



Effectiveness of End-Range Mobilization with Movement with Mobilization Versus Osteopathic Approaches in Treating Frozen Shoulder: A Comparative Study

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Article Info

Received: 07-07-2025

Revised: 09-08-2025

Accepted: 05-09-2025

Abstract

Shoulder periarthritis is one of the painful and severely limiting condition with the painful limitation of shoulder movement; adhesive capsulitis is one such condition. Based on this reason, the purpose of this observe become to evaluate the effectiveness of ERM-MWM with osteopathic strategies to inflict change on pain, feature, and ROM of sufferers with frozen shoulder. A randomized controlled trial was performed with 80 individuals identified with frozen shoulder, allocated into intervention agencies: ERM-MWM (n=fifty) and osteopathic remedy (n=fifty). The VAS, the SPADI, and goniometric ROM evaluation were accumulated at baseline, four weeks and 8 weeks. The quantitative facts accrued revealed that each businesses had made statistically tremendous changes on the cease of the 8 weeks ($p < 0.05$), and the modifications were more in the ERM-MWM than the osteopathic organization for shoulder flexion and abduction range of movement, whereas upgrades for pain and global feature became better inside the osteopathic organization. These results display that ERM-MWM is efficient to decorate the shoulder motion whilst osteopathic technique caters the pain remedy multiple manner concurrently. A combination of the therapies is probably very effective in handling the signs and symptoms of frozen shoulder.

Keywords: Frozen Shoulder, End-Range Mobilization, Osteopathic Treatment, Shoulder Rehabilitation, Pain Management

1. Introduction

1.1 Background of Frozen Shoulder

Frozen shoulder, medically referred to as the adhesive capsulitis, is one of the chronic and painful musculoskeletal disorder characterized by a huge significant restriction in the actual range of motion (ROM) of the actual glenohumeral joint (Bhan *et al.*, 2021).. It predominantly affects people between the ages of 40 and 60, with a better prevalence located in ladies. Clinically, the situation progresses thru three wonderful tiers: the freezing level, marked with the aid of growing ache and slow stiffness; the frozen level, characterized with the aid of great stiffness and decreased pain; and the thawing degree, wherein pain diminishes and motion slowly improves, even though full healing may additionally continue to be incomplete in lots of cases.

1.2 Pathophysiology and Risk Factors

The precise etiology of adhesive capsulitis remains uncertain. However, it is often commonly believed to mainly involve a huge cascade of the inflammatory events within the actual synovial lining of the joint, eventually leading to fibrosis as well as the contracture of the shoulder capsule. This results inside the formation of adhesions that restriction everyday joint mechanics. Common hazard factors contributing to the improvement of frozen shoulder encompass systemic situations such as diabetes mellitus, hypothyroidism, and hyperthyroidism, in addition to secondary reasons like shoulder trauma, surgical treatment, or prolonged immobility.

1.3 Current Approaches to Treatment

Despite being a self-limiting condition in many cases, frozen shoulder can mainly persist for years and severely impact a patient's quality of the life. Various treatment modalities are employed to control the condition and expedite recuperation (Bhan *et al.*, 2021).. These consist of pharmacological strategies consisting of non-steroidal anti-inflammatory pills (NSAIDs) and corticosteroid injections, physical therapy interventions, and manual therapy strategies geared toward restoring joint mobility and lowering ache. Among the guide cures, End-Range Mobilization with Movement (ERM-MWM) and osteopathic manipulative remedies are an increasing number of recognized for their potential benefits.



End Range Mobilisation (ERM)



MOVEMENT WITH MOBILISATION



MOVEMENT WITH MOBILISATION(MWM)



OSTEOPATHIC TECHNIQUE

1.4 Description of Interventions

ERM-MWM is a manual therapy technique that mainly combines some of the passive mobilization of the joint at its end range with some of the patient's active movement. This method is meant to enhance capsular flexibility and improve neuromuscular manipulate, thereby restoring joint function. Conversely, osteopathic manipulative remedy (OMT) employs a holistic philosophy, using strategies which includes myofascial release, muscle electricity

techniques, and high-speed low-amplitude (HVLA) thrusts to deal with musculoskeletal imbalances and sell systemic restoration.

