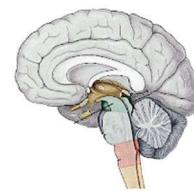


Contents lists available online at:

Jurnal Kesehatan MesencephalonJournal homepage:
<https://ejournal.stikeskepanjen-pemkabmalang.ac.id/index.php/mesencephalon>**The Effect Of Combined Ultrasound And Shoulder Manipulation Therapy On The Degree Of Joint Scope Of Motion In *Frozen Shoulder* Patients At Lavalette Hospital Malang****Elisabet Arni¹, Achmad Fariz², Nurul Halimah³, Angria Pradita⁴**^{1,2,3,4} Faculty Of Health Sciences, Institute Of Technology, Science and Health RS Dr. Soepraoen Kesdam V/Brawijaya Malang, Indonesia
E-mail: echakmampung@gmail.com¹**ARTICLE INFO****Keywords:***Frozen shoulder*, LGS, Ultrasound, Manipulation Therapy**Correspondence:**E-mail:
echakmampung@gmail.com**ABSTRACT**

Frozen shoulder is a condition in which the connective tissue around the shoulder thickens and tightens leading to loss of mobility. This condition causes a person to have difficulty moving his arms because they are stiff. The main characteristics of frozen shoulder are gradual stiffness in the shoulder joint, severe pain especially at night and limitation of motion in both active and passive capsular patterns. The aim was to determine the effect of a combination of ultrasound and shoulder manipulation therapy on the degree of scope of motion of the shoulder joint in Frozen shoulder patients at Lavalette Hospital Malang. This study used quantitative with a quasi-experimental research design one-group pretest-posttest design. The sample of this study was 17 Frozen shoulder patients at Lavalette Hospital Malang. Test statistical analysis with shapiro-wilk to describe normal p values and then test the hypothesis using t-paired tests with normal distributed data. The results showed the effect of a combination of ultrasound and shoulder manipulation therapy on the degree of scope of motion of the joints of Frozen shoulder patients at Lavalette Hospital Malang, the significant value of the normally distributed wilcoxon test $p = 0.00 < 0.05$. The results and discussion of this study can be concluded: 1. There is an effect of a combination of ultrasound and shoulder manipulation therapy on the degree of joint scope of motion in Frozen shoulder patients at Lavalette Hospital Malang 2. There are differences in LGS values of pre-intervention shoulders and post-intervention where the mean (maximum-minimum) pre-intervention values in rotational external motion are 56.88 (45-70) and post-intervention 64.00 (48-73), mean (minimum-maximum) values of preintervention abduction motion are 156.00 (145-170) and post-intervention 170.00 (170-158-170), mean values (maximum-minimum) external motion of pre-intervention rotation 60.00 (45-75) and post-intervention 73.00 (63-79).

INTRODUCTION

Frozen shoulder is a condition where the connective tissue around the shoulder thickens and tightens which causes loss of mobility (Sudaryanto and Nashrah, 2020). This condition has a severity that varies from mild pain to severe pain and limitation of motion in the glenohumeral joint (Knopf, 2017). The main characteristics of frozen shoulder are gradual stiffness in the shoulder joint, severe pain especially at night and limitation of motion in capsular patterns both active and passive (Jehaman et al., 2021). The prevalence of frozen shoulder in Indonesia is 40-65% in women compared to men around 2-6%. Around 16-20% of frozen shoulder occurs in people with diabetes mellitus compared to those who do not suffer (Bintang et al., 2021).

