

# Scapula manipulation on frozen shoulder condition: a case study

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## ABSTRACT

**Background:** Frozen shoulder or adhesive capsulitis is a stiffness in the shoulder joint, namely the thickening of the shoulder joint capsule tissue, resulting in pain and limited shoulder joint movement. In Indonesia, 2-11% of frozen shoulder sufferers have diabetes. Complaints in the shoulder also often accompany human movement activities due to gaps in body functions, including a frozen shoulder.

**Case description:** This was a case study of a patient aged 56 years with a diagnosis of frozen shoulder; this case was taken at Dr. Harjono Ponorogo Hospital, held from March 3, 2023, to March 23, 2023. The physiotherapy problems encountered in this case included pain, limited joint motion, weakness in muscle strength, and limited functional activity.

**Conclusion:** At three meetings, the patient was given intervention in the form of scapular mobilization, which decreased pain and increased the range of motion on the shoulder. A decrease in limitations can also be seen from the measurements used by the shoulder pain and disability index (SPADI), but in the SPADI assessment, there were no significant changes.

**Keywords:** exercise therapy, frozen shoulder, manual therapy, pain, scapula manipulation.

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## INTRODUCTION

Frozen shoulder, also known as adhesive capsulitis, is a condition of uncertain etiology characterized by limited shoulder joint motion.<sup>1</sup> Passive and active movements occur without any definite cause of the frozen shoulder.<sup>2</sup> The population prevalence of frozen shoulder in Indonesia is around 2%, with 11% in people with diabetes. Frozen shoulder can occur in both shoulders simultaneously or alternately in as many as 16%. 14% of patients experience contralateral frozen shoulder when the shoulder on the other side shares the same thing. Women aged 40-60 experience this disorder more often than men, with an incidence rate of 60 from 2-5% of the population.<sup>3</sup>

The causes of frozen shoulder are still not known with certainty. However, many studies explain that a frozen shoulder is caused by inflammation, thickening of the joint capsule, and shrinkage of the synovial fluid in the joint capsule (adhesive capsular) surrounding the shoulder joint.<sup>4</sup> Shoulder pain can also be caused by overuse, which causes the supraspinatus tendon in the shoulder region to become inflamed or torn or the joint surfaces of the

acromioclavicular joint, sternoclavicular joint, and glenohumeral joint to become damaged due to degenerative processes, excessive movement due to the capsule, and so on.<sup>5</sup>

Complaints about the shoulder also often accompany human movement activities due to gaps in body functions, including a frozen shoulder.<sup>6</sup> Frozen shoulder condition is an idiopathic condition characterized by the onset of pain and limitations in the shoulder joint. Patients with frozen shoulders usually experience shoulder joint stiffness, which feels painful at night, and almost experience severe limitation of motion in the active external movement of the shoulder joint.<sup>7</sup> It has been demonstrated that manipulations, soft tissue mobilizations, and electrotherapy are beneficial in reducing pain, enhancing shoulder range of motion, and lowering the functional impairment of the shoulder.<sup>8</sup> Joint mobilization is a procedure to relieve pain and increase the joint range of motion (ROM).<sup>9</sup>

Scapular mobilization is an intervention technique used to manage shoulder musculoskeletal disorders. Manual application with therapist-controlled

mobilization of all four directions of the scapula glides to the scapula thoracic joint. Scapular mobilization is aimed at joint mobilization or distraction, thereby providing scapula thoracic distance, and the muscles will be stretched by controlling movement from the position of the scapula, which can help the glenoid in a normal position.<sup>10</sup>

The role of physiotherapy is very important in the rehabilitation of frozen shoulder cases. Physiotherapy can help restore functional movement of the shoulder due to a frozen shoulder, and it also helps reduce pain so that you can return to your activities independently.<sup>11</sup> In this case, frozen shoulder intervention was given in the form of manipulation of the scapula, which in this study explained the effectiveness of mobilizing the scapula in a frozen shoulder, effectively helping increase ROM and helping reduce functional disability in the shoulder joint.

## CASE REPORT

The patient, Mrs. S, 56, is an old female diagnosed with a frozen shoulder. The patient feels pain and limited movement of the right shoulder joint, so the patient has

difficulty carrying out daily activities such as wearing clothes, taking taller items, and doing other household chores. At each meeting, the patient received intervention in the form of short wave diathermy for 10 minutes, TENS for 15 minutes, mobilization of the scapula, strengthening of the deltoid muscles, ROM exercise, and stretching of the shoulder joint was carried out for ten repetitions of 2 sets and held for 8 seconds. The patient's vital signs are stable, and she has no history of comorbidities.

**METHODS**

This study used the case study method conducted in patients with frozen shoulder dextra in March 2023. In March, this case was taken at Dr. Harjono Ponorogo hospital and underwent physiotherapy for three meetings. The measurement tool used by researchers is the Numeric Rating Scale (NRS) to evaluate the level of pain felt by patients with a scale of 1-10 (interpretation 0: no pain, 1-3: mild pain, 4-6: moderate pain, 7-10: pain great). Manual Muscle Testing (MMT) to evaluate muscle strength in the shoulder joint. ROM to evaluate the range of motion of the shoulder joint. To evaluate the functional ability of the shoulder joint, the Shoulder Pain Disability Index (SPADI) measurement is used.

This study was qualitative information about perceived pain, muscle strength, range of motion, and functional ability in frozen shoulder cases. An observational data collection approach was used throughout therapy. Intervention observations will be checked through each therapy session and interviews with respondents to determine their effectiveness.

**Intervention**

Scapular mobilization is performed with the patient lying on his side with the arm flexed 90°. The physiotherapist holds the scapula from its medial border and applies medial-lateral, supero-inferior, and circumduction movements ten times each. 30-second rest is given each training session. Then, a second manual therapy was performed, such as Posterior capsule stretching with the patient lying in the lateral position. The scapula is stabilized

laterally with the arm flexed 90°. The stretch is performed from the elbow with a downward force. The stretch is repeated ten times for 20 seconds each. 30-second rest given each stretch.

**Evaluation**

At the first meeting, the results of measurements using the numeric rating scale shown in Figure 1 gave a score of 3 for pain at rest in the category of mild pain. For tenderness, the value was five, which means the patient felt moderate pain. For movement pain, the patient scored 6, which means the patient felt moderate pain and Diarrhea in the area of the right shoulder joint, especially when the patient raised his hand. After three meetings with researchers, the patient said the pain had begun to decrease. The patient feels pain when stationary, with a

score of 2 indicating mild pain, tenderness being 3, and motion pain being 4, meaning the patient feels mild pain.

Evaluation of muscle strength using MMT is shown in Table 1. At the first meeting, the researchers gave a score of 2 for the muscles of flexion, extension, abduction, adduction, exportation, and end rotation of the right shoulder, where it was interpreted that the patient was able to move the joint but not yet full ROM. However, muscle strength was not increased in all areas of the right shoulder joint at the second meeting. At the third meeting, there was an increase in muscle strength. The researcher gave a value of 2 to a value of 3, meaning the patient can fight gravity.

The patient's condition can move his shoulder passively and actively. However, they still experience limited movement

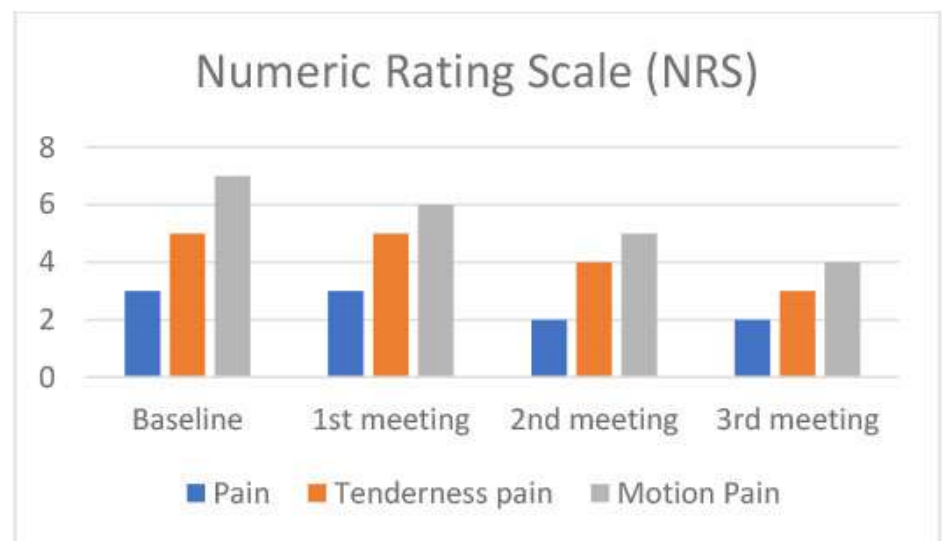


Figure 1. Numeric rating scale.

Table 1. Manual Muscle Testing

Movement	Baseline Right	1 <sup>st</sup> meeting Right	2 <sup>nd</sup> meeting Right	3 <sup>rd</sup> meeting Right
Flexion	2	2	2	3
Extension	2	2	2	3
Abduction	2	2	2	3
Adduction	2	2	2	3
Internal Rotation	2	2	2	3
External Rotation	2	2	2	3

Table 2. Range of Motion

Regio	Baseline	1 <sup>st</sup> meeting	2 <sup>nd</sup> meeting	3 <sup>rd</sup> meeting
Shoulder dextra	S: 0°-0°-90°	S: 5°-0°-95°	S: 8°-0°-96°	S: 8°-0°-96°
	F: 90°-0°-0°	F: 95°-0°-0°	F: 96°-0°-0°	F: 96°-0°-0°
	R: 30°-0°-15°	R: 30°-0°-15°	R: 30°-0°-15°	R: 30°-0°-15°

**Table 3. Shoulder pain and disability index**

1. Pain Scale	Baseline	1 <sup>st</sup> meeting	2 <sup>nd</sup> meeting	3 <sup>rd</sup> meeting
At its worst?	8	7	6	4
When lying on the involved side?	7	5	4	3
Are you reaching for something on a high shelf?	7	6	5	4
Are you touching the back of your neck?	7	6	4	4
Are you pushing with the involved arm?	6	5	4	4
Note :				
0 = No pain				
10 = The worst pain imaginable				
2. Disability Scale	Baseline	1 <sup>st</sup> meeting	2 <sup>nd</sup> meeting	3 <sup>rd</sup> meeting
Are you washing your hair?	6	5	4	3
Are you washing your back?	7	7	6	5
Are you placing an object on a high shelf?	5	4	3	3
Are you putting on an undershirt or pullover sweater?	6	5	4	4
Putting on a shirt that buttons down the front?	5	4	3	3
Are you putting on your pants?	4	4	3	3
Are you carrying a heavy object of 10 pounds?	7	7	6	5
Are you removing something from your back pocket?	3	2	1	1
Note :				
0 = no difficulty				
10 = so difficult it requires help				

and pain when moved. Researchers measured the joint's range of motion using a goniometer to determine how much movement occurs in the shoulder joint, as shown in Table 2. At the first meeting, the movement of the dextra sagittal region of the shoulder is S: 5°-0°-95° limited to flexion and extension movements, in the frontal plane movements, namely F: 95°-0°-0° limited to abduction and adduction movements, in rotational plane movements R: 30°- 0°-15° limited to external and internal rotation movements. At the third meeting, there was an increase in the range of motion in the movement of the shoulder joint, such as the sagittal S: 8°-0°-96°, frontal F: 96°-0°-0° and rotation R: 30°-0°-15°.

Researchers used functional measurements with the SPADI in frozen shoulder cases to determine the level of independence of functional activities in these patients. Interpreting the score from SPADI with a value of 0 means no difficulty, and a value of 10 means it is very difficult and requires assistance. At the third meeting, the overall score from SPADI showed a pain score of 30%, previously a baseline score of 70%, a disability score of 33.7%, previously a baseline score of 53.7%, a total SPADI score of 35.3%, previously at a baseline score of 60 % shown in Table 3.

## DISCUSSION

The therapy administration provides therapeutic effects such as reducing pain, stretching muscle adhesions, increasing the range of motion of the joints, and increasing the ability to perform daily functional activities.<sup>12</sup> The theoretical study explains that scapular manipulation is intended for joint mobilization or distraction to provide scapulothoracic distance, and the muscles will be stretched. They are controlling movement from the position of the scapula, which can help the glenoid in a normal position. So that the movement will be more mobile and increase function in the shoulder, such as lifting things, throwing, placing objects from a low position to a higher position, and back rubbing activities.<sup>13</sup>

Manual therapy is a therapeutic technique using hands with a special technique. This therapy is not limited to joint mobilization techniques or manipulation. Physiotherapists use specific techniques with exercise to diagnose and treat soft tissue to increase joint range of motion, reduce pain, reduce and minimize soft tissue inflammation; provide relaxation; improve contractile and non-contractile tissue recovery, increase extensibility, increase stability; facilitate movement and improve bodily functions.<sup>14</sup>

This scapular manipulation aims to release tissue adhesions and relax the muscles around the shoulder to improve movement in the shoulder. The soothing effect caused will increase circulation so that metabolism increases, irritation decreases and can cause a decrease in pain and increase the range of motion of the joints. Stretching at a low intensity will make the patient feel more comfortable and relaxed. Consistent administration of scapula manipulation can also help reduce contractility in the muscles of the shoulder region. Scapular mobilization intervention causes relaxation of the antagonist muscles and stability of the agonist muscles being trained.<sup>15</sup>

When administration is repeated with or without elastic rubber in concentric or eccentric contractions, this exercise stimulates rhythmic muscle contractions to form dynamic stability in the muscles given training. Stretching that occurs will stimulate the Golgi tendon organ (GTO) so that relaxation reflexes occur. Intermittent contraction and stretching will improve capillary microcirculation and joint fluid by pumping action, thereby reducing irritation to afferent nerves, which cause reflexes to balance muscle tone. The balance of this muscle tone will correct the scapular position when stationary and when moving silently so

that a proportional scapular humeral rhythm is formed and avoids movements that can cause repeated injuries.<sup>16</sup>

Scapular mobilization was relatively better than conventional treatment in pain relief, increased shoulder abduction, and external rotation ROM. Since scapular mobilization produces a tissue stretching effect and leads to the repair of connective tissue, extracellular matrix, and collagen tissue, tissue remodeling can increase tensile loads.<sup>17</sup>

The decline did not decrease significantly at each session, as seen from the graph above. Changes in pain were reduced at the third meeting after routine therapy by providing modalities and reducing activities that could exacerbate the current condition. The therapy administration provides therapeutic effects such as maintaining and increasing the range of motion of the joints, increasing muscle strength, reducing pain, and optimizing functional abilities. Pain is a protective mechanism to create awareness that tissue damage is occurring or will occur. Because of their value for survival, nociceptors (pain receptors) do not adapt to repeated or prolonged stimulation.<sup>18</sup>

Muscle strength can be increased by employing strengthening exercise therapy, namely contracting the muscles that have decreased mass. Muscle contractions can occur because of the role of the skeletal muscle fiber membrane, which generates and spreads action potentials and connects them to the end to release intracellular calcium stores that trigger mechanical contractions.<sup>19</sup> The shoulder joint pain and limitation index is a questionnaire of two dimensions: pain and functional activity. The pain dimension consists of 5 questions regarding the pain level in someone who has a frozen shoulder, and functional activities consist of eight questions designed to measure the difficulty level of someone with a frozen shoulder doing their daily activities.<sup>20</sup>

Joint mobilization is one of the most effective interventions for treating a frozen shoulder. So many studies attach great importance to the mobilization of the glenohumeral joint. However, there is little literature supporting scapular mobilization interventions. Scapular mobilization can stretch the shoulder joint

muscles, increasing scapular movement, reducing pain, and improving shoulder ROM and function.<sup>21</sup>

Some limitations to this study must be noted. For starters, because this was a case study, it cannot be applied to all individuals with frozen shoulders. Second, due to the short duration of the trial and the inability to assess the long-term effects of the therapy, this study was conducted in three appointments over three weeks.

## CONCLUSION

After going through three meetings with researchers on a patient with the initials Mrs. S, 56 years old, with frozen shoulder disease, the patient feels pain, limited movement, and decreased muscle strength. Hence, the patient has difficulty carrying out daily activities. At each session, the patient received the scapula mobilization intervention. The shoulder pain and disability index was included in the category of moderate limitations, and it was seen that the question items had decreased, but the decrease was not significant. To reach something on a high shelf and touch the back of the patient's neck is still difficult.

## CONFLICT OF INTEREST

All authors declare that they have no conflicts of interest.

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## AUTHOR CONTRIBUTIONS

AA, SSP, and KN conceived the study design, collected the data, performed data analysis, and interpreted the results; AA, SSP, and KN prepared the manuscript, reviewed the results, and approved the final version.

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