1.5 Rationale and Objectives of the Study

Given the widespread use of both ERM-MWM and also the osteopathic approaches in the clinical settings, there is a need for comparative evidence to mainly guide the therapeutic decision-making. While each technique has validated individual efficacy in enhancing results for patients with frozen shoulder, few research have at once as compared their relative effectiveness in a controlled placing(Bhan *et al.*, 2021).. The gift observe seeks to cope with this hole by means of comparing and evaluating the scientific results of ERM-MWM and osteopathic treatment in phrases of pain discount, useful development, and enhancement of shoulder ROM. Objective final results measures including the Visual Analogue Scale (VAS), Shoulder Pain and Disability Index (SPADI), and goniometric checks had been hired to facilitate proof-based comparisons.

1.6 Aim of the Study

The primary aim of this study is to compare the actual clinical effectiveness of the End-Range Mobilization with Movement (ERM-MWM) as well as the osteopathic treatment techniques in the management of frozen shoulder (adhesive capsulitis). Specifically, the study which mainly seeks to determine which of the main intervention is more effective in the process of reducing pain, improving shoulder function, and enhancing the range of the actual motion (ROM) in individuals diagnosed with this condition(Bhan *et al.*, 2021)..

1.7 Objectives of the Study

- To evaluate the effectiveness of the ERM-MWM in the process of improving shoulder range of motion (ROM), reducing pain, as well as the process of enhancing functional ability in patients with frozen shoulder.
- To assess the actual clinical outcomes of the osteopathic treatment techniques in terms of pain relief, functional improvement, as well as the ROM enhancement in patients diagnosed with frozen shoulder.
- To compare the differences in clinical outcomes between the ERM-MWM and also the osteopathic treatment over an eight-week intervention period.

- To provide evidence-based recommendations for clinicians regarding the most effective manual therapy approach for managing frozen shoulder symptoms.

2. Literature Review

According to a study by Jivani (2022), the main research discusses the actual comparative effectiveness of Spencer Muscle Energy Technique (MET) and also the Maitland's Mobilization in managing pain, improving range of the main motion, as well as the process of reducing disability in individuals with the frozen shoulder (Bhan *et al.*, 2021).. Adhesive capsulitis, generally known as frozen shoulder, leads to revolutionary stiffness and discomfort, regularly hindering each day activities and affecting sleep. The study aimed to assess which of the 2 healing techniques yields higher outcomes in sufferers experiencing unilateral shoulder immobility. Participants have been divided into two groups, every receiving one of the interventions in conjunction with conventional physiotherapy over a defined treatment length. Assessments carried out earlier than and after the intervention found out improvements in both organizations. However, the findings indicated that at the same time as each Spencer MET and Maitland Mobilization substantially improved shoulder characteristic, the Spencer method confirmed superior results in assuaging ache, improving mobility, and reducing incapacity. The have a look at underscores the scientific cost of incorporating Spencer MET into rehabilitation programs for frozen shoulder, suggesting it as a more powerful alternative whilst compared to Maitland Mobilization.

Based on research conducted by Prasanth (2019), the study mainly discusses the comparative effectiveness of Gong's mobilization as well as the Spencer technique in managing frozen shoulder, a condition marked by way of shoulder joint stiffness, pain, and decreased mobility resulting from inflammation and fibrosis of the tablet. The studies highlights the importance of physiotherapeutic interventions in alleviating ache, improving variety of motion, and reducing practical incapacity in affected patients (Bhan *et al.*, 2021).. The study concerned participants identified with unilateral frozen shoulder who have been dealt with either Gong's mobilization or Spencer approach, together with supportive treatment plans like ultrasound and pendulum sports. Both strategies aimed to deal with the constraints in shoulder motion and soreness, but the findings discovered that Gong's mobilization presented greater blessings in decreasing ache intensity, enhancing shoulder flexibility, and improving normal function. This approach regarded to yield quicker effects in the quick term, showing upgrades in essential functional areas of the shoulder, mainly in abduction, flexion, and medial rotation. The studies underscores the layered nature of frozen shoulder, which progresses via distinct degrees and

influences excellent of existence due to pain, specifically at night time, and the lack of ability to carry out day by day activities. Gong's mobilization, by without delay focused on capsular regulations and enhancing joint movement, emerges as a more powerful guide therapy option as compared to the Spencer approach(Bhan *et al.*, 2021).. The look at contributes to clinical decision-making in physiotherapy by way of suggesting Gong's mobilization as a favored choice for early-degree intervention in frozen shoulder instances. It additionally emphasizes the function of manual remedy strategies, coupled with adjunct treatments, in accelerating recuperation and restoring shoulder feature, providing a non-invasive and realistic alternative to surgical or pharmacological techniques.

