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## CASE STUDY: THE INFLUENCE OF ULTRASOUND AND TENS ON INCREASING THE RANGE OF MOTION OF JOINT IN FROZEN SHOULDER DUE TO ROTATOR CUFF

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### ABSTRACT

*Frozen shoulder* is a disorder of the shoulder joint that causes pain and always causes limitation of joint motion in all directions resulting in physical problems and decreased functional activity. Frozen Shoulder due to rotator cuff is caused by inflammation from prolonged tendinitis, characterized by a marked limitation of the glenohumeral joint range of motion, both active and passive. The prevalence of this disease is about 20% of the general population and 10-20% in people with diabetes (Shichling & Walsh, 2001). And often occurs in people above 40 years of age, especially for women aged 50 years. When trauma occurs, it causes a local inflammatory reaction in the joints and causes adhesions to the joint capsule and cartilage, which is characterized by shoulder pain that occurs gradually, sharper pain, stiffness and limitation of motion. Frozen shoulder can be treated with medication and a physiotherapy program. Physiotherapy programs are useful for reducing pain, both pressure and motion, increasing muscle strength, increasing the range of motion of the joints and restoring functional activities/daily activities. The purpose of this study was to determine the effectiveness of the physiotherapy program with Ultrasound, TENS, and Codman Pendular exercise.

Keywords: *Frozen Shoulder*, ultrasound, TENS, Codman pendular exercise

### ABSTRACT

*Frozen shoulder* is a disorder in the joint of shoulder that cause pain and always lead to limitation of motion of the joints to all direction of the movement that led to the problems of physical and decrease the activity of the functional . Frozen Shoulder due to rotator cuff due to inflammation of tendinitis that prolonged , is marked by the limitations of wide motion of the glenohumeral joint are real , good movement of active and passive . The prevalence of this disease is about 20% of the



general population and 10-20% in people with diabetes (Shichling & Walsh, 2001). And often occurs in people over the age of 40 years , especially women aged 50 years . When it happens the trauma it causes a reaction inflammation locally in the joints and cause adhesions capsule joints and bone cartilage, which is characterized by painful shoulder are raised slowly , the pain is getting sharper , stiffness and limitation of motion . Treatment of frozen shoulder can be done with medications and program of physiotherapy. Physiotherapy program is beneficial for reducing pain both press and motion, increasing the strength of muscle, add to the scope of the motion of the joints and restores the activity of functional / activity daily. The aim of study this is to know the effectiveness of a program of physiotherapy with ultrasound, TENS and Codman pendular exercise.

**Keywords :** *Frozen Shoulder* , Ultrasound, TENS, Codman pendular exercise

## INTRODUCTION

*Frozen shoulder* is a disorder of the shoulder joint that causes pain and limitation of joint motion in all directions of movement resulting in physical problems and decreased functional activity. The prevalence of this disease is about 20% of the general population and 10-20% in people with diabetes (Shichling & Walsh, 2001). Frozen shoulder due to the rotator cuff is pain that results in limited range of motion (LGS) in the shoulder. Occurs due to trauma, develops slowly without signs or history of trauma. Frozen Shoulder due to rotator cuff is caused by inflammation from prolonged tendinitis, characterized by a marked limitation of the glenohumeral joint range of motion, both active and passive. This inflammation causes pain and muscle spasm which causes immobilization of the shoulder causing intra/extra cellular adhesions to the joint capsule. Pain occurs when moving the shoulder and the patient is afraid to move. So that with prolonged immobilization, the muscles strength will decrease (Wijaya, 2015).

Rotator cuff tendinitis occurs due to repeated trauma and pathological changes in the tendons. It was usually occurred due to direct injury to the shoulder or injury caused by excessive work of the rotator cuff muscle. The pathophysiology of frozen shoulder tendinitis rotator cuff occurred with right shoulder pain, limited range of motion of the right shoulder joint, and functional disorders.

