FORENSIC INSIGHTS AND HEALTH SCIENCES BULLETIN

Volume 4: Issue 2: 2026

https://doi.org/10.56770/fihsb20264210

EFFECTIVNESS OF MULLIGAN'S MOBILIZATION WITH MOVEMENT IN PATIENT WITH FROZEN SHOULDER, A RANDOMIZED CONTROL TRAIL

Muhammad Raza[1], Muhammad Abdullah Khan[2], Raazia Batool[2], Nida Kausar[3], Afaf Khalid[3*], Rabab Kompal[4]

[1] Physiotherapy Department, Faisal Hospital Khanewal Road, Multan, Punjab, Pakistan
[2] Department of Physical Therapy, University of Sargodha, Punjab, Pakistan
[3] Department of Physical Therapy, Riphah International University Islamabad, Pakistan
[4] Physiotherapy Department, Tertiary Care Hospital Nishtar-II Multan, Punjab, Pakistan

Submitted: August 19, 2026; Revised: September 26, 2026; Accepted: September 27, 2026; Published: October 31, 2026

ABSTRACT

Background: The condition known as frozen shoulder causes the shoulder range of motion to be limited there is progressive onset of stiffness, intense discomfort, particularly at night and restriction of active and passive range of motion are its key features. If the reason of adhesive capsulitis is unknown it is known as primary adhesive capsulitis (idiopathic) or secondary (due to some other cause). Although there is a chance of complete resolution, it typically has a lifespan of one to three years and is self-limiting. **Objective:** To find out the effectiveness of Mulligans mobilization and to find out the effectiveness of Kaltenborn mobilization in the patients with adhesive capsulitis or to compare both techniques in order to rule out which one is better to improve the quality of life in the patients with adhesive capsulitis. **Methods:** A randomized controlled trial was conducted using a standardized questionnaire. The study included both the genders with diagnosed adhesive capsulitis. Data from 44 patients was taken before and after treatment. Data was analyzed through SPSS. **Results:** The P value is 0.005 that shows Mulligans mobilization MWM technique is more effective than Kaltenborn mobilization technique. **Conclusion:** Mulligans MWM technique outperforms the Kaltenborn mobilization method in terms of improving pain but both techniques were proved to be effective in order to improve range of motion in the patients with adhesive capsulitis.

Keywords: Frozen shoulder, Adhesive capsulitis, Physical therapy, MWM

[*]**Corresponding Author.** E-mail: afafk2002@gmail.com

INTRODUCTION

The adhesive capsulitis, another name for frozen shoulder, is a painful alignment that most frequently affects adults in the sixth decade of their life. Pain, stiffness, and a loss of function are brought on by an inflammation, scarring, and contraction of the shoulder joint's capsule. Due to shoulder pain, people with frozen shoulder may find it difficult to do simple everyday tasks and may experience sleep disturbances. It is frequently described as primary or idiopathic frozen shoulder **[1]**. A common debilitating condition well-known as frozen shoulder is described by pain and progressive loss of shoulder ROM. Frozen shoulder typically develops after periods of immobilization or is linked to other systemic disorders **[2].** Frozen shoulder is a pain-full shoulder illness that lasts longer than the three months **[3]**. It is characterized by a set of events from inflammation of capsule and fibrosis to the fibrosis's spontaneous resolution **[4]**. Primary frozen shoulder has idiopathic onset while secondary adhesive capsulitis has intrinsic or extrinsic events **[5]**. In frozen shoulder, the glenohumeral joint develops adhesions or scar tissues, which causes discomfort, stiffness, and dysfunction **[6]**. Clinically, adhesion capsulitis is characterized by restricted range of motion brought on by adhesions of the glenohumeral joint capsule **[7]**. Researches showed ,mulligan's mobilization method is effective to relief pain and to improve range of motion **[8]**.

FIHSB is published by AMMANIF Publisher. The authors retain the copyright without restriction. This article is an open access article published under the terms and conditions of Creative Commons Attribution 4.0 International License.

Physical therapy techniques are effective for pain management , improvement of range and function in a patient having frozen shoulder **[9]**. Studies proved that physical therapy management of adhesive capsulitis is effective for example mulligan's MWM along with other therapies like stretching therapy etc **[10]**. MWM is effective in order to manage pain and to improve function in patients with limited ROM in shoulder pathologies **[11]**.

