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Scapula Mobilization For Improving Functional Ability In Frozen Shoulder Conditions: Case Study

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ABSTRACT

Background: Frozen Shoulder is characterized by progressive pain resulting in stiffness and limited active and passive motion in the shoulder joint. The primary or idiopathic cause of frozen shoulder is not known with certainty, while secondary causes are usually due to trauma, thyroid disease, and rheumatoid arthritis. The intervention provided is in the form of scapula mobilization which can increase the extensibility of the shoulder capsule and stretch tight soft tissues thereby reducing pain and increasing ROM.
Objective: This study aims to determine the effect of scapula mobilization to improve functional ability in frozen shoulder conditions.
Method: This study used the case study method which was conducted on frozen shoulder patients at Condong Catur Hospital Yogyakarta in November 2022. Shoulder Pain and Disability Index (SPADI) to measure functional ability. SPADI is a quality of life questionnaire consisting of 13 items to evaluate 5 items for pain and 8 items for disability.
Results: After 3 times of physiotherapy, the results showed reduced pain, increased muscle strength, increased ROM, and increased functional ability.
Conclusion: Scapula mobilization is effective in reducing pain, increasing muscle strength, and increasing ROM so that there is also an increase in functional ability.

Keywords: *Frozen Shoulder, scapula mobilization, SPADI*

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INTRODUCTION

Adhesive capsulitis was first introduced by Duplay in 1872 as periarthritis and then coined the term Frozen Shoulder by Codman in 1934 (Date & Rahman, 2020). Frozen shoulder is characterized by progressive pain resulting in stiffness and limited active and passive motion in the shoulder joint (Ghorbanpour, 2019). In addition, pain is also felt when sleeping at night (Sarasua et al., 2021). The prevalence of frozen shoulder is estimated to be around 2-5% of the population, more in women than men. Generally in the age range of 40-70 years (Date & Rahman, 2020).

The primary or idiopathic cause of frozen shoulder is not known with certainty. Secondary causes are usually due to trauma, thyroid disease, and rheumatoid arthritis (Sarasua et al., 2021). Frozen shoulder is divided into 3 stages, namely stage 1 (freezing) lasting 3-4 months where its characteristics are characterized by pain and a progressive decrease in joint mobility. Stage 2 (frozen) lasts for 4-12 months where its characteristics are characterized by not causing increased pain, but limited range of joint motion, especially flexion, internal rotation and abduction movements. Stage 3 (thawing) lasts for 12-42 months where its characteristics are characterized by a progressive increase in joint range of motion(Cavalleri et al., 2020).

Frozen shoulder is characterized by thickening of the synovial capsule resulting in loss of active and passive mobility in the glenohumeral joint due to contracture of the

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joint (Pragassame et al., 2019). The pain felt in a frozen shoulder is described as a dull ache. Pain and stiffness can be stimulated by lifting the hand or placing the hand on the back. Limited Range of Motion (ROM) usually occurs in flexion, abduction, internal rotation, and external rotation (Ramirez, 2019).

Limitation of external rotational movement is the earliest sign of frozen shoulder. If the flexion movement is less than 100°, external rotation is less than 10°, and internal rotation is less than the level of the L5 vertebra, it is called global ROM restriction. Apart from that, it is also characterized by limitations in passive rotational external movement on the affected side to less than 50% of a normal shoulder (Pandey & Madi, 2021). Limitations on the Range of Motion (ROM) can result in a decrease in functional abilities such as bathing, dressing, picking up objects, carrying heavy objects, and picking up objects from the back pocket of your pants. Decreased functional ability can disrupt a person quality of life (Santia et al., 2019).

Physiotherapy can play a role in cases of frozen shoulder by providing intervention in the form of scapula mobilization. Scapula mobilization can increase the extensibility of the shoulder capsule and stretch tight soft tissues thereby reducing pain and increasing the Range of Motion (ROM) and function of the shoulder. Scapula mobilization can release the muscles there by increasing the movement of the shoulder. Increasing shoulder movement can also be associated with increasing movement in the scapula (Pragassame et al., 2019).

Based on the prevalence of frozen shoulder cases and also more common in women with an age range of 40-70 years which are generally included in the productive age. So, from the description above the researcher is interested in conducting research on frozen shoulder patients on behalf of Mrs. E is 66 years old and given scapula mobilization intervention.

METHOD

The research method used is a case study which was conducted on patients with frozen shoulder on behalf of Mrs. E at Condong Catur Yogyakarta Hospital in November 2022. The patient is a 66 years old woman who is a housewife. Complaints felt by patients included pain and stiffness in their right shoulder, muscle weakness, and limited Range of Motion (ROM), as well as disruption of daily functional activities involving his shoulder. The intervention program provided is scapula mobilization.