Complaints of pain and limited range of motion of the shoulder joint are felt by procurement goods employees who experience interference while working. Meanwhile, activities that are disrupted include not being able to raise the hands up when combing hair and rubbing the back while taking a shower or taking something from behind. Complaints that often occur in motion and function in the shoulder joint are basically pain and stiffness that result in limited movement in the shoulder joint (Morgan & Potthoff, 2012). With a trauma that causes inflammation (pain) and limitation of



movement of the shoulder so that sometimes it cannot be moved at all, it interferes the patient activities, especially when driving, dressing, and sleeping.

Physiotherapy is useful for reducing pain, and increasing joint range of motion and muscle strength using physiotherapy modalities of Ultrasound, TENS, and exercise therapy. And exercise therapy is given to increase the range of joint motion as well as a form of education so that it can be carried out at home to reduce pain and improve the recovery of the limited range of motion.

### METHOD

The research method used in this study was a case study. The case study was conducted on the patient Mrs. NS, 49 years old, profession as part of the procurement of goods, and a Muslim.

#### Case Presentation:

##### *Subjective Examination*

The patient complained of pain and limited range of motion of the right shoulder since 2 months ago after an accident (falling from a motorcycle) where the right shoulder was crushed by her body so that the patients felt pain and was afraid to move it. The right shoulder is getting more sore and painful moving. Along with the prolonged immobilization of the right shoulder resulted in limited range of motion of the joint and the supraspinatus and subscapularis muscles spasm.

The patient's personal history, the patient worked in the procurement department and it was related to taking goods and lifting, mostly using the right hand. And the same pattern of movement is repeated every day.

The goals to be achieved are to reduce the pain felt by the patient, and to increase the range of motion of the joints, muscle strength, and daily functional activities in household and work activities.

##### *Physical Examination*

*Physical* examination included the aspects of vital signs, inspection, and palpation. The results on examining the vital signs included blood pressure, pulse, respiration, temperature, height, and weight, were normal. And the next examination was inspection, palpation, percussion, and auscultation. Inspection was carried out statically and dynamically, where on static inspection found the right shoulder was slightly larger than the left shoulder, there was no sign of redness. And on dynamic inspection, it was occurred painful flexion, extension, and abduction movements. On palpation, it was found spasm and tenderness in the supraspinatus and subscapularis muscles, but



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without warmness. Meanwhile, percussion and auscultation were not performed because of no patient complaints.

The vital signs examination showed normal conditions of blood pressure, pulse rate, respiratory rate, and temperature.



Table 1 Vital Sign Examination

Vital Sign	Values	Description
Blood pressure	120/80 mmHg	Normal
Pulse rate	84 x / min	Normal
Respiration rate	24 x / minute	Normal
Temperature	36.5°C	Normal
Height	160 cm	Normal
Weight	60 kg	Normal

Furthermore, physiotherapy examine the patient's range of motion of shoulder joint. In active movement, the patient can move the shoulder in the direction of flexion, extension, and abduction with limited ROM due to painfulness. In passive movement, shoulder movement can be done towards flexion, extension, and abduction with full ROM and painful, isometric movement against resistance in flexion, extension, and abduction due to pain.

Table 2. Examination of Passive Joint Movement

Movements of Shoulder	Pain	ROM	End Feel
Flexion	+	Full	Firm end feel
Extension	+	Full	Firm end feel
Abduction	+	Full	Firm end feel

On examination of the passive range of motion of the shoulder joint, a firm end feel was obtained. To determine and distinguish between physiological and pathological end-feel, it should be examined slowly and carefully to feel the end of joint motion. And this sensation of firm end occurs in joints that usually have soft or hard end feels as result of increased muscle tone or shortening muscles, capsules, and ligaments.

Table 3. Examination of Joint Movements Active

Movements of Shoulder	Pain	ROM
Flexion	+	Limited
Extension	+	Limited
Abduction	+	Limited

The active movement examination of the shoulder carried out by patient herself showed limited range of motion (ROM) due to the painful sensation during flexion, extension, and abduction movements of the shoulder.