Adhesive capsulitis can have multiple effects on functioning of individuals. Mulligan's and kaltonborn mobilization techniques have found to be effective in treatment of adhesive capsulitis. So, this research focused on whether mulligan or kaltonborn mobilization was effective in management of pain and for the improvement of ROM. This research further thoroughly researched the effects of these techniques for the improvement of quality of life of patients with frozen shoulder. Patients having frozen shoulder are at higher risk of functional restrictions due to pain and decreased ROM required during the performance of ADLs. Significance of our study was to find the better technique for the physiotherapist to treat the patients having adhesive capsulitis for better outcome. Results of the study may be useful for the awareness at different levels of community members and physiotherapists. To see the effectiveness of Mulligan's technique in order to improve pain and ROM in the patient with adhesive capsulitis. The progressive onset of shoulder stiffness, intense discomfort, particularly at night, and restriction of the active and passive range of motion are key features. If the reason of the frozen shoulder is unknown, it is classified as primary (idiopathic) or secondary (caused by another condition). Although there is a chance of incomplete resolution, it typically has a one- to three-year lifespan and is self-limiting **[12]** . It is a prevalent but poorly understood illness that affects the shoulder joint, frozen shoulder has poor long-term effects for certain people in terms of pain and mobility. Developing new treatments may benefit from an understanding of the pathogenesis of the frozen shoulder at cellular and molecular levels. A systematic appraisal of studies evaluating the cellular, molecular, and metabolic results in the frozen shoulder was the objective of this work **[13]**. Because of societal change and the emergence of new diseases, epidemiology is a relatively recent discipline. This epidemiology is essential tool for understanding diseases and events related to health **[14]**. Frozen shoulder had a relatively high point prevalence (59%) in patients with type 1 diabetes who had had the disease for less than 45 years **[15]**. Taking into account historical data, the lifetime prevalence was 76% **[16]**. The likelihood of experiencing frozen shoulder increases to 2.69 times when a person has thyroid diseases, particularly hypothyroidism and the presence of benign thyroid nodules **[17]**.

Between 3% and 5% of the general population has adhesive capsulitis of the shoulder. Although majority of the patients are between the ages of 40-59 when they are diagnosed there is some data to support the idea that the adhesive capsulitis can also develop far ahead in life. According to research of more than 26 million Americans under 65, prevalence of the adhesive capsulitis was 0.35 percent after one year. Adhesive capsulitis has a number of comorbidities that have been linked to increased risk, such as diabetes, thyroid gland abnormalities, and cerebrovascular diseases **[18]**. Throughout a 17-year period, data from all the patients from a single institute with any HbA1c readings were gathered (1998-2015). 130,794 patients in all were located. Age less than 18 years was a requirement for disqualification **[19]**. The diseases like hyper-thyroidism, hypothyroidism, hypoadrenalism, Parkinsonism, cardiac illness, pulmonary ailment, stroke, and even surgical measures that do not directly influence the shoulder, such as cardiac operation, cardiac catheterization, neurosurgery, and the radical neck dissection, are examples of co-morbid conditions **[20]**. At the initial examination, pain intensity (using the Numerical Rating Scale [NRS]), face pain scale and self-efficacy [Pain Self-Efficacy Questionnaire [PSEQ]] were measured **[21]**. The gleno-humeral joint, a highly mobile ball and socket synovial joint, is stabilized by tendons of the biceps and triceps brachii and the rotator cuff muscles, which adhere to joint capsule. The glenoid fossa of scapula and humeral head articulate. Given that the fossa can only hold around one-third of the humeral head, the articulation is shallow. The fibrocartilaginous ring known as the labrum adds depth and rigidity to the glenoid fossa, where it adheres, keeping the humeral head in place. The capsule is surrounded by a small number of bursae, which help with motility. The subacromial, subdeltoid, subscapular, and sub coracoid bursae are those mentioned **[22]**.

The glenoid broad range of motion is made possible by the fact that its articular surface is significantly smaller than that of the humerus **[23]**. The proximal tendons of biceps brachii muscle are two. The supraglenoid tubercle of scapula is where long head tendon originates, while coracoid process is where short head tendon is joined. When it passes through the glenohumeral joint, the proximal long head tendon is more prone to produce pain than short head tendon and is intimately linked to the disease of the rotator cuff tendon. The subscapularis tendon runs anteriorly, the supraspinatus tendon runs posteriorly, the coracohumeral ligament runs superiorly, and the superior glenohumeral ligament runs inferiorly. The

long head tendon runs in the rotator cuff interval after leaving the superior labrum. The tendon enters the bicipital groove on the humeral head between the smaller tuberosity after leaving the rotator cuff interval. The tendon enters the bicipital groove on the humeral head between the lesser tuberosity medially and the greater tuberosity laterally after leaving the rotator cuff interval. The transverse humeral ligament, an outgrowth of the subscapularis tendon's fibers, stabilizes the tendon at the groove level. The biceps tendon sheath, an outgrowth of the glenohumeral joint's synovial sheath, encircles the biceps tendon's long head **[24]**.