The measurements taken were pain measurements using the Numeric Rating Scale (NRS), consisting of a number between 0-10 where 0 indicates no pain at all and 10 indicates maximum pain (Atisook et al., 2021). The NRS scale is used because the research that has been done has obtained a level of validity and reliability of $\alpha = 0.75$ (Pratitdya et al., 2020). Measurement of muscle strength using Manual Muscle Testing (MMT) with a range of values 0-5, value 0 is no contraction, value 1 is contraction but no movement, value 2 is able to move but cannot yet defy gravity, value 3 is able to move with full Range of Motion (ROM) against gravity but cannot yet fight resistance, value 4 is able to move with full ROM against minimum resistance gravity, and value 5 is able to move with full ROM against maximum resistance gravity. Goniometer to measure Range of Motion (ROM), and Shoulder Pain and Disability Index (SPADI) to measure functional ability. SPADI is a quality of life questionnaire consisting of 13 items to evaluate 5 items of pain and 8 items of disability associated with shoulder dysfunction related to the patient's ability to perform basic activities of daily living. Each item is scored with a score consisting of 0-10 where 0 is no pain and 10 is the worst pain. SPADI has high internal consistency (Cronnbach's alpha = 0.94 for the total score) and good test retest reliability (ICC = 0.89) (Membrilla-Mesa et al., 2015).

RESULTS

Evaluation of pain with Numerical Rating Scale (NRS)

Table 1. Results of pain evaluation

Pain Type	T0	T1	T2	T3
Silent pain	3	3	2	1
Tenderness pain	5	5	4	3
Motion pain	6	6	5	4

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Table 1 shows a decrease in pain from silent pain, tenderness pain, and motion pain after 3 treatments. The results of measurements of silent pain at T0 = 3 becomes T3 = 1. Tenderness pain at T0 = 5 becomes T3 = 3. Motion pain T0 = 6 becomes T3 = 4.

Evaluation muscle strength with Manual Muscle Testing (MMT)

Table 2. Result of muscle strength evaluation

Shoulder Dextra	T0	T1	T2	T3
Flexor	2	2	2	3
Extensor	2	2	2	2
Abductor	2	2	2	3
Adductor	5	5	5	5
Internal rotation	4	4	4	4
External rotation	2	2	2	3
Horizontal abductor	5	5	5	5
Horizontal adductor	5	5	5	5

Table 2 shows an increase in the value of muscle strength in the flexor shoulder dextra, T0 = 2 to T3 = 3 which means that it is able to move with full ROM against gravity but cannot yet resist resistance. Abductor shoulder dextra T0 = 2 becomes T3 = 3 which means it is able to move with full ROM against gravity but cannot yet resist resistance. External rotation T0 = 2 becomes T3 = 3 which means it is able to move with full ROM against gravity but cannot yet fight resistance

Evaluation Range of Motion (ROM) with Goniometer

Table 3. Result of Range of Motion (ROM) evaluation

Shoulder Dextra	ROM	T0	T1	T2	T3	Normal Value
Flexi Extension	Active	S 30°-0°-135°	S 30°-0°-135°	S 30°-0°-135°	S 35°-0°-140°	S 45°-0°-180°
	Passive	S 35°-0°-160°	S 35°-0°-160°	S 35°-0°-160°	S 40°-0°-165°	S 45°-0°-180°
Abduction Adduction	Active	F 100°-0°-75°	F 100°-0°-75°	F 100°-0°-75°	F 105°-0°-75°	F 180°-0°-75°
	Passive	F 120°-0°-75°	F 120°-0°-75°	F 120°-0°-75°	F 125°-0°-75°	F 180°-0°-75°
Internal rotation External rotation	Active	R 70°-0°-60°	R 70°-0°-60°	R 70°-0°-60°	R 75°-0°-65°	R 90°-0°-80°
	Passive	R 80°-0°-70°	R 80°-0°-70°	R 80°-0°-70°	R 85°-0°-75°	R 90°-0°-80°
Horizontal abduction Horizontal adduction	Active	T 90°-0°-40°	T 90°-0°-40°	T 90°-0°-40°	T 90°-0°-40°	T 90°-0°-40°
	Passive	T 90°-0°-40°	T 90°-0°-40°	T 90°-0°-40°	T 90°-0°-40°	T 90°-0°-40°

Table 3 shows an increase in ROM in both active and passive movements. An increase in ROM is associated with a decrease in pain felt by the patient. Pain has quite an effect on ROM because of the discomfort that causes the patient difficulty when the shoulder is moved actively or passively. In active flexion there is an increase in T3 of 5° and 5° of extension while in passive flexion there is an increase in T3 of 5° and 5° of extension. In active abduction there is an increase in T3 of 5° while in passive abduction there is an increase in T3 of 5°. In active internal rotation there is an increase in T3 of 5° and external rotation of 5° while in passive internal rotation there is an increase in T3 of 5° and external rotation of 5°.