Table 4. Examination of Isometric Joint Movement Against Resistance

Movements of Shoulder	Pain	Contraction
Flexion	+	Not Maximum
Extension	+	Not Maximum
Abduction	+	Not Maximum

In the examination of the range of motion of joint in isometric against resistance. This movement was carried out by the patient and therapist where the therapist providing resistance. The resistance given caused contractions that were not maximal because of the pain.

Furthermore, the physiotherapist performed a specific examination for the diagnosis of frozen shoulder tendinitis rotator cuff by drop arm test, supraspinatus test, and crossover impingement test. These three specific examinations showed positive tests, indicating the presence of pain in the shoulder joint, especially in the supraspinatus and subscapularis muscles.

The drop arm test is a test of the shoulder joint to determine the patient's ability to maintain movement of the humeral joint through eccentric contraction of the arm through full adduction. It can also assess for rotator cuff tears. This test is performed with the patient sitting or standing during the test. The therapist is on the lateral side or behind the arm in full adduction. Then the patient is asked to lower her arm slowly. If the patient's arm drops or falls at 90 degrees, this indicates rotator cuff dysfunction. And if the result is positive if it is found that the patient is unable to carry out controlled movements and feels pain when doing the test.

Supraspinatus test is for supraspinatus impingement or supraspinatus muscle and tendon integrity. This test is performed in a sitting or standing position, where the examiner's hands stabilize the shoulder on the side to be tested. The patient's arm is positioned abducted 90° with rotation and angled forward 30° so that the thumb is facing the floor. The examiner gave more pressure on the site and evaluate the findings. If the patient feels pain or there is weakness of contractions indicating abnormalities in the supraspinatus muscle.

The crossover impingement test is a test used to identify possible subacromial impingement syndrome. Where the examiner places the patient's shoulder in 90 degrees of shoulder flexion with the elbow flexed to 90 degrees and then rotates the arm internally. The test is considered positive if the patient experiences pain with internal rotation.

Examination of pain using Verbal Descriptive Scale (VDS) in the condition of resting, motion, and pressure, measurement of muscle strength with Manual Muscle Test (MMT), and measurement of joint range of motion with a goniometer.

Pain measurement was performed using the Verbal Descriptive Scale (VDS). This instrument



provides an opportunity for patients to express pain and complaints. It provides a description of the classification of pain which consists of a score of 1: no pain, 2: slight pain, 3: mild pain, 4: moderate pain, 5: pain quite severe, 6: severe pain, and 7: almost unbearable pain that have made it impossible to carry out activities. On examination of pain, there are resting pain: 1, motion pain: 6, pressure pain: 4.

Table 5. Pain examination with VDS classification

Criteria	Resting pain	Motion pain	Pressure pain
Score	1/7	6/7	4/7

Examination of muscle strength with MMT consisted of 0-5 scores, 0: no palpable or observable contraction, 1: palpable or observable contraction, 2: moves without gravity loading over the full ROM, 3: moves against gravity less over the full ROM, 4: moves against gravity and moderate resistance over the full ROM, 5: moves against gravity and maximal resistance over the full ROM.

The examination of MMT in the patient affected shoulder showed the score of flexion: 3, extension: 3, abduction: 3.

Table 6. Examination of Muscle Strength with MMT

Shoulder Muscle	Right	Score Left
Flexor	3	5
Extensors	3	5
Abductor	3	5

The joint range of motion was evaluated using a goniometer with passive and active motion. On examination of passive range of motion S: 45°-0-105°, F: 98°-0-45°, R: 43°-0-45° and for active joint range of motion S: 43°-0-95°, F: 85°-0-45°, R: 35°-0-40°.

Table 5. Examination of the Scope of Motion

Movement of shoulder muscle	Passive	Active
S	45°-0-105°	43°-0-95°
F	98°-0-45°	85°-0-45°
R	43°-0-45°	35°-0-40°

Functional Activity Examination was conducted using an index measuring instrument of Shoulder Pain and Disability Index (SPADI). The test was carried out by asking and answering the patient for pain and limitations during activities. Type of pain scale: lying on the affected side, reaching for



something on a high shelf, touching the back of the neck, and pushing with the affected hand. Types of disability scale: washing hair, scrubbing back when bathing, putting on and taking off undershirts or clothes, wearing button-down shirts, wearing pants, picking up objects, and lifting heavy objects. The assessment criteria for the pain scale are 0: no pain, and 10: the worst unbearable pain, while the disability scale is 0: no difficulty and 10: very difficult and needs help.