MATERIALS & METHODS

Study Design: A Randomized Controlled Trial (RCT) was employed for the period of 12 weeks, at Laser Pain Management and Rehabilitation Clinic and RIMS Physical Therapy Clinic, Multan. Patients were randomly assigned into two equal groups, Group A (Experimental Group) and Group B (Control Group), through simple random sampling using online randomization software (Epitool). Sample Size Calculation: The sample size was calculated using G*Power software. With a mean of Group 1 = 2.3, mean of Group 2 = 1.45, SD of Group 1 = 0.86, SD of Group 2 = 0.82, effect size (Cohen's d) = 1.01, and critical t = 1.68 at a significance level of 0.05 and power of 80%, the total sample size was estimated to be 44 (22 participants in each group). For intervention, Mulligan's Mobilization with Movement (MWM) technique was applied to Group A, while conventional conservative physical therapy was administered to Group B.

Intervention and Comparative Intervention Group

In interventional group 22 patient with frozen shoulder were treated with mulligans mobilization technique. Patient will receive treatment for 3 sets (10 glides per set) for 3 weeks **[28]**. patients were treated with mulligans technique Mobilization with Movement (MWM), a concept developed by Brian Mulligan, is a logical continuation of the development of manual therapy from active stretching exercise to therapist-applied passive physiological movement to passive accessory mobilization technique. MWM refers to the simultaneous application of a continuous auxiliary mobilization by the therapist and an active physiological movement to end range by the patient. Then, passive end of range over pressure or stretching can be administered without pain acting as a barrier. Several repetitions of the technique-correctional mobilization will start to result in long-lasting gains. Manual therapy approaches aim to break up capsular adhesions, and restore joint mobility **[25]**. Mulligan's mobilization approach helped patients with frozen shoulder experience less discomfort, functional impairment, and improved quality of life **[26]**. A mobilization method used in the treatment of musculoskeletal diseases is called Mulligan's MWM. It incorporates the manual technique of a prolonged glide by the therapist over the joint while the patient is actively doing a concomitant movement of the joint **[27]**. In comparative interventional group 22 patient with frozen shoulder were treated with conservative therapy. In this group the conservative therapy was applied. Patient in this group receive heating pad TENS and ultrasound (3 sets of 10 repetition) for 3 weeks in order to improve pain and ROM.

The patients with history of frozen shoulder and with glenohumeral ROM more than 45◦ degree were included in the study. Whereas the patients with Fracture and dislocation in upper extremity, patient taking corticosteroids, and patient using intra-articular injection were excluded from the study.

RESULTS

Data was analyzed and compiled through SPSS and presented in graphical and tabulated form for better understanding.

Participant's Gender Distribution in Interventional Group

Pie chart was plotted to represent gender of participants in interventional group.

Normality of Data

The normality of the data was confirmed before conducting inferential statistics. Z=Skewness/SE, Z= Kurtosis/SE through skewness, Kurtosis, and Z=Skewness/SE. Normality test in Kolmogorov-Smirnov test showed p value less than 0.05, when p value is significant in Kolmogorov-Smirnov test then data is not normally distributed.

Tests of Normality of Data

The normality of post-treatment pain and ADLs scores following Mulligan Mobilization was assessed using the Kolmogorov–Smirnov and Shapiro–Wilk tests. For post-treatment pain, the Kolmogorov–Smirnov statistic was 0.236 ($p = 0.002$), while the Shapiro–Wilk statistic was 0.757 ($p < 0.001$). For post-treatment ADLs scores, the Kolmogorov–Smirnov statistic was 0.223 ($p = 0.006$), and the Shapiro–Wilk statistic was 0.909 ($p = 0.045$). Both outcomes showed significant deviations from normality ($p < 0.05$), suggesting that non-parametric tests were appropriate for statistical analysis.

