large amplitude, performed on the range of motion but does not reach the limit of the scope of motion of the joints and dilakuan oscillation 2-3 times per second for 1-2 minutes,
- b. grade III is a large amplitude, carried out to limit the scope of motion of the joints and oscillation 2-3 times per second for 1-2 minutes.

The direction of the given motion should not exceed the normal limit of joint motion. When applying oscillation motion techniques, the physiotherapist must recognize joint motion and the direction of movement based on the capsular pattern (external rotation, internal rotation, abduction) on the shoulder. The grade II and III oscillations are given 3 times per second, 10-15 reps, 3 sets of treatment persistions and 30 seconds rest time between sets and intervention 3 times per week for 4 weeks.

2. Mobilization With Movement (MWM) in the second group using rolling and gliding technique.
  - a. Limitations of abduction

The patient is positioned to sleep side by side (side lying) the therapist standing on the side of the treated part. The shoulder bracelet is fixed by the depression position. Different hands of the sides are placed on the humeral from the lateral and as close to the joint as possible and then the physiotherapist performs a roll and glid movement against the humeral cap toward the caudal using weight. The therapist maintains 10 seconds in the position. 10 reps of perset as much as 3 sets each intervention session, with 1 minute break time between sets.

b. Limitations of Endorotation

The patient is positioned sleeping on his back on a slight angle to the sore side, the therapist standing medial from the arm being treated. The scapula is fixed by the side of the bed. One of the hands of physiotherapy is placed on the upper arm of the ventral part, while the other hand is as close as possible to the joint to fix the humeral cap and then perform a lateral dorsal gliding motion. The patient's arm is supported by the therapist's other hand The therapist maintains 10 seconds in the position. 10 reps of perset as much as 3 sets each intervention session, with 1 minute break time between sets.

c. Limitations of Exorotation

The initial position of the patient sleeping prone (prone lying) slightly tilted towards the sick, the therapist stands beside the patient on the side to be treated. One of these physiotherapy hands is placed next to the dorsal right shoulder with a grip as close as possible to the shoulder joint space, one other physiotherapy hand placed on the upper arm then performs a gliding motion toward the ventral slightly medial. The therapist maintains 10 seconds in the position. 10 reps of perset as much as 3 sets each intervention session, with 1 minute break time between sets.

**2.6.3. Data analysis**

Wilcoxon test and Mann-Whitney test was conducted to examined the effect of end range mobilization and mobilization movement toward increasing the scope of joint motion on non specific frozen shoulder.

**3. Result**

**Table 1: Subject Distribution by Sex of Each Group**

Sex	End Range Mobilization Group		Mobilization With Movement Group	
	n	%	n	%
Male	2	25 %	3	37 %
Female	6	75 %	5	63 %
Total	8	100 %	8	100 %

The table 1 showed the percentage of the sample based on the characteristics of the research subject of gender. Total subjects of research as many as 16 people with the subject of men as many as 5 people and subject women 9 people. The number of subjects in the End Range Mobilization group consisted of 2 men and 6 women, while the mobilization with movement group consisted of 3 men and 5 women.

**Table 2:** Characteristics of the Subject by Age

	End Range Mobilization Group	Mobilization With Movement Group
Min	41	51
Max	63	63
Mean	52,25	57,25
St. Deviasi	± 7,960	± 3,845

Characteristics of subjects by age: ERM group has an average age of 52,25 years with a minimum age of 41 years and a maximum age of 63 years. The age variable of the Mobilization With Movement group has an average age of 57,25 years with a minimum age of 51 years and a maximum age of 63 years.

**Table 3:** Data Measurement Results Scope of the Joints Motion Before Treatment

Scope of The Joints Motion	End Range Mobilization Group		Mobilization With Movement Group	
	Mean	St. Deviasi	Mean	St. Deviasi
Abduction	153,13°	±6,512	138,75°	±18,851
Exorotation	62,50°	±5,345	56,88°	±5,939
Endorotation	68,75°	±7,440	68,75°	±9,910

The initial conditions of measurements of subjects of joint motion in both study groups prior to treatment were as follows:

In the End range mobilization group obtained the measurement of shoulder abduction joint scope with a mean of  $153,13 \pm 6,512$ .

Measurement result of external shoulder rotation shoulder rotation with mean of  $62,50 \pm 5,345$ . Measurement result of shoulder endorotation joint scope with average  $68,75 \pm 7,440$ .

While the results in the MWM group obtained measurement results linkgkup motion abduction shoulder joint with a mean of  $138.15 \pm 18.851$ .

The measurement results of shoulder joint eksperotasi motion with average  $56,88 \pm 5,939$ .

Measurement result of shoulder endorotation joint scope with average  $68,75 \pm 9,910$ .