### Physiotherapy Program Plan

The physiotherapy process is carried out for the patient as long as the patient follows all treatment sessions at the hospital. And the patient came to the physiotherapy poly, the purpose of the intervention was to reduce pain, increase the range of motion of the joints, increase muscle strength and improve the functional ability of daily activities.

The table below described the interventions performed:

Table 8. Physiotherapy Program

Intervention	Dosage	Description	Purpose
Ultrasound Therapy	F: 2 times a week I: 1 MHz Frequency: 0.8 W/cm <sup>2</sup>	Continuous	
	Time: 5 minutes		
TENS	F: 2 times a week Frequency: 200 hz Frequency mode : 20 hz Intensity: patient tolerance Duration : 15 minutes	Continuous	
Codman Pendular exercise	F; 2 times a week Performed 8-16 repetitions For 30 seconds in one direction and repeated for 30 seconds in the opposite direction Performed 3 times a day	Education	Removing tissue adhesions Relaxation of muscles Increases range of motion of joints Reduces pain and swelling in the shoulder Improves shoulder flexibility Ability of the patient's functional activities experiencing increased

## RESULTS AND DISCUSSION





### *The Results of Pain Measurement with VDS*

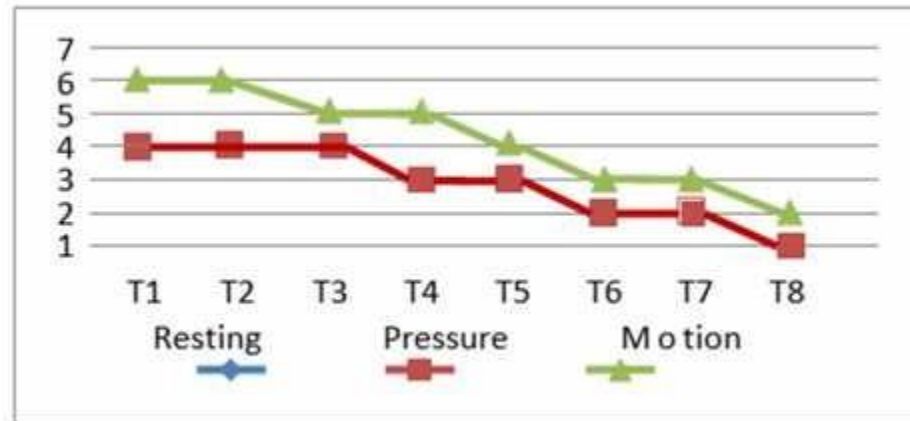


Figure 1. The measurement results of VDS of T1-T8 during therapy T1-T8

VDS pain Inspection obtained the following results:

With the modalities of Ultrasound, TENS, and Exercise Therapy (Codman Pendular exercise) reduced the frequency of pain on T1-T2 with the score of resting pain: 1, motion pain: 6, and pressure pain: 4 in which no change was occurred in motion pain and pressure pain. T3 showed resting pain:

1, motion pain: 5, and pressure pain: 4, and there was a decrease in motion pain at T2-T3. T4 showed resting pain: 1, motion pain: 5, and pressure pain: 3, there was only changes in pressure pain at T3-T4. T5 showed resting pain: 1, motion pain: 4, and pressure pain: 3, and there was a decrease in motion pain at T4-T5. T6 showed resting pain: 1, motion pain: 3, pressure pain: 2, there was a decrease motion pain and pressure at T5-T6. T7 showed resting pain: 1, motion pain: 3, and pressure pain: 2, and there was no change in motion pain and pressure pain at T6-T7. T8 showed resting pain: 1, motion pain: 2, and pressure pain: 1, there was a decrease in motion pain and pressure pain at T7-T8.