Comparison of MWM Groups

Wilcoxon sign ranked test was conducted to run inferential statistics for MWM group pre and post treatment values. The Wilcoxon signed-rank test was used to compare pre-treatment and post-treatment pain and ADLs scores in the Mulligan Mobilization (MWM) group. The results showed statistically significant differences in pain scores and ADLs scores between pre-treatment and post-treatment measurements ($p < 0.001$ for both outcomes).

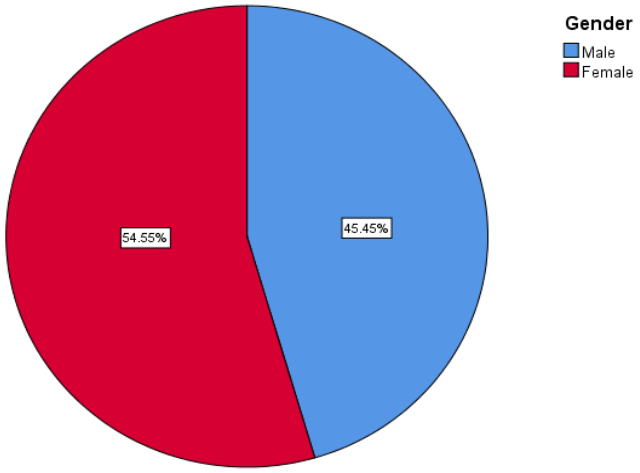


Figure 1: Pie chart of distribution gender of participants in case group.

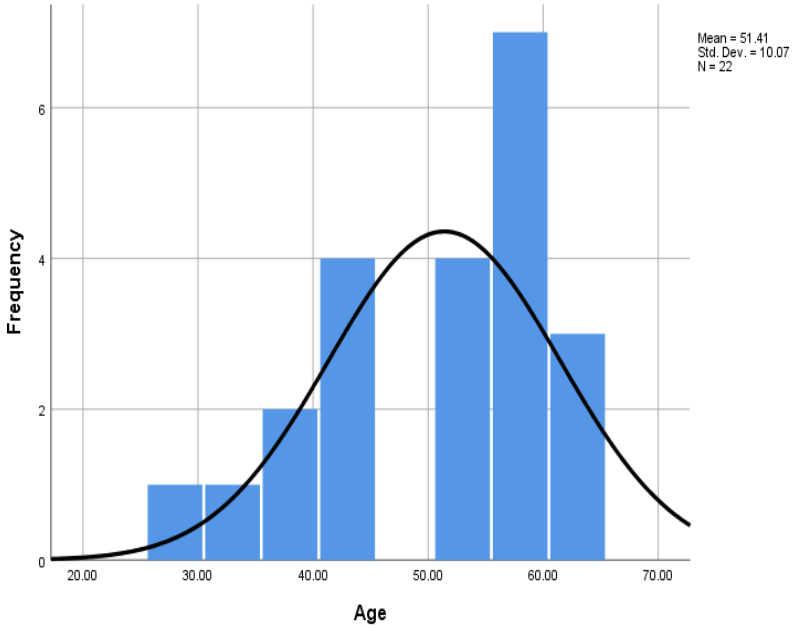


Figure 2: Histogram of age of participants in case group.

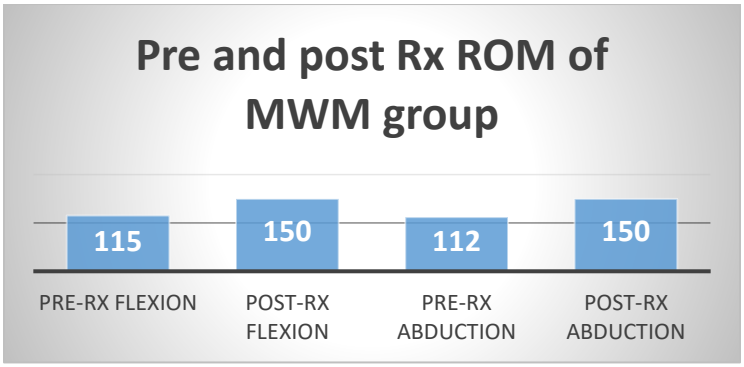


Figure 3: Bar chart of pre and post treatment Shoulder ROM of patients of MWM group.