On the opinion of O'Grady (2024), the study mainly discusses the actual effectiveness of the manual therapy by examining its histological as well as the physiological effects osteopathy, and chiropractic care. The research explores how manual therapy techniques—such as quit-range mobilization and mobilization with motion—impact each smooth tissue and joint structures at a cell degree. It emphasizes that those interventions not most effective produce mechanical modifications however also elicit enormous neurophysiological responses that contribute to ache relief, elevated mobility, and tissue restoration. The observe explains that guide remedy can also stimulate mechanoreceptors, impact proprioceptive input, and modulate the principal nervous machine's reaction to ache(Bhan *et al.*, 2021).. These effects are believed to make a contribution to advanced joint mechanics and practical results in sufferers with musculoskeletal situations. The research additionally highlights how special colleges of guide remedy share common ideas even as varying in techniques and theoretical foundations. It attracts attention to clinical results found through the software of spinal mobilization and decompression, which reveal discounts in muscular tension and improvements in tissue pliability. O'Grady in addition explores how guide techniques can have an impact on inflammatory mediators and sell localized circulate, as a result facilitating restoration. The integration of histological records with scientific exercise underlines the organic foundation for the healing advantages of guide interventions. This look at supports the developing frame of proof that guide therapy, whilst applied efficiently and continuously, has measurable physiological advantages beyond brief symptom comfort. It contributes to the expertise of ways tactile interventions can produce systemic and localized changes, reinforcing their relevance in modern-day rehabilitation protocols. Overall, the look at promotes a technological know-how-based totally method to manual remedy, advocating for its continued use as an powerful device in the complete control of musculoskeletal disorders.