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Evaluation of functional ability with Shoulder Pain and Disability Index (SPADI)

Table 4. Result of functional ability evaluation

Activity Type	Difficulty Level (0-10)			
	T0	T1	T2	T3
At its worst?	6	6	6	4
When lying on the involved side?	7	7	7	5
Reaching for something on a high shelf?	7	7	7	5
Touching the back of your neck?	8	8	8	5
Pushing with the involved arm?	7	7	7	5
Total Pain Score	35	35	35	24
Washing your hair?	6	6	6	4
Washing your back?	8	8	8	5
Putting on an undershirt or jumper?	7	7	7	5
Putting on a shirt that buttons down in front?	3	3	3	1
Putting on your pants?	5	5	5	3
Placing an object on a high shelf?	7	7	7	5
Carrying a heavy object of 10 pounds (4,5 kilograms)?	7	7	7	5
Removing something from your back pocket?	8	8	8	6
Total Disability Score	51	51	51	34
Total Score SPADI	86	86	86	58
Score SPADI	67%	67%	67%	45%

Table 4 shows the results of measuring functional ability using SPADI, which decreased after being given 3 times of physiotherapy. The results of the SPADI score measurement T0 = 67% then decreased to T3 = 45%. There is a significant decrease in the measurement of functional ability using SPADI, which means that the patient's functional ability is increasing.

DISCUSSION

Less significant reduction in pain due to scapula mobilization which was carried out only 3 sessions. Based on previous research, 10 sessions were carried out so as to provide optimal results (Pragassame et al., 2019). Due to the short time constraints the researcher only conducted 3 sessions. The reduction in pain which was less significant was also seen from the patient's daily activities, as a housewife. Monotonous and repetitive activities using the arms, such as sweeping, cooking, ironing or washing clothes. In addition to environmental activities that are less ergonomic, they also affect things, such as ironing boards, places for drying clothes, and racks that are too high.

Scapula mobilization has neurophysiological effects based on peripheral mechanoreceptor stimulation and nociceptor inhibition (Pragassame et al., 2019). Scapula mobilization aims to release tissue adhesions which can cause relaxation of the shoulder muscles so as to reduce pain and increase the Range of Motion (ROM) (Duzgun et al., 2019).

An increase in muscle work due to being given resistance in movement will trigger an increase in muscle fiber work. This is done continuously, routinely, and programmed to increase muscle mass and strength. Of course, considering the principles of progressiveness and specificity that are designed according to individual conditions (Setiawan & Pristianto, 2021). Providing scapula mobilization can increase muscle strength and also stabilize a group of muscle tissue and joints in the shoulder. Besides that, it can also maintain and train shoulder muscles such as the upper trapezius, levator scapula, supraspinatus, and serratus anterior (Kisner & Colby, 2012).

Decreased Range of Motion (ROM) in the shoulder is caused by inflammation of the joint capsule and soft tissue around the shoulder so that when the muscles contract, it can cause pain to stiffness or stiffness. This will reduce shoulder ROM (Rangan et al., 2020). Previous research revealed that there was a significant increase in ROM in flexion, abduction, external rotation, and internal rotation where patients were given scapula mobilization through relaxation of the soft tissues so as to increase the flexibility of the shoulder joint capsule (Duzgun et al., 2019).

Based on the measurement of functional ability using SPADI, there is an

increase in daily functional activities. SPADI measurements are carried out to evaluate activities related to daily life such as dressing, hair care, rubbing the back when bathing, and doing other work on the sore side (Fernandes, 2015). Frozen shoulder is considered a mild condition and can heal on its own, while patients experience pain that affects their daily activities (Kraal et al., 2019). Based on the table above, there was a decrease in pain so that there was an increase in functional ability after being given 3 sessions.

CONCLUSION

Based on case studies that have been carried out 3 sessions in November 2022 for patients on behalf of Mrs. E is 66 years old with a diagnosis of Frozen Shoulder dextra. Complaints felt by patients are pain, decreased muscle strength, limitation of ROM, and decreased functional ability given interventions in the form of scapula mobilization. After being given physiotherapy intervention in the form of scapula mobilization for 3 sessions, it was found that there was reducing pain, increasing muscle strength, and increasing ROM so that there is also an increase in functional ability.

Suggestions in this study are that patients are expected when carrying out monotonous and repetitive activities according to their abilities and pay attention to ergonomics in every activity carried out. Physiotherapists can perform these interventions and can combine them according to the patient condition.

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