Based on the examination of pain with VDS, the results showed that there was still motion pain but there was a decrease in pressure pain.

### *Results of Muscle Strength Measurement*

Measurement of muscle strength was carried out by Manual Muscle Testing (MMT). The results were as follows:

Table 6. Measurement of Muscle Strength T1-T8

Shoulder Muscle Regions	T1	T2	T3	T4	T5	T6	T7	T8
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Flexors	2	2	2+	3	3	3+	4	4+
Extensors	3	3+	4	4	4+	4+	5	5
Abductors	2	2	2+	3	3	3+	4	4+

The results of the measurement of muscle strength on T1-T2 showed a slight increase in shoulder extensor strength. On T2-T3, there was an increase in shoulder extensors and a slight increase in shoulder flexors and abductors. On T3-T4, there was an increase muscle strength in the flexor and abductor shoulder. On T4-T5, there was a slight increase in muscle strength in the extensor shoulder. On T5-T6, there was a slight increase in the strength of the flexor and abductor shoulder muscles. On T6-T7, there was an increase in the strength of the flexor, extensor, and abductor shoulder muscles. On T7-T8, there was a slight increase in the strength of the flexor and abductor shoulder muscles.

On T1-T8, there was an increase in the strength of the flexor, extensor, and abductor shoulder muscles.

### ***Results of Range of Joint Motion Measurement***

The range of motion measurements performed using a goniometer on passive and active motion of the shoulder joint as follows:

Table 7. Range of Joint Motion Measurement T1-T8

Treatment	Passive			Active		
T1	S: 45°-0-105°	F: 98°-0-45°	R: 43°-0-45°	S: 43°-0-95°	F: 85°-0-45°	R: 35°-0-40°
T2	S: 45°-0-110°	F: 100°-0-50°	R: 45°-0-48°	S: 48°-0-97°	F: 87°-0-45°	R: 37°-0-43°
T3	S: 45°-0-115°	F: 105°-0-53°	R: 48°-0-50°	S: 50°-0-100°	F: 90°-0-45°	R: 40°-0-45°
T4	S: 45°-0-119°	F: 110°-0-55°	R: 50°-0-50°	S: 53°-0-103°	F: 94°-0-45°	R: 43°-0-45°
T5	S: 45°-0-123°	F: 113°-0-58°	R: 53°-0-52°	S: 55°-0-105°	F: 97°-0-45°	R: 45°-0-45°
T6	S: 45°-0-125°	F: 115°-0-60°	R: 55°-0-55°	S: 58°-0-108°	F: 100°-0-45°	R: 48°-0-50°
T7	S: 45°-0-130°	F: 118°-0-64°	R: 60°-0-57°	S: 60°-0-110°	F: 113°-0-45°	R: 50°-0-50°
T8	S: 45°-0-135°	F: 120°-0-65°	R: 63°-0-60°	S: 63°-0-113°	F: 115°-0-45°	R: 50°-0-50°

The results of measuring the range of motion of the joints at T1-T8 in passive motion showed an increase in shoulder flexion, abduction, and adduction, and internal and external rotation.

The results of measuring the range of motion of the joints at T1-T5 in active motion showed an increase in shoulder flexion, abduction and adduction, and internal and external rotation. The results of measuring the range of motion of the joints at T6-T8 showed an increase in shoulder



flexion, abduction and adduction motion, and for internal and external rotation showed the same motion (no increase).

There was an increase in the range of motion of the T1-T8 joints passively and actively, although there was little change.

### ***Results of Functional Activity Measurement***

The functional activity measurement was performed using the Shoulder Pain and Disability Index (SPADI).