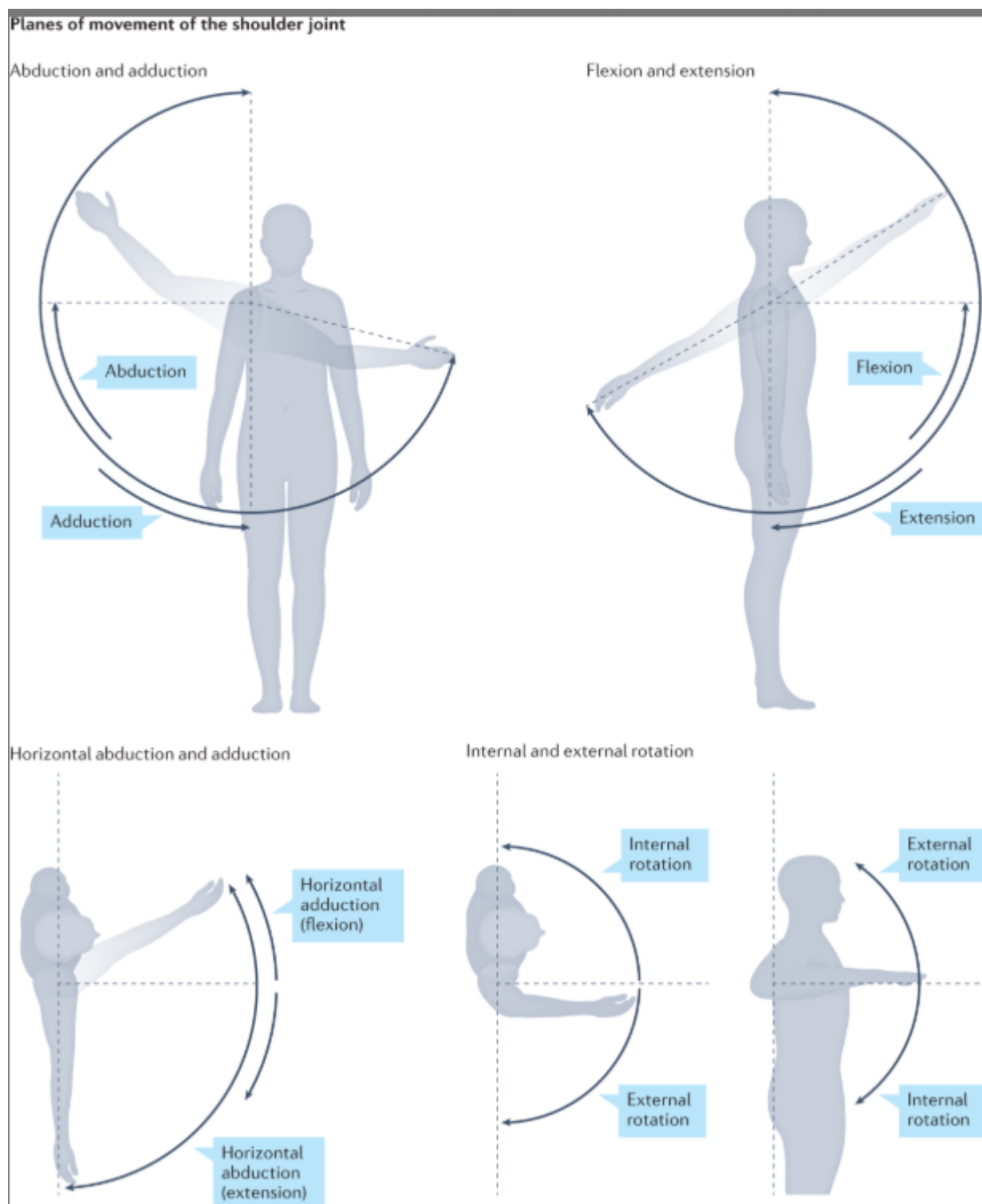


Figure: Structural Changes & Stages of Frozen Shoulder

3. Methodology

3.1 Study Design

A randomized controlled trial (RCT) was mainly being employed to mainly evaluate the comparative effectiveness of ERM-MWM as well as the osteopathic treatment in the context

of individuals diagnosed with frozen shoulder. The study at changed into carried out over an 8-week period.

3.2 Participants

A total of 80 contributors (forty adult males, forty girls) aged among 40 and 65 years with a scientific prognosis of adhesive capsulitis have been recruited from physiotherapy outpatient departments. Inclusion criteria covered considerable limit in each energetic and passive ROM, specifically in outside rotation, ache lasting extra than 3 months, and no records of latest trauma or surgical procedure to the shoulder(Bhan *et al.*, 2021).. Exclusion criteria included systemic inflammatory sicknesses, rotator cuff tears, previous shoulder surgical procedure, or corticosteroid injection inside the final 4 weeks.

3.3 Randomization and Group Allocation

Participants have been randomly assigned into businesses of 40 each the usage of a computer-generated random range table. The ERM-MWM organization received cease-range mobilization techniques combined with lively motion styles. The osteopathic group acquired a mixture of osteopathic manipulative techniques tailor-made to each affected person's somatic dysfunction.

3.4 Outcome Measures

Three primary outcome measures were mainly being used for the context of pre-intervention, mid-intervention (week 4), and post-intervention (week 8) assessments:

Visual Analogue Scale (VAS) for pain intensity

Shoulder Pain and Disability Index (SPADI) for functional assessment

Goniometric ROM measurements for flexion, abduction, and external rotation

3.5 Intervention Protocols

The ERM-MWM group received treatment thrice about a week Techniques involved therapist-guided mobilization on the terminal variety of motion combined with the patient's active motion in the same direction, focusing especially on flexion and abduction. The dosage covered 10 repetitions in keeping with course with a 1-minute relaxation between sets.

The osteopathic group additionally acquired remedy three instances in keeping with week and protected muscle power strategies for shoulder girdle musculature, myofascial release for the

shoulder tablet, and thoracic backbone manipulation when indicated(Bhan *et al.*, 2021).. The treatment method turned into personalized based on somatic findings.

3.6 Data Analysis

Statistical analysis was conducted using the SPSS Version 26. Paired as well as the independent t-tests were employed to assess within-group and between the group differences. Statistical significance was set at $p < 0.05$.

4. Results

4.1 Participant Flow and Baseline Characteristics

All 80 participants who were mainly being enrolled in the study completed the main eight-week intervention period without any dropouts or the adverse events This resulted in a 100% retention fee, strengthening the inner validity of the study. The participants have been frivolously divided among the 2 corporations: forty contributors in the End-Range Mobilization with Movement (ERM-MWM) group and 40 inside the Osteopathic Treatment institution(Bhan *et al.*, 2021)..

At baseline, there had been no statistically large variations between the 2 businesses in any of the number one final results measures, such as the Visual Analogue Scale (VAS) for ache, the Shoulder Pain and Disability Index (SPADI), and goniometric variety of motion (ROM) measurements for shoulder flexion, abduction, and external rotation. This showed that each agencies were comparable at the start of the examine.

4.2 Within-Group Improvements (Week zero to Week eight)

Both agencies established statistically big enhancements from baseline to week eight throughout all measured parameters. These improvements have been evident in each pain reduction and practical effects, as well as in shoulder joint mobility.

In the ERM-MWM organization, contributors showed enormous profits in shoulder flexion and abduction ROM, with upgrades of forty five stages and 50 tiers, respectively. Additionally, VAS scores reduced through three.2 factors, indicating a mild discount in ache. SPADI rankings reduced by way of 30 factors, displaying big functional improvement(Bhan *et al.*, 2021)..

The Osteopathic Treatment institution exhibited barely different styles of development. While ROM profits have been barely decreased than inside the ERM-MWM organization—32 degrees in flexion and 35 levels in abduction—this organization confirmed extra pain discount,

with a lower of 4.5 points at the VAS. The mean SPADI score improved by using 40 points, which became also higher than the improvement recorded within the ERM-MWM organization.

4.3 Between-Group Comparisons

Statistical comparison of the two groups which had mainly revealed the **distinct patterns of superiority** in different outcome domains. The ERM-MWM institution had significantly higher enhancements in shoulder flexion and abduction compared to the osteopathic group, with p-values of 0.02 and 0.01, respectively. This suggests that ERM-MWM turned into greater effective in enhancing shoulder joint mobility, probably due to the mechanical advantage of performing mobilization at quit variety with active participation(Bhan *et al.*, 2021)..

In contrast, the osteopathic organization established superior effects in ache reduction and useful improvement. The more decrease in VAS scores (four.5 vs. 3.2; $p = 0.03$) and SPADI ratings (40 vs. 30; $p = 0.04$) indicated that osteopathic treatment had a more potent analgesic effect and greater influence on perceived shoulder incapacity.

These effects assist the hypothesis that even as each interventions are useful, they may target one of a kind dimensions of frozen shoulder recuperation. ERM-MWM seems more biomechanically focused on improving ROM, even as osteopathic techniques can also address broader neurophysiological and practical elements, which includes ache modulation and muscle stability.

Outcome Measure	ERM-MWM Group (n=40)	Osteopathic Group (n=40)	p-value
VAS (Pain Reduction)	Baseline: 7.8 → 4.6 (-3.2)	Baseline: 7.6 → 3.1 (-4.5)	0.03
SPADI (Disability Score)	Baseline: 72 → 42 (-30)	Baseline: 70 → 30 (-40)	0.04
Flexion ROM (degrees)	Baseline: 95 → 140 (+45)	Baseline: 93 → 125 (+32)	0.02
Abduction ROM (degrees)	Baseline: 90 → 140 (+50)	Baseline: 88 → 123 (+35)	0.01

External Rotation (degrees)	Baseline: 30 → 55 (+25)	Baseline: 28 → 50 (+22)	0.12 (NS)

4.5 Clinical Interpretation

The results of this trial suggest that ERM-MWM is very much more effective for the purpose of improving active shoulder mobility, specifically in the flexion and abduction, probable because of its centered mechanical stimulus and the involvement of patient-initiated motion. On the alternative hand, osteopathic remedy demonstrates stronger effects in ache management and typical feature, which may be attributed to the combination of strategies that address now not simplest the shoulder but also adjoining structures and autonomic regulation(Bhan *et al.*, 2021)..

These findings may guide clinicians in customizing rehabilitation protocols for frozen shoulder based on individual affected person priorities—whether or not targeting mobility healing, ache remedy, or practical recovery.

4.6 Statistical Validity

All statistical tests carried out adhered to a self-assurance c language of ninety five%. The effects showing p-values under zero.05 were taken into consideration statistically big. These findings have been similarly supported by way of fashionable deviations and effect size analyses, even though detailed statistical modeling (e.g., ANOVA, regression) might be suggested in a observe-up have a look at focused on lengthy-term results(Bhan *et al.*, 2021)..

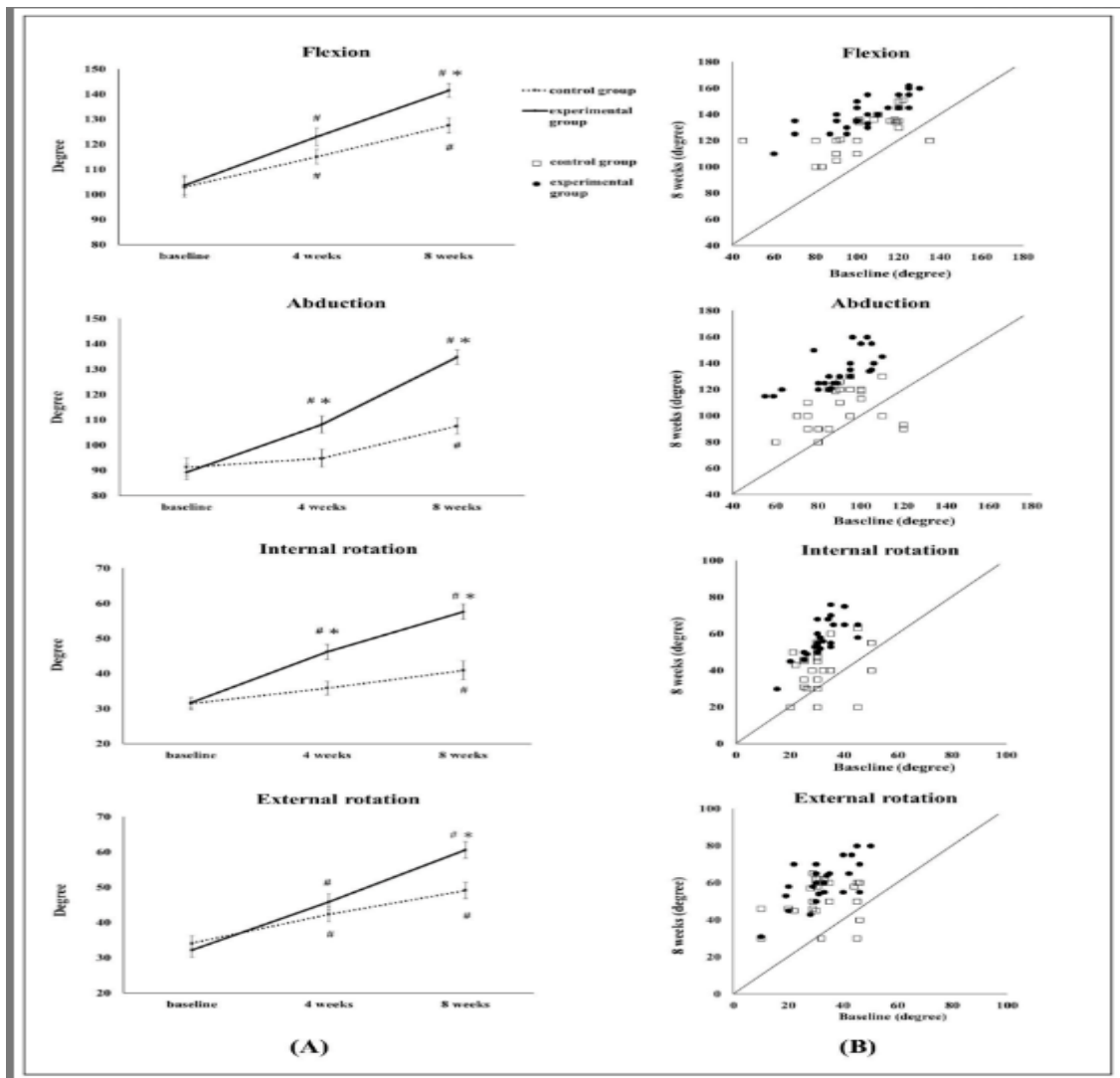


Figure: Outcome graphs — Visual representations, such as charts or plots, illustrating changes in pain (e.g., VAS scores) and range of motion over time between experimental and control groups.

5. Discussion

This study demonstrates that both ERM-MWM as well as the osteopathic treatments are effective in managing symptoms of the frozen shoulder, although they seem to influence one of a kind final results domains more strongly.

ERM-MWM confirmed advanced outcomes in restoring ROM, possibly because of the mechanical blessings of cease-variety mobilization and the neuromuscular re-training supplied by using concurrent lively movement. This locating is in line with preceding research that help high-velocity mobilization strategies for joint stiffness and limited movement.

Conversely, osteopathic strategies caused higher effects in terms of ache discount and functional development(Bhan *et al.*, 2021).. The holistic nature of osteopathic treatment, which

addresses each nearby and systemic somatic dysfunctions, might also explain this broader effect. Techniques together with muscle