A common cause of frozen shoulder is a change in the synovial membrane where synovitis or inflammation occurs and changes around the joint capsule, such as thickened connective tissue, tightening which causes loss of glenohumeral joint mobility (Widaningrum et al., 2021). For classification, frozen shoulder is divided into 2 parts, namely primary and secondary. Primary frozen shoulder (idiopathic) causes are unknown, while secondary frozen shoulder can be caused by trauma, surgery, thyroid dysfunction 2, prolonged immobilization, and diabetes mellitus (Bintang et al., 2021). In the early phase, patients often find it difficult to move their shoulders, the main problems in frozen shoulder include pain and limitation of motion, causing loss of passive and active ROM in capsular motion patterns (Knopf, 2017). Limited motion includes the most limited rotational external motion followed by abduction and internal rotation (Maund et al., 2012). This limitation of Scope of motion of joints results in a decrease in the patient's functional abilities such as bathing, packing, picking objects in high places, rubbing the back, scratching the head, drying the clothes, and hooking the bh for women. From the above problems cause the patient's quality of life is disturbed and more limited. Some physiotherapy interventions that can help overcome problems that arise in frozen shoulder cases are US administration and manipulation therapy.

Ultrasound is a type of high-frequency sound wave of more than 500,000 to 5,000,000 Hz (0.5-5 MHz) per second that is not detected by the human ear. The waves generated by the US cause stretching within the network. The US frequency consists of 1 Mhz (2.5 cm) and 3 Mhz (5 cm). The frequency of 1 MHz is deeper in penetrating the network compared to 3 MHz which is superficial, and has 2 effects, namely thermal and nonthermal (Hayes, 2017). The thermal effect resulting from ultrasound can increase the extensibility of soft tissues as well as help movement in molecules that can increase collagen tissue in the joint capsule that has adhesions, and can increase local blood flow, speed conducive to nerves, which helps regenerate tissue in the joint capsule able to increase metabolism, reduce spasm, control pain, improve blood circulation and soft tissue extensibility (Suharyadi and Ismarda, 2021). And the nonthermal effect can increase intraslesluler calcium levels, increase 3 permeability of cell membranes and skin using low intensity. The resulting effect is thermal (warm and more to the inner tissue) so that it can be used for Frozen shoulder conditions (Gaba et al., 2020).

Manipulation therapy used in the shoulder joint is done passively in the joints and soft tissues. Movement accessories, namely roll and glide, always have the same movement as bone movements both on convex and concave surfaces (Zaimsyah, 2020). The sudden rapid movement of accessories in the joints and small amplitude for therapeutic purposes. The purpose of providing manipulation therapy to frozen shoulder patients is to increase the scope of motion of the shoulder joint. In shoulder manipulation therapy, it is divided into several parts, namely: translational traction aims to stretch between joints, anterior glide to increase external rotational motion, inferior glide to increase abduction motion and posterior glide to increase rotational internal motion (Ahmad et al., 2021).

METHODS

This study used an experimental design with a one-group pretest-posttest. The samples in this study were 17 patients with frozen shoulder conditions with capsular patterns at Lavalette Hospital Malang. The location of the study was carried out at Lavalette Hospital Malang. The study was conducted for 3 weeks in November 2023 and meetings were conducted 9 times over 3 weeks. The independent variable in this study was a combination of ultrasound and manipulation therapy, while the dependent variable was an increase in the scope of motion of the shoulder joint. The inclusion criteria referred to in this study were

patients with frozen shoulder capsular patterns, aged 40-65 years, subacute frozen shoulder, ethical management of research carried out at Strada Kediri.

Measurement of joint scope of motion carried out before and after the intervention aims to determine whether there is an effect of the combination of ultrasound and shoulder manipulation therapy on the degree of scope of motion of the shoulder joint in frozen shoulder patients at Lavalette Hospital Malang. The ultrasound dose given to patients in this study was a frequency of 1 Mhz, intensity 0.4 W/cm² for 6 minutes, then continued with manipulation therapy including translational traction therapy dose 7 to 10 seconds and rest interspersed for 5 seconds and repeated 6 times, Anterior glide dose 10 seconds stretch force, 5 seconds rest and movement repeated 8 times, inferior glide dose used 10 seconds for stretch pull, rest 5 seconds and repeated 8 times, posterior glide dose used stretch style 10 seconds followed by partial release (grade I or II), then repeat with slow, intermittent stretching and stretching interval, rest 5 seconds 8 repetitions. Data analysis using Wilcoxon Test and data collection techniques using a combination of name, age, gender interviews and measuring the scope of motion of joints i.e. external rotation, then abduction and internal rotation.