**Table 4:** Data Measurement Results Scope of Joints Motion After Treatment

Scope of The Joints Motion	End Range Mobilization Group		Mobilization With Movement Group	
	Mean	St. Deviasi	Mean	St. Deviasi
Abduction	159,38°	±8,210	149,38°	±17,410
Exorotation	66,88°	±4,581	66,88°	±7,039
Endorotation	71,88°	±6,512	75,00°	±8,864

The final condition of the subject after treatment was as follows: In the End Range Mobilization group, the measurement result of shoulder motion of shoulder scope was obtained with mean of  $159,38^\circ \pm 8,210$ . The measurement result of external rotation of shoulder rotation should be  $66,88 \pm 4,581$ . The result of measurement of joint shoulder endorotation with mean of  $71,88 \pm 6,512$ . While the results in group 2 Mobilattion with movement obtained measurement result motion abduction shoulder joint with mean of  $149,38 \pm 17,410$ . Measurement result of shoulder motion of shoulder exorotation with mean of  $66,88^\circ \pm 7.039$ . Measurement result of shoulder endorotation joint scope with mean of  $75,00 \pm 8,864$ .

**Table 5:** Difference between Pre-Post Second Treatment

Scope of The Joints Motion	End Range Mobilization Group		Mobilization With Movement Group	
	Mean	St. Deviasi	Mean	St. Deviasi
Abduction	6,25°	±2,315	10,63°	±4,173
Exorotation	4,38°	±3,204	9,38°	±4,173
Endorotation	3,13°	±2,588	6,25°	±4,432

The difference between the pre-post of both treatments was obtained. In the end-mobilization treatment group the difference for shoulder abduction was  $6.25 \pm 2.315$ . Difference to shoulder exorotation with average  $4.38 \pm 3.204$ . Difference for shoulder endorotation with average of  $3.13 \pm 2.588$ . While in the second treatment group Mobilization with movement for the difference between abduction shoulder and the mean of  $10.63 \pm 4.173$ . Difference for shoulder exorotation with average of  $9.38 \pm 4.173$ . Difference for shoulder endorotation with mean of  $6.25 \pm 4.432$ .

Wilcoxon Test results in the End range mobilization group and. In the End range mobilization group, the p value of abducted shoulder shows p value = 0.008 (p <0.05). And for shoulder exorotation show value p = 0,020 (p <0,05). And on endorotation movement showed p value = 0,025 (p <0,05). Which means overall showed no



significant changes after the therapy provided End Range Mobilization. This suggests that End Range Mobilization therapy can have a significant effect on increasing the scope of joint motion in non specific frozen shoulder patients.

**Table 6:** Wilcoxon Sign Rank Test for pre-post treatment group End Range Mobilization

Scope of The Joints Motion	Means		St. Deviasi		z	P
	Pre test	Post test	Pre test	Post test		
Abduction	153,13°	159,38 °	6,512	±8,210	-2,640	0,008
Exorotation	62,50°	66,88°	5,345	±4,581	-2,333	0,020
Endorotation	68,75°	71,88°	7,444	±6,512	-2,236	0,025

**Table 7:**Test Wilcoxon Sign Rank Test for pre-post treatment group Mobilization with Movement

Scope of The Joints Motion	Means		St. Deviasi		z	P
	Pre test	Post test	Pre test	Post test		
Abduction	138,75	149,38 °	±18,851	±8,210	-2,636	0,008
Exorotation	56,88°	66,88°	±5,939	±7,039	-2,558	0,011
Endorotation	68,75°	75,00°	±9,910	±8,864	-2,271	0,023

In the Mobilization with movement group, for abduction movement shoulder p value showed  $p = 0.008$  ( $p < 0.05$ ). And the shoulder exorotation shows the p value = 0.011 ( $p < 0.05$ ). As for the movement of endorotation shoulder showed p value = 0,023 ( $p < 0,05$ ). which means that overall there is a significant change after the action given by Mobilization with movement. This suggests that the provision of a therapeutic action of Mobilization with movement can result in significant changes in increased shoulder joint motion in non-specific frozen shoulder patients.

The table above showed Mann-Whitney Test result that is U value for abduction shoulder equal to 11,000 with p value = 0,013  $< 0,05$ . And for the Mann - Whitney test the shoulder exorotation U value of 12,000 with the value  $p = 0.023 < 0.05$ . Both movements show that there is a significant difference between end-range mobilization and mobilization with movement. However, for the Mann-Whitney test on the endorotation of the shoulder, the value of U is 16,000 with  $p = 0.074$  which means that there is no difference between the result of therapy end range mobilization with Mobilization with movement. Thus it can be concluded that mobilization with movement is more effective than end mobilization in increasing the scope of joint motion for the limitations of shoulder abduction and shoulder exorotation in frozen shoulder patients. However, for the limitations of shoulder

endorotation, no significant difference equals the same increase.