Table 8. T1-T8 Functional Activity Measurement (Pain Scale)

No	Activity	Value							
		T1	T2	T3	T4	T5	T6	T7	T8
1.	How severe the pain was: At its worst.	6	6	5	5	4	3	3	2
2.	When lying on involved side.	4	4	3	3	2	2	1	1
3.	Reaching for something on a high shelf.	6	5	4	4	3	3	2	2
4.	Touching the back of the neck.	6	6	5	4	4	3	3	2
5.	Pushing with the involved arm.	5	5	4	4	3	2	2	1

The measurement of functional activity on pain scale with the value of 0-10 describes 0: no pain and a value of 10 is the worst pain that cannot be imagined. When the T1 showed moderately severe pain, it was reducing to mild pain until T8. T1 when lying on the involved side showed moderate pain until T8 became mild pain. T1 when reaching for something on a high shelf showed

the slightly severe pain, then, the pain until T8 reduced to mild pain. T1 when touching the back of the neck showed the slightly severe pain, then, the pain until T8 reduced to mild pain. T1 when pushing with the involved arm showed a bit severe pain, then, the pain until T8 reduced to mild pain.

The results of the measurement of functional activity of shoulder muscle at T1-T8 showed a decrease in pain from slightly severe pain to mild pain.

Table 9. T1-T8 Functional Activity Measurement (Disability Scale)

No	Activity	Value							
		T1	T2	T3	T4	T5	T6	T7	T8
1.	How much difficulty was: Washing hair	6	6	5	4	4	3	3	2
2.	Rubbing back	6	6	6	5	5	4	4	3
3.	Putting on an undershirt or pullover shirt	6	6	5	5	4	4	3	3
4.	Putting on a shirt that buttons down the front	6	6	5	5	4	4	3	2
5.	Putting on pants	4	4	3	3	2	2	1	1



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6.	Placing an object on a high shelf	6	6	5	5	4	4	4	3
7.	Carrying a heavy object	7	7	6	6	5	5	5	4

The measurement of functional activity on disability scale with the value of 0-10 describes 0: no difficulty and a value of 10 is very difficult and requires assistance for daily personal activities. The patient's disability scale showed a decreasing score from T1 to T8, indicating the patient became rather can do personal daily activities.

At T1, when the patient washing hair, it was rather heavy, then until T8, it became a little able to do washing hair. At T1, when the patient rubbing her back, it was a bit heavy and had difficulty doing it then until T8, it became a little able to do back rubbing. At T1, when the patient putting on an undershirt or pullover shirt rubbing her back, it had difficulty doing it then until T8, it became a little ease doing it. At T1, when the patient putting on a shirt that buttons down the front, it showed a bit of difficulty in doing so and until T8 the patient was able to wear a shirt a little. At T1, when the patient putting pants, it had moderate difficulty then until T8, the patient was able to put pants. At T1, when the patient placing an object on a high shelf, it had a bit of difficulty, then until T8, the patient was a little able to do so. At T1, when the patient carrying a heavy object, it had difficulty then until T8, the patient was a little able to do so.

The results of measuring T1-T8 activity showed that patients still needed full assistance from others in placing an object on a high shelf and carrying the heavy objects, while the patient still needed a little help from others when washing hair, rubbing back, putting on an undershirt or pullover shirt, Putting on a shirt that buttons down the front.



## ***Discussion***

### **1. Ultrasound**

Ultrasound therapy is a type of thermotherapy (heat therapy) that can reduce acute and chronic pain. This therapy uses an electric current that is passed through a transducer containing quartz crystals that can expand, contract, and produce sound waves that can be transmitted to the skin and into the body. Ultrasound therapy is performed in the frequency range of 0.8 to 3 MHz or 800 to 3,000 kHz. Lower frequencies can lead to deeper penetration of up to 5 cm. The generally used frequency is 1,000 kHz having a heating target at a depth of 3 to 5 cm under the skin. At higher frequencies which is 3,000 kHz, the energy is absorbed at a shallower depth of about 1 to 2 cm. Sound waves can cause the molecules in the tissue to vibrate, giving rise to mechanical energy and heat (Arofah, 2010). Low frequency of 2,000 had the effect of thermal ultrasound (US) and causing pain reduction. The presence of a thermal stimulus fires the large diameter afferent nerve fibers which will provide an analgesic effect through a gate control mechanism/ counter irritation role. It was occurred due to the activation of the substantia gelatinosa. When the substantia gelatinosa is active, the gate was closed so that the pain impulse stops or is not transmitted to the center. In addition to reducing pain through nerve activity, ultrasound thermal stimulus will also activate the release of histamine which causes vasodilation of blood vessels, then increase the circulation so that irritating substances (factor P) will be carried away from the tissue and pain will be reduced. (Low, 2000). Being reduced pain, the muscles can carry out movement and function.

### **2. TENS**

TENS is a way of using electrical energy to design the nervous system through the skin surface with its modulation effect (Slamet, 2006). TENS is a low-stimulation method whose main goal is to reduce pain (symptomatic) which will stimulate sensory nerves. Low-frequency currents tend to be irritating to the skin tissue so it will be painful at high intensity. TENS is able to activate thick-diameter nerves and small-diameter nerves that will convey various sensory information to the central nervous system. The effectiveness of the tension can be explained through the control gate theory with a sinusoidal waveform specification, phase duration of 125 microseconds, and 100-200 Hz based on the actualization of conditions and intensity according to patient tolerance (Parjoto, 2006).

### **3. Exercise Therapy (Codman Pendular Exercise)**

The aim of therapy is to improve joint play in the shoulder joint so that it can improve joint limitations both passively and actively. Manipulation therapy should be terminated when the joint has reached maximal LGS without pain and the patient can perform normal active movements (Kuntono, 2009). Manipulation therapy has been shown to have an effect on overcoming pain and joint limitations (Mudatsir, 2012). This can restore normal joint function, and the patient's functional activity will be increased without pain. After giving manipulation therapy, it can be followed by Codman Pendular Exercise. This technique is done passively by moving the shoulder joint. The mechanism for reducing pain and increasing functional activity of the shoulder with Codman Pendular Exercise is obtained through distraction (gravity) and oscillation, as well as an increase in nutrition on the joint surface, thus facilitating joint mobilization, increasing the extensibility of the glenohumeral joint capsule in patients with frozen shoulder. The force of gravity causes the glenoid head



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and humeral head to stretch so that there is no friction between them. Codman Pendular Exercise can not only be performed in the hospital but it can also be performed at home by educating the patients to improve their functional activities. Codman Pendular Exercise performed to some Frozen shoulder patients showed an increased patient' shoulder joint ROM and ability of functional activity. Both manipulation therapy and



Codman Pendular Exercise can be used for frozen shoulder patients because both methods can reduce adhesion to the glenohumeral joint capsule. If the adhesion to the joint capsule is reduced, the patient's limitation of motion will decrease so that the range of motion of the joint will increase and functional activity will also increase. The Codman Pendular Exercise intervention is effective in helping frozen shoulder patients, because the movements are easy to do and the patient does not feel pain when performing the movements because it uses gravity. The force of gravity causes the glenoid head and humeral head to stretch so that there is no friction between them. Moreover, Codman Pendular Exercise also has the advantage of cost effectiveness due to it can carry out both in the hospital and home as a home program.

## CONCLUSION

Frozen shoulder due to rotator cuff tendinitis is a disorder of the shoulder joint due to repetitive trauma or excessive injury that causes pain and limited joint motion in all directions of movement. With the onset of pain and limitation of joint motion, it causes physical problems and decreased functional activity. Ultrasound, TENS, and Codman Pendular exercise physiotherapy programs are given to reduce pain and increase the range of motion of the joints. Exercise therapy can also perform at home as a form of education. The results of the given physiotherapy showed very useful findings in decreasing pain, and increasing joint ROM, muscle strength, ability of functional activity so that personal daily activities can be carried out independently.



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Saturday/Sunday, 21-22 Agustus 2021

**"Innovation of Physiotherapy Community on Increasing Physical Activity during Pandemic Covid-19"**

Jl. A. Yani, Mendungan, Pabelan, Kec. Kartasura, Kabupaten Sukoharjo, Jawa Tengah 57169

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