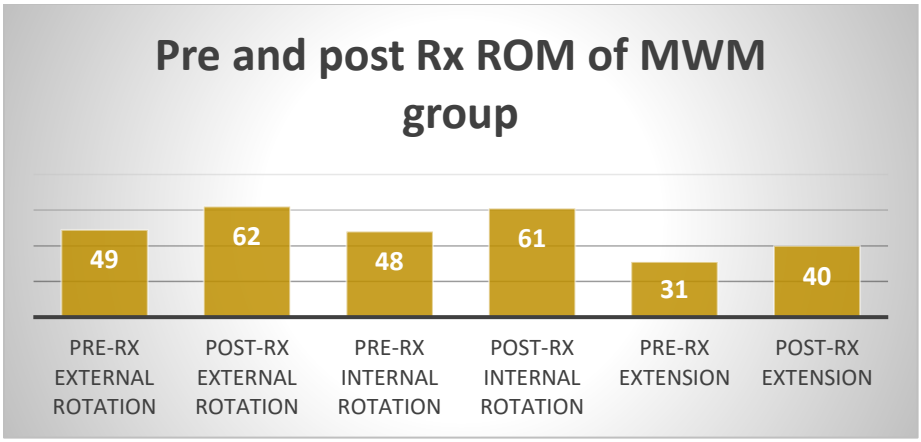


Figure 4: Bar chart of pre and post treatment shoulder ROM of MWM group.

Age of Participants in Case Group

Histogram was plotted to represent age of the participants who participated in case group. age of participants ranged from 28 years to 62 years with mean and standard deviation 51.41±10.07.

Therefore, the null hypotheses were rejected, indicating that MWM treatment was effective in reducing pain and improving ADLs among patients.

Pre and Post Treatment Shoulder ROM of Patients of MWM Group

Simple bar chart was plotted to represent pre and post treatment shoulder ROM of participants of case group. Figure 03 showed that mean of pre and post treatment flexion was 115 and 150 respectively. Mean of pre and post treatment values of shoulder abduction were 112 and 150 respectively. By MWM treatment method ranges were improved.

Pre and Post Treatment Shoulder ROM of Patients of MWM Group

Simple bar chart was plotted to represent pre and post treatment shoulder ROM of participants of case group. Figure 04 showed that mean of pre and post treatment values of shoulder external rotation were 49 and 62 respectively. Mean of pre and post treatment values of shoulder internal rotation were 48 and 61 respectively. Mean of pre and post treatment values of shoulder extension were 31 and 40 respectively. By MWM treatment method ranges were improved.

DISCUSSION

It is still unclear how frozen shoulder develops. But some conceivable risk factors have been found like Diabetes mellitus, which can occur in up to 20% of people. Stroke, Disorder of the thyroid, Shoulder injury, Disease of Dupuytren Parkinson's illness, localized pain syndrome with cancer **[3]**. A clinical diagnosis of frozen shoulder is done using the medical history, physical checkup, and imaging techniques (ruling out another disorder, rather than checking the diagnosis of AC). No one laboratory or imaging test can provide complete confirmation of the AC diagnosis on its own **[3]**. According to the results of current study mulligan mobilization technique is more effective than kaltenborn mobilization technique. Previously a study was performed by D Rathod, G Priyanka, A Palkar in 2019. This study includes 40 subjects. The subjects were split into two equal groups at random. Kaltenborn mobilization was given to Group A, and Mulligan mobilization was given to Group B. The entire procedure was explained to the patients, and written informed consent was obtained from all participants who agreed to participate in this study. Using a universal goniometer, the baseline ROM data for all shoulder movements were gathered. Using SPADI, data on pain and disability were gathered for the first sitting before treatment and the tenth sitting after treatment to assess the functional outcome. The treatments for each group are given for ten sessions on alternate days, with six to ten sets per session. Prior to the treatment, ten minutes of moist heat were applied. This study shows that the Mulligan MWM technique outperforms the Kaltenborn mobilization method in terms of improving range and function (Rathod, Priyanka, and Palkar 2019). We recognized 29 098 cancer patients with the frozen shoulder diagnoses between 1 January 1995 and 30 November 2013. The median follow-up period lasted 5.0 years (lower quartile: 2.2 years; upper quartile: 9.3 years). 56% of patients were female, with a median age at diagnosis of 53 years (lower quartile: 46 years; upper quartile: 61 years) **[16]**. In contrast to our study a research was performed, enrolling 56 subjects and 28 were given kaltenborn mobilization for 30 seconds, 20 repetitions. In the other group 28 patients were given mulligans MWM (3 sets of pain free glides ,10 repetition). Thus group receiving kaltenborn mobilization showed significant results than group received mulligan MWM **[28]**. In contrast to recent study a research was conducted in 2016 demonstrated

that maitland technique and combined mobilization was found to be effective in the treatment of frozen shoulder **[29]**.