RESULT AND DISCUSSION

Tabel 1 Characteristics of Respondents Based on Age and Gender of Lavalette Hospital Malang

Gender Variable	Total	Percentase
Gender		
Male	4	23,52 %
Female	13	76,47 %
Age		
40- 50	7	41,17 %
51- 60	9	52,94%
61- 63	2	11,76%

From the table above, it can be concluded that patients who experience *frozen shoulder* conditions are more affected by women as many as 13 people than men as many as 4 people. And the average age of patients is 40-63 years old. The age that experiences the most *frozen shoulder problems* based on the table above is 51-60 years with a percentage of 52.94%, compared to the age of 40-50 years with a percentage of 41.17% and ages 61-63 with a percentage of 11.76%.

Tabel 2 Characteristics of Frozen shoulder Respondents Based on LGS RS Lavalette Malang

Motion	Total	Percentase
Eksternal rotasi	10	58,82%
Abduksi	6	35,29%
Internal rotasi	7	41,17%

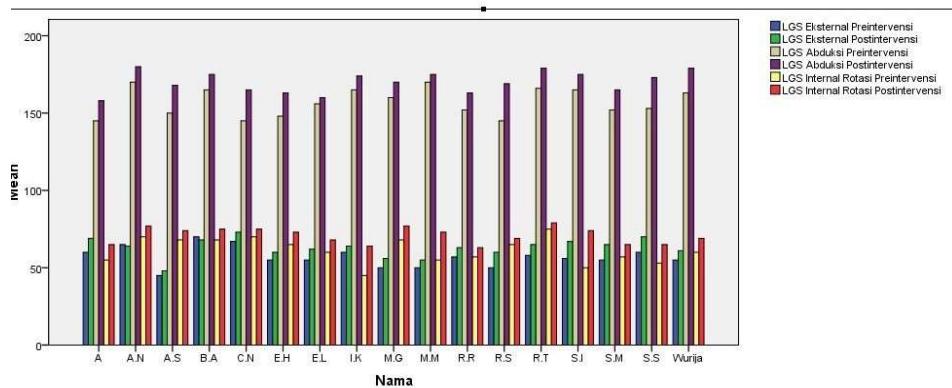


Figure 5.13 LGS Pre and Post Intervention Diagram

Tabel 3 The Effect of Combination of *Ultrasound* and Manipulation Therapy on the Degree of Scope of Motion of *Frozen shoulder Patients* at Lavalette Hospital Malang

	n	Median (Minimum- Maximum)	Nilai- p
Pre Treatmen LGS <i>Ekternal rotasi</i>	17	56,88 (45-70)	0,00
Post treatmen LGS <i>Eksternal rotasi</i>		64,00 (48-73)	
Pre Treatmen LGS <i>Abduksi</i>	17	156,00 (145-170)	0,00
Post Treatment LGS <i>Abduksi</i>		170,00 (158-170)	
Pre Treatmen LGS <i>internal rotasi</i>	17	60.00 (45-75)	0,00
Post Treatmen LGS <i>internal rotasi</i>		73.00 (63-79)	

1. General Characteristics

Based on table 1 above, patients with frozen shoulder conditions are more common in women with a percentage of 76.47% and an age range of 51 years with a percentage of 52.94%, compared to men 23.52%. This is influenced by physical activity in women repeatedly. This result is in accordance with the theory of the average patient with frozen shoulder condition Women aged 40-60 years (Kurniawan and Rochmadhona, 2021). This is influenced by the degeneration process that causes hormonal changes during menopause that occur in women, and the hormone that undergoes changes is calcitonin which can inhibit osteoclast activity so that collagen production decreases and fibroblast adhesion which causes stiffness in the joint capsule in the glenohumeral (Widaningrum et al., 2021).