**Table 8:** Mann-Whitney's test on increasing the scope of joint motion between the End Range Mobilization and Mobilization With Movement Groups

Scope of the Joints Motion	Respondent Group	Average Value	Difference in Standar Deviasi	U	P
Abduction	ERM	6,25°	±2,315	11,000	0,013
	MWM	10,63°	±4,173		
Exorotation	ERM	4,38°	±3,204	12,000	0,023
	MWM	9,38°	±4,173		
Endorotation	ERM	3,13 °	±2,588	16,000	0,074
	MWM	6,25 °	±4,423		

#### 4. Discussions

Based on different test results with Wilcoxon signed ranks between pre test and post test in group I with mean value between pre-post test showed there was influence of therapy action of end range mobilization to increase the joint motion in non specific frozen shoulder.

The increase in shoulder joint coverage with end range mobilization is in line with the research conducted by Kumar, Kumar [8] in which the study compared the effectiveness of Maitland mobilization grade IV with shoulder exercise on increasing the scope of abduction and external rotational motion, SPADI score and decrease pain in the shoulders.

A total of 16 subjects were randomized and divided into 2 groups: Maitland mobilization grade IV and shoulder exercise group. The conclusions of the study were that both techniques showed an improvement in each group, but statistically significant results on SPADI scores and abduction and external rotation scope and decreased shoulder pain were found in the Maitland mobilization grade IV group.

Maitland mobilization grade IV or also called end mobilization is a form of passive stretching done at end range position [12]. The research by Vermeulen, Obermann [13] entitled End-Range Mobilization Techniques in Adhesive Capsulitis of the Shoulder Joint, demonstrated an increase in shoulder joint capacity and shoulder joint mobility in 7 patients with adhesive capsulitis after 3 months of end-range mobilization techniques and 5 patients reported no longer feel pain in the affected shoulder joint after 3 months post treatment.

End Range Mobilization is a passive movement method consisting of: (1) passive oscillation motion with 2-3 repetitions per second, (2) passive stretching motion with oscillation. Oscillation is a passive movement of joints

with large or small amplitude that is performed when the joint surface is distracted and compressed. The End Range Mobilization technique with rhythmic oscillations will stimulate the type 2 mechanisms and inhibit the type 4 nociceptors, thereby blocking nociceptive pathways at the spinal and brainstem levels, so pain is not perceived.

The basic principle of end mobilization is stretching the periarticular tissue around the shortened joints so as to restore joint joints. The intensity of the end range mobilization is until the soft tissues around the shoulder joint are in a state of maximum tension and then coupled with the force from the outside until the network is stretched. The stretching of the periarticular tissue causes remodeling of the periarticular tissue by releasing abnormal cross-links between the collagen fibers and will stimulate the collagen tissue response to increase tensile-strength through the synthesis of collagen and other extracellular components. Collagen tissue in an irregular position (cross-link) changed its position to be straight again in accordance with the direction of tension received. This can restore the collagen tissue back to normal and can maintain the periartite tissue extensibility around the joints and maintain joint mobility [7].

Based on different test results with Wilcoxon signed ranks between pre test and post test in group II with mean value between pre-post test indicate that there is influence of action of Mobilization with movement therapy on increasing of joint motion in frozen shoulder non specific patient.

This result is in line with a study conducted by Teys, Bisset [14] entitled the initial effects of a Mulligan's mobilization with movement technique on the range of movement and pressure pain threshold in pain-limited shoulder: double-blinded randomized. A total of 44 subjects (11 men and 13 women) with shoulder pain more than 1 month were divided into 3 groups: Mobilization With Movement (MWM) group, sham group and control group. Before and after the treatment of each subject, a shoulder abduction motion examination was performed using a goniometer and a pain check (blind to the pre and post-outcome measures). The conclusion of this research is Mobilization With Movement Techniques (MWM) effectively used as one of manual therapeutic therapies in case of limited abduction joint scope, eksorotasi and endorotasi and elevation of shoulder joint.

Kachingwe, Phillips [15] study on the differences in the effect of manual therapy with therapeutic exercise in shoulder impingement patients with clinical symptoms of pain and disadvantages of shoulder LGS. The results of the MWM group statistically showed higher results against an increase in the active range of motion (AROM) of the shoulder joint, decreased pain and increased functional ability of the shoulder joint compared to the group given other modalities. Mobilization with movement is a combination of gliding techniques on the humeral head with physiological motion of the shoulder joint which is part of osteokinematics of the joints performed actively or passively [10].

The physiological motion of the shoulder joints in the form of external rotational motion, abduction and internal rotation performed actively by the patient or passively by the therapist will stimulate the biological activity of the joint through the movement of synovial fluid. This synovial fluid will bring nutrients to the avascular cartilage at the joint surface and intra-articular fibrocartilage tissue on the joint pillow. With the increase of nutrients to cartilage and fibrocartilage in the joint pillow is expected to improve vascularization so followed by

repair or regeneration of cartilage and joint pillow [11].