CONCLUSION

Mulligans MWM technique was effective in improving pain and ROM in the patients with adhesive capsulitis. However, other group also showed improvements but between group comparison showed statistical significant difference. Moreover, study had limitations, such as involving small sample size and was conducted without using blinding of participants. Furthermore, future research should include larger sample sizes and longer intervention periods to provide a more comprehensive understanding of this area.

Authors Contribution: data collection and supervision, M. Raza and M. K Abdullah; resources, B. Raazia; supervision, K. Nida and K. Afaf; review and editing, K. Rabab.

Funding: No funding involved.

Ethical Approval: Not applicable

Conflict of Interest: Nil.

Consent for Publication: All authors approved the manuscript for publication.

REFERENCES

1. Rangan A, Brealey SD, Keding A, Corbacho B, Northgraves M, Kottam L, et al. Management of adults with primary frozen shoulder in secondary care (UK FROST): a multicentre, pragmatic, three-arm, superiority randomised clinical trial. The Lancet. 2020;396(10256):977-89.
2. Millar NL, Meakins A, Struyf F, Willmore E, Campbell AL, Kirwan PD, et al. Frozen shoulder. Nature Reviews Disease Primers. 2022;8(1):59. doi: 10.1038/s41572-022-00386-2) T
3. Mezian K, Coffey R, Chang K-V. Frozen shoulder. StatPearls [Internet]: StatPearls Publishing; 2021.
4. Cho C-H, Song K-S, Kim B-S, Kim DH, Lho Y-M. Biological aspect of pathophysiology for frozen shoulder. BioMed Research International. 2018;2018. Doi: 10.1155/2018/7274517
5. Ryan V, Brown H, Minns Lowe CJ, Lewis JS. The pathophysiology associated with primary (idiopathic) frozen shoulder: A systematic review. BMC musculoskeletal disorders. 2016;17:1-21. Doi: 10.1186/s12891-016-1190-9
6. Le HV, Lee SJ, Nazarian A, Rodriguez EK. Adhesive capsulitis of the shoulder: review of pathophysiology and current clinical treatments. Shoulder & elbow. 2017;9(2):75-84. doi: 10.1177/1758573216676786
7. Redler LH, Dennis ER. Treatment of adhesive capsulitis of the shoulder. JAAOS-Journal of the American Academy of Orthopaedic Surgeons. 2019;27(12):e544-e54. doi: 10.5435/JAAOS-D-17-00606
8. Ishaq H, Zuber M, Kandakurti PK, Arulsingh W. Do Manual Therapy Techniques Help in Patients with Frozen Shoulder?: A Systematic Literature Review. Critical Reviews™ in Physical and Rehabilitation Medicine. 2022;34(2). doi: 10.1615/CritRevPhysRehabilMed.2022043235
9. Nakandala P, Nanayakkara I, Wadugodapitiya S, Gawarammana I. The efficacy of physiotherapy interventions in the treatment of adhesive capsulitis: A systematic review. Journal of back and musculoskeletal rehabilitation. 2021;34(2):195-205. doi: 10.3233/BMR-200186
10. Jie H, Lingfeng X, Xiaoling H, Xiaohua H. Effects of Mulligan's mobilization with movement combined with stretching therapy in the management of frozen shoulder. Physiotherapy. 2015;101:e683-e4.
11. Satpute K, Reid S, Mitchell T, Mackay G, Hall T. Efficacy of mobilization with movement (MWM) for shoulder conditions: a systematic review and meta-analysis. Journal of Manual & Manipulative Therapy. 2022;30(1):13-32. doi: 10.1080/10669817.2021.1955181
12. Maund E, Craig D, Suekarran S, Neilson A, Wright K, Brealey S, et al. Management of frozen shoulder: a systematic review and cost-effectiveness analysis. Health Technol Assess. 2012;16(11):1-264. doi: 10.3310/hta16110
13. Jump CM, Duke K, Malik RA, Charalambous CP. Frozen shoulder: a systematic review of cellular, molecular, and metabolic findings. JBJS reviews. 2021;9(1):e19. doi: 10.2106/JBJS.RVW.19.00153
14. Frérot M, Lefebvre A, Aho S, Callier P, Astruc K, Aho Glélé LS. What is epidemiology? Changing definitions of epidemiology 1978-2017. PloS one. 2018;13(12):e0208442. doi: https://doi.org/10.1371/journal.pone.0208442
15. Van Eeden AE, van Hoeken D, Hoek HW. Incidence, prevalence and mortality of anorexia nervosa and bulimia nervosa. Current opinion in psychiatry. 2021;34(6):515. doi: 10.1097/YCO.0000000000000739
16. Juel NG, Brox JI, Brunborg C, Holte KB, Berg TJ. Very high prevalence of frozen shoulder in patients with type 1 diabetes of≥ 45 years' duration: the dialong shoulder study. Archives of physical medicine and rehabilitation. 2017;98(8):1551-9. doi: http://dx.doi.org/10.1016/j.apmr.2017.01.020
17. Cohen C, Tortato S, Silva OBS, Leal MF, Ejnisman B, Faloppa F. Association between frozen shoulder and thyroid diseases:

