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Original Research

Manipulative Therapy Following Standard Therapy Improves Shoulder Joint Function in Patients with Frozen Shoulder

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ABSTRACT

Background: *Frozen shoulder is a common disorder encountered by physiotherapists, causing limited movement and pain in the shoulder joint. Many complaints experienced by patients require effective therapeutic modalities to improve joint functional ability. This study aimed to determine the effect of manipulation therapy after standard therapy on improving shoulder joint functional ability in frozen shoulder patients at Telogorejo Hospital, Semarang.*

Methods: *This study used an experimental design with a one-group pre-test and post-test design with control, involving two groups of frozen shoulder patients. Sampling was conducted randomly with a total of 30 patients. Both groups received standard therapy in the form of TENS and ultrasound, while the treatment group received additional manipulation therapy. The measurement instrument used was the Shoulder Pain and Disability Index (SPADI) to assess pain and functional ability, which was analyzed using the Wilcoxon test.*

Results: *The analysis showed a significant decrease in SPADI scores in the treatment group (pre-test value 62.6±6.17 decreased to post-test 44.07±5.8, $p<0.05$) compared to the control group (pre-test 64.4±7.58 to post-test 53.5±6.3, $p<0.05$). This indicates a greater improvement in functional ability and pain reduction in the treatment group.*

Conclusion: *Manipulative therapy after standard therapy effectively improves function and reduces pain in patients with frozen shoulders. It is recommended that manipulative therapy be included in the rehabilitation protocol for frozen shoulder patients to achieve optimal therapeutic results.*

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INTRODUCTION

Cases of frozen shoulder have recently been frequently encountered by physical therapists in various hospitals and clinics. Pain and limited movement due to frozen shoulder significantly impact patients' quality of life. Data from the 2018 Indonesian Basic Health Research shows that the prevalence of joint disorders in Indonesia reaches 7.3%, with a higher prevalence of shoulder joint disorders in women (8.5%) than in men

(6.1%). The large number of cases has driven the need for effective therapeutic modalities to address frozen shoulder complaints (Suprawesta, 2015; Wardani, 2021).

Frozen shoulder is characterized by inflammation, stiffness, and pain in the shoulder joint due to progressive glenohumeral capsule contracture. This condition causes loss of active and passive shoulder movement, accompanied by pain and muscle weakness. The main risk factors are age above 40 years and a predominance in women of around 70%. This condition is also a fairly serious musculoskeletal disorder with a prevalence of 2-5% in the general population, affecting mobility and quality of life (Kraal, 2021; Wardani, 2021).

The diagnosis of frozen shoulder is established through examination of active and passive movement function, characterized by limited scapulohumeral movement and the presence of a characteristic capsular pattern. Further examinations include joint play movement, shoulder muscle palpation, and contact relax stretch test to identify spasms and movement limitations after muscle contraction. Accurate diagnosis is important to determine the optimal physiotherapy intervention (Branddom, 2011).

Physical therapy is the primary treatment option for managing frozen shoulder, utilizing various modalities such as heat, electrical stimulation, and exercises. Standard hospital therapy, such as that used at Telogorejo Hospital, employs a combination of TENS and ultrasound to reduce pain and improve shoulder joint function. TENS works by electrical stimulation that produces a physiological response in the tissue, while ultrasound provides a thermal effect that accelerates tissue healing and reduces inflammation (Lin et al., 2019; Mezian et al., 2022).

The effectiveness of manipulation therapy as an adjunct in the treatment of frozen shoulder requires further research (Wardani, 2021; Kraal, 2021). Currently, there is no global consensus on the optimal standard of manipulation therapy for frozen shoulder. Therefore, this study aims to examine the effect of manipulation therapy after standard therapy on improving shoulder joint function in frozen shoulder patients at Telogorejo Hospital in Semarang as an effort to explore more effective treatment alternatives.

MATERIALS AND METHOD

This study used an experimental design with a one-group pre-test and post-test design with control. This design was chosen because it can measure changes in pain and functional ability of frozen shoulder patients before and after manipulation therapy and standard therapy in two different groups. The selection of this design also aims to compare the effectiveness of manipulation therapy as an additional treatment to standard therapy that is commonly applied in hospitals.

The study was conducted at the Rehabilitation Unit of Telogorejo Hospital in Semarang during the period from December 2022 to January 2023. This location was chosen because of its complete rehabilitation support facilities and a representative population of outpatients with a diagnosis of frozen shoulder for the purposes of this study. This location also supported the implementation of therapy protocols and supervision of patients during the study.

The study population consisted of outpatients diagnosed with frozen shoulders at Telogorejo Hospital who met the inclusion criteria. The sampling technique used random sampling with a total of 30 patients divided into two groups: 15 patients as the treatment group who received manipulation therapy in addition to standard therapy, and 15 patients as the control group who only received standard therapy. Inclusion criteria included patients aged 26-55 years with capsular stiffness, able to follow instructions, and willing

to sign informed consent. Exclusion criteria were patients with cognitive impairment, a history of shoulder surgery, open wounds, and neoplastic pathology in the shoulder area.

The research instrument used the Shoulder Pain and Disability Index (SPADI), which quantitatively measures the intensity of pain and functional ability of patients. SPADI has high validity with Cronbach's alpha coefficient above 0.85 and excellent test-retest reliability, so the data obtained is reliable and consistent. Measurements were taken before therapy (pre-test) and after therapy (post-test) 12 times over a period of 6 weeks.

The data collection procedure began with obtaining research permission and providing information to patients. After patients met the criteria, they were divided into groups and informed about the procedure, benefits, and risks of therapy. Measurement data were collected by filling out the SPADI questionnaire directly before and after therapy. The entire process of implementing therapy and collecting data was supervised by researchers and rehabilitation officers.

Data analysis used the Shapiro-Wilk test for normality and Levene's test for homogeneity. The paired t-test or Wilcoxon test was used to compare pre- and post-therapy results within a group. The independent t-test or Mann-Whitney test was used to compare differences between groups. This study applied ethical principles, and all patients signed informed consent forms as a form of agreement to participate in the study.

RESULTS

Table 1. Characteristics of Research Subjects Based on Gender (n =34)

Gender	Group I (Manipulative Therapy + Standard) n (%)	Group II (Standard Therapy) n (%)	Total n (%)
Male	7 (41.2)	7 (41.2)	14 (41.2)
Female	10 (58.8)	10 (58.8)	20 (58.8)
Total	**17 (100)**	**17 (100)**	**34 (100)**

Table 1 shows that most subjects were female, with a percentage of 58.8%, while males accounted for 41.2%.

Table 2. Characteristics of Research Subjects Based on Age (n = 34)

Group	n	Minimum Age (years)	Maximum Age (years)	Mean ± SD (years)
I (Manipulative Therapy + Standard)	17	31	55	47.41 ± 6.12
II (Standard Therapy)	17	30	55	44.82 ± 5.76

Table 2 shows that the average age of respondents in group I was 47.41 ± 6.12 years and in group II was 44.82 ± 5.76 years.

Table 3. SPADI Scores Before and After Treatment (n = 34)

Group	n	Minimum Score (%)	Maximum Value (%)	Mean ± SD (%)
Before Treatment				
I (Manipulative Therapy + Standard)	17	55.38	75.38	62.60 ± 6.17
II (Standard Therapy)	17	53.08	77.69	64.40 ± 7.58
After Treatment				
I (Manipulative Therapy + Standard)	17	36.15	56.15	44.07 ± 5.80
II (Standard Therapy)	17	43.08	63.85	53.50 ± 6.30

Table 3 shows that before therapy, the average SPADI score in group I was 62.60 ± 6.17% and in group II was 64.40 ± 7.58%. These values indicate that both groups had almost the same level of functional shoulder disability before treatment. After six weeks of intervention, Group I experienced a decrease in SPADI scores to 44.07 ± 5.80%, while Group II decreased to 53.50 ± 6.30%.

Table 4. Results of Pre-Test and Post-Test Statistical Tests for Each Group

Group	Mean Pre-Test ± SD	Mean Post-Test ± SD	Score p-value	Description
I (Manipulative Therapy + Standard)	62.60 ± 6.17	44.07 ± 5.80	<0.001	There is a significant difference
II (Standard Therapy)	64.40 ± 7.58	53.50 ± 6.30	<0.001	There is a significant difference

Table 4 shows the results of the Wilcoxon test, indicating a p-value < 0.05 in both groups, suggesting that both manipulation therapy and standard therapy significantly reduced SPADI scores. However, the greater reduction in Group I indicates the additional effectiveness of manipulation therapy in improving shoulder joint function.

Table 5. Comparison of Post-Test Results Between the Treatment and Control Groups

Variable	Group I (Mean ± SD)	Group II (Mean ± SD)	p-value	Description
SPADI (%)	44.07 ± 5.80	53.50 ± 6.30	0.00	There is a significant difference between groups

Table 5. The *independent t-test* shows a significant difference in SPADI scores between the treatment and control groups ($p < 0.05$). These results indicate that manipulation therapy combined with standard therapy is more effective in improving

shoulder functional ability than standard therapy alone. These findings reinforce the results of Cavalleri (2020) and Lad & Anandh (2017), who reported that shoulder manipulation techniques can significantly improve mobility and reduce pain.

DISCUSSION

This study shows that manipulation therapy after standard therapy can significantly improve the functional ability of patients with frozen shoulders. The treatment group experienced a greater reduction in SPADI scores compared to the control group. This indicates that manipulation therapy is effective in reducing pain and improving shoulder joint function. These findings are consistent with the principle that manual therapy can improve mobility and reduce pain due to mechanoreceptor stimulation and reduced inflammation in the joint capsule (Primary Data, 2023).

These results are in line with previous studies stating that manual therapy such as shoulder and scapula mobilization and therapeutic exercises are effective methods for treating frozen shoulder. A meta-analysis study by Cavalleri (2020) states that manual therapy has been proven to optimize joint mobility and function and reduce patient pain. Research by Mj et al. (2014) also shows that a combination of manual therapy and exercise can significantly reduce pain and increase range of motion. Therefore, physiotherapy practices involving these techniques are highly recommended.

The clinical implication of this study is that manipulation therapy can improve the rehabilitation outcomes of frozen shoulder patients, especially in the early adult phase. This therapy helps patients overcome movement limitations more quickly, thereby accelerating functional independence. Because manipulation therapy requires special expertise, patients must receive services from professional physiotherapists equipped with adequate infrastructure to ensure the safety and effectiveness of the therapy.

The limitations of this study include the relatively small number of subjects and the dominance of a particular gender, which may affect the generalization of the results. The limited study time resulted in adjusted exercise doses that may not have been optimal. In addition, external variables such as patients' daily activities and motivation in carrying out therapy could not be controlled optimally. This is an important note for further research to improve the validity and reliability of the results.

Based on these results and discussions, it is recommended that manipulation therapy be a routine part of the frozen shoulder management protocol in physical therapy clinics. Training for physical therapists on proper manipulation techniques needs to be strengthened. Future research can extend the duration of therapy, add exercise variations, and increase the sample size to strengthen the scientific evidence and improve the generality of the research results.

Overall, this study shows that manipulation therapy after standard therapy provides significant improvement in joint function and pain reduction in frozen shoulder patients. This therapy is an effective option to include musculoskeletal rehabilitation to accelerate recovery and improve patients' quality of life.

CONCLUSION

This study concluded that administering manipulation therapy after standard therapy in patients aged 26-55 years with frozen shoulders for 6 weeks with 12 sessions of showed better effectiveness in improving functional ability compared to standard therapy alone. Manipulation therapy was proven to help reduce frozen shoulder complaints significantly, thereby having a positive impact on shoulder joint function

recovery. Based on these results, it is recommended to integrate manipulative therapy into the frozen shoulder rehabilitation protocol to achieve optimal therapeutic outcomes.

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