Gliding on a humeral cap that is maintained for 10 seconds will cause the muscles and soft tissues around the shortened joint to be stretched out. This can occur as it stimulates the first proprioceptors of the muscle spindle and the second proprioceptors of the organ tendon golgi. Muscle spindle is a fiber that is sensitive to changes in muscle length and serves to monitor the speed and duration of stretching. While the organ tendon golgi is sensitive to muscle tension and assesses the mean stresses in the otats and soft tissues around the joint. At the time of muscle stretched muscle spindle also stretched out.

Muscle spindles will report changes in muscle length and how quickly the length changes occur as well as signals the spinal cord to pass information to the central nervous system and ordered to maintain changes in muscle length. At the same time golgi tendon organs will be stimulated and inhibit tension in the muscle so as to give elasticity to elastic components muscles and muscles can be easily lengthened. Gradually muscle spindles and golgi tendon organs will be adept and trained to provide greater muscle length [14].

The difference in the effect of these two actions can be seen from the Mann – Whitney test result, which shows that the action of Mobilization with movement is more effective against end mobilization in increasing the extent of joint motion in the non-specific frozen shoulder patient. But statistically for the improvement of shoulder endorotation joints, the two actions are equally unimportant. This result is in line with research conducted by Yang, Chang [10] in which case of frozen shoulder is given manipulation therapy by comparing 3 mobilization techniques ie end range mobilization (ERM), mid-range mobilization (MRM) and mobilization with movement techniques (MWM). The subjects (n = 28) with frozen shoulder over 3 months and have LGS limitations of shoulder joints 25% or more, are randomly divided into 2 group with multiple-treatment design. Each of the subjects in each group received 2 or more treatments to determine the different effects of each of the mobilization techniques on the case of frozen shoulder syndrome.

Evaluate every 3 weeks. The results of this study indicate an increase in FLEX-SF, arm elevation, humeral external rotation, humeral internal rotation is significant in end mobilization and mobilization with movement in both groups. While improving scapulohumeral rhythm is best in the mobilization with movement group. In addition to the mechanical effects caused by physiological movements so that there is stimulation of biological activity by moving the synovial fluid that brings nutrients to the cartilage on joint surfaces and maintains the exchange of nutrients to reduce the process of soft tissue degeneration around the joints [11]. The presence of gliding along with the physiological motion of joints in the humeral cap will stimulate the joint receptors of the propyleptors to pass on the impulses to the afferent nerve fibers to be transmitted to the central nervous system thus providing awareness of joint position and motion called proprioceptive feed back.

This will aid the correction of humeral subluxe undergoing subluxation through sensory input relative to the static position and the sense of movement velocity (type I receptor found in the superficial joint capsule), change in movement velocity (type II receptors found in the inner lining of the joint capsule and bearing joint fat) and a sense of direction of movement (type I and III receptors found in the ligaments) so that arthrokinematics and osteokinematics in the shoulder joints are expected to occur, compared with the effect of

end mobilization only arthrokinematic refinement occurs only through oscillations at the end of the scope of motion of the joints (grade IV mobilization).

Gliding humeral cap that is maintained for 10 seconds will provide a boost to the soft tissues around the joint according to the humeral gliding humeral direction. The shortened, adhesive soft tissue becomes stretched and is in a maximum elongated position then the entire sarcoma will extend fully and provide a boost to adjacent connective tissue, as increased tissue tension is expected to be obtained by relaxation of the tissue by the release of opiate endogenous analgesia via descending pain control mechanisms. The opiate endogenous analgesia is obtained by activating the nociceptors A $\delta$  and C that will transmit the impulses to the periaqueductal gray region located in the midbrain and will contribute to stimulate the nucleus in the spinal ponsdanmedulla so that it exits serotonin through the dorso-lateral tract and enkephalin in the interneuron.

This leads to the inhibition of impulse transmission to second-order neurons so that pain is not perceived [11]. With no perceived pain, it will facilitate the patient to move the shoulder joints and facilitate the therapist while doing gliding and passive movement so that there is an increased scope of motion of the shoulder joint.

## **5. Conclusion**

The end-mobilization intervention may have a significant effect on increasing joint motion in non-specific frozen shoulder patients. Mobilization with movement intervention can have a significant effect on the increase of joint motion in non specific frozen shoulder patients. Mobilization with movement intervention is more effective in increasing the scope of joint motion in non-specific frozen shoulder patients compared with end mobilization range, but statistically for the addition of joint motion in the shoulder endorotation movement is the same as showing less significant results

## **Conflict Interest**

The author declared there is no conflict interest.

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