strengthening the evidences. Revista Brasileira de Ortopedia. 2020;55:483-9. doi: DOI https://doi.org/ 10.1055/s-0039-3402476.
18. Jacob L, Gyasi RM, Koyanagi A, Haro JM, Smith L, Kostev K. Prevalence of and Risk Factors for Adhesive Capsulitis of the Shoulder in Older Adults from Germany. Journal of Clinical Medicine. 2023;12(2):669. doi: https://doi.org/10.3390/jcm12020669
19. Chan JH, Ho BS, Alvi HM, Saltzman MD, Marra G. The relationship between the incidence of adhesive capsulitis and hemoglobin A1c. Journal of Shoulder and Elbow Surgery. 2017;26(10):1834-7.
20. Manske RC, Prohaska D. Diagnosis and management of adhesive capsulitis. Current reviews in musculoskeletal medicine. 2008;1:180-9.
21. Hirata J, Tomiyama M, Koike Y, Yoshimura M, Inoue K. Relationship between pain intensity, pain catastrophizing, and self-efficacy in patients with frozen shoulder: a cross-sectional study. Journal of orthopaedic surgery and research. 2021;16:1-6. doi: https://doi.org/10.1186/s13018-021-02693-y
22. Miniato MA, Anand P, Varacallo M. Anatomy, shoulder and upper limb, shoulder. StatPearls [Internet]: StatPearls Publishing; 2021.
23. Zheng M, Zou Z, Bartolo PJDS, Peach C, Ren L. Finite element models of the human shoulder complex: a review of their clinical implications and modelling techniques. International journal for numerical methods in biomedical engineering. 2017;33(2):e02777. doi: 10.1002/cnm.2777
24. Chang K-V, Mezian K, Naňka O, Wu W-T, Lin C-P, Özçakar L. Ultrasound-guided interventions for painful shoulder: from anatomy to evidence. Journal of Pain Research. 2018:2311-22. doi: 10.2147/jpr.s169434
25. Rathod D, Priyanka G, Palkar A. Comparative study of kaltenborn mobilisation versus mulligan mobilisation in patients with frozen shoulder. International Journal of Health Sciences and Research. 2019;9(9):320-4.
26. Muzammal Z, Islam F, Batool M, Raza A, Muzammal M. Effectiveness of kaltenborn versus mulligan mobalization as physical therapy intervention in management of unilateral frozen shoulder.
27. Ragav S, Singh A. Comparison of effectiveness of mulligan ‘MWM’technique versus kaltenborn mobilization technique on pain and end range of motion in patients with adhesive capsulitis of shoulder joint: A randomized controlled trial. Journal of Exercise Science & Physiotherapy Vol. 2019;15(1). doi: 10.18376/jesp/2019/v15/i1/111313
28. Fernandes A, Shah L, Mohan A. Effectiveness of Kaltenborn Mobilization Technique Versus Mulligan's MWM in Patients with Adhesive Capsulitis of Shoulder. Indian Journal of Physiotherapy & Occupational Therapy. 2020;14(3).
29. Noten S, Meeus M, Stassijns G, Van Glabbeek F, Verborgt O, Struyf F. Efficacy of different types of mobilization techniques in patients with primary adhesive capsulitis of the shoulder: a systematic review. Archives of physical medicine and rehabilitation. 2016;97(5):815-25. doi: S0003999315010667