In Table 2, the average scope of motion of the joints is limited to patients, namely the most limited external rotation with a percentage of 58.82%, then internal rotation percentage 41.17% then abduction 35.29%. This result is in accordance with the theory that states patients with frozen shoulder conditions experience limited capsular pattern motion, namely more limited external rotation followed by abduction and less internal rotation (Zaimsyah, 2020). This is influenced by repetitive movements in the shoulder joint continuously will cause microtrauma that causes inflammation of the joint capsule. In this condition, patients are reluctant to move their arms so that the blood supply is reduced which causes atrophy and

death in the tissue around the joint capsule, so that tissue elasticity decreases and adhesions (Erawan and Arpandjaman, 2020).

2. Effect of Combination of Ultrasound and Shoulder Manipulation Therapy on the Degree of Joint Scope of Motion

Based on table 3 the effect of combined ultrasound and shoulder manipulation therapy on the degree of joint scope of motion in frozen shoulder patients. Wilcoxon test results obtained LGS value results, namely; median LGS value external pre-intervention rotation 56.88 and post intervention 64.00, median value of pre-intervention LGS abduction 156.00 and post intervention 170.00, median value of internal LGS pre-intervention rotation 60.00 and post intervention 73.00. And obtained results $p = 0.000 < 0.05$ which showed that there was an effect of a combination of ultrasound and shoulder manipulation therapy on the degree of scope of motion of frozen shoulder patients. And the ultrasound dose given to patients in this study was a frequency of 1 Mhz, an intensity of 0.4 W / cm² for 6 minutes and the continuous incoming waveform and the location of the transducer in the anterior part of the patient's shoulder. This result is in accordance with the theory that states that the administration of ultrasound modalities has an effect on increasing the scope of motion of the joints in patients who experience frozen shoulder (Erawan and Arpandjaman, 2020). This is because the thermal effect resulting from ultrasound can increase the extensibility of soft tissues and aid movement in molecules that can increase collagen tissue in the adhesions joint capsule, and can increase local blood flow, nerve conducive speed, which helps regenerate damaged tissue in the joint capsule (Az-zahra and Natsir, 2023).

In addition, this is reinforced by (Akhadiany *et al.*, 2022) the provision of manual therapy to frozen shoulder *patients* can increase the scope of motion of joints that experience limitations, the provision of manipulation therapy in the form of translational traction to stretch between joint surfaces, anterior glide to increase *external rotational* motion, inferior glide to increase abduction motion and superior glide to increase rotational internal motion. The dose for each movement is translational traction (10 seconds interspersed with 5-second rest repeated 6 times), anterior glide, inferior glide and posterior glide (dose glide held 7 seconds followed by rest 10 seconds and repeated 8 times). This is influenced by the mechanical effects resulting from each movement in manipulation therapy, namely the stimulation of biological activity by moving *synovial fluid* that carries nutrients to the cartilage on the joint surface, and maintaining the extensibility of stretch power between joints and tissues around joints, especially joints that experience adhesions. From this condition, afferent nerve impulses at joint receptors are forwarded to the central nervous system so that they realize the position and movement of the joints (Jehaman *et al.*, 2021).

CONCLUSIONS AND RECOMMENDATIONS

From the results and discussion of research on the effect of a combination of ultrasound and shoulder manipulation therapy on the degree of joint scope of motion in frozen shoulder patients at Lavalette Hospital Malang, it can be concluded: 1. There is a combination effect of ultrasound and shoulder manipulation therapy on the degree of joint scope of motion in *frozen* shoulder patients At Lavalette Hospital Malang 2. There were differences in Shoulder LGS values before and after the intervention. Where the mean value (maximum-minimum) before intervention in external motion rotation 56.88 (45-70) and after intervention 64.00 (48-73), and mean value (minimum-maximum) in abduction motion before intervention 156.00 (145-

170) and after intervention 170.00 (170-158-170), and mean value (maximum-minimum) in external motion rotation before intervention 60.00 (45-75) and after intervention 73.00 (63-79).

The combination of ultrasound and manipulation therapy in frozen shoulder patients with limited joint scope of motion can be applied as one of the physiotherapy interventions in dealing with the problem of LGS limitations in frozen shoulder conditions.

REFERENCES

Ahmad, Andy, Dwitama, Y. (2021) PERIPHERAL JOINT MOBILIZATION From Upper Limb To Lower Limb. Edited by T.B. Medika. Jawa Timur: BFS Medika

Akhadiany, A., Kuntono, H.P. and Pertiwi, J.K. (2022) ‘PENGARUH TERAPI MANUAL TERHADAP PENINGKATAN LINGKUP GERAK SENDI PADA FROZEN SHOULDER: STUDI LITERATUR’, 3(1), pp. 39– 53.

Aras, D., Ahmad, H. and Ahmad, A. (2016) The New Concept Of Test And Measurement In the Patient Care Physiotherapy. First Edit. Makassar: Physiocare Publishing. Bintang, S.S.B.S. et al. (2021) ‘Seminar Pemberian Codman Pendular Exercise Terhadap Peningkatan Lingkup Gerak Sendi Penderita Frozen Shoulder Di Rumah Sakit Grandmed Lubuk Pakam’, Jurnal Pengmas Kestra (Jpk), 1(1), pp. 163–167. Available at: <https://doi.org/10.35451/jpk.v1i1.759>.

Cameron, M.H. (2017) Physical agents in rehabilitation : from research to practice /. Elsevier/Saunders.

Clarkson, H.M. et al. (2013) *Musculoskeletal assessment : joint range of cal guide*.USA: Wolters Kluwer.

Dalley, A.F. (2014) Clinically oriented anatomy. 7th ed. 2014 / Moore. Walter Kluwer- Lippincott W&W.

50 Drake, R., Vogl, A.W. and Mitchell, A. (2014) ‘Gray Dasar-Dasar Anatomi Manusia’. Edited by V. Kalanjati, p. 644.

Gaba, E. and Sethi, J. (2020) ‘Efek Terapi Interferensi dibandingkan Terapi Ultrasound dengan Umum Protokol Terapi Manual di Bahu Beku Kelas - II’, 16(2), pp. 1–10. Available at: <https://doi.org/10.18376/jesp>.

Gaba, E., Sethi, J. and Bhardwaj, M. (2020) ‘Effect of Interferential Therapy over Ultrasound Therapy with Common Protocol of Manual Therapy in Grade - II Frozen Shoulder’, Journal of Exercise Science and Physiotherapy, 16(2), pp. 23–31. Available at: <https://doi.org/10.18376/jesp/2020/v16/i2/157454>.

Gundtoft, P.H. et al. (2020) ‘Diabetes mellitus affects the prognosis of frozen shoulder’, Danish Medical Journal, 67(10), pp. 1–8. Hardani, dkk (2020) Buku Metode Penelitian Kualitatif dan Kualitatif, Repository.Uinsu.Ac.Id.

Hayes, K.W. (2017) Agen Modalitas Fisioterapi. 6th edn. Jakarta: EGC.

Jehaman, I. et al. (2021) ‘Manfaat Pemberian Manual Terapi Dan Codman Pendular Exercise Terhadap Aktivitas Fungsional Pasien Frozen Shoulder’, Jurnal Pengmas Kestra (Jpk), 1(1), pp. 13–18. Available at: <https://doi.org/10.35451/jpk.v1i1.702>.

Kelley, M.J. et al. (2013) ‘Shoulder pain and mobility deficits: Adhesive capsulitis: Clinical practice guidelines linked to the international classification of functioning, disability, and health from the orthopaedic section of 51 the american physical therapy association’, Journal of Orthopaedic and Sports Physical Therapy, 43(5). Available at: <https://doi.org/10.2519/jospt.2013.0302>.

Kisner, C. and Colby, L.A. (2013) *Buku Fisioterapi: Buku Manual Terapi*, Edisi 2. New Delhi: Jaype Brothers Medical Publiser(P) Ltd. Available at: <https://egcmedbooks.com/buku/detail/2460/manual-terapi-edisi-2> (Accessed: 15 June 2023).

Kisner, C., Colby, L.A. and Borstad, J. (2018) Therapeutic Exercises: Foundations and Techniques. Seventh Ed. United States Of America: F.A Davis Compani.

Kisner, C.C.L.A. (2017) ‘Terapi Latihan Dasar dan Teknik Edisi 6 Vol.1’. Available at: http://www.lib.akfisrsdustira.ac.id/index.php?p=show_detail&id=51 (Accessed: 15 June 2023).

Knopf, K.G. (2017) *Heal Your Frozen Shoulder* | Ulysses Press, Ulysses Press. USA. Available at: <https://ulyssespress.com/books/heal-yourfrozen-shoulder/> (Accessed: 15 June 2023).

Lawry, G. V (2016) Pemeriksaan muskuloskeletal yang sistematis. Jakarta: Erlangga.

Magee, J.D. et al. (2016) *Pathology and Intervention in Musculoskeletal Rehabilitation* (Second Edition). Second. Cina: Elsevier/Saunders.

Maund, E. et al. (2012) ‘*Management of frozen shoulder: a systematic review and cost-effectiveness analysis.*’, Health Technology Assessment (Winchester, England), 16(11), p. 1. Available at: 52 <https://doi.org/10.3310/HTA16110>.

Neuman, A.D. (2017) *Kinesiology of the Musculoskeletal System Foundations for Rehabilitation*. Edited by Third Edition. Canada: Elsevier/Saunders.

Norkin, C.C. and White, D.J. (2016) *Measurement of Joint Motion: A Guide to Goniometry*. fifth. Florida: Evolve: F.A Davis Company.

Sebastian, D. (2020) Manual Terapi. Ed.2. Jakarta: EGC. Sudaryanto, S. and Nashrah, O.N. (2020) ‘Efektifitas Kombinasi Ultrasound Dan Maitland Mobilization Atau Kaltenborn Mobilization Terhadap Perubahan Nyeri Dan Range of Motion Shoulder Pada Penderita Frozen Shoulder Di Rsad Tk. Ii Pelamonia Makassar’, Media Kesehatan Politeknik Kesehatan Makassar, 15(1), p. 18. Available at: <https://doi.org/10.32382/medkes.v15i1.1333>.

Suharyadi, T. and Ismanda, S.N. (2021) ‘Penatalaksanaan Fisioterapi Pada Frouzen Shoulder Dekstra Dengan Modalitas Ultrasound Serta Terapi Latihan’, Jurnal Kesehatan Tambusai, 2(4), pp. 111–118. Available at: <https://doi.org/10.31004/jkt.v2i4.2759>.

Suyanto (2015) Dasar Metodologi Penelitian. Yogyakarta: Literasi Media 53 Publishing.

Widaningrum, R. et al. (2021) ‘Perbedaan Pengaruh Pemberian SWD dan Mobilisasi Sendi Terhadap Peningkatan Kemampuan Fungsional Bahu’, Jurnal Keperawatan Muhammadiyah, 6(4), p. 164.

Zaimsyah, F.R. (2020) ‘Perbedaan Pengaruh Stretching Dengan Terapi Manipulasi Terhadap Peningkatan Aktivitas Fungsional Bahu Pada Penderita Frozen Shoulder’, Jurnal Ilmiah Fisioterapi, 3(2), pp. 30–37. Available at: <https://doi.org/10.36341/jif.v3i2.1433>.

Zaki, M. and Saiman, S. (2021) ‘Kajian tentang Perumusan Hipotesis Statistik Dalam Pengujian Hipotesis Penelitian’, JIIP - Jurnal Ilmiah Ilmu Pendidikan, 4(2), pp. 115–118. Available at: <https://doi.org/10.54371/jiip.v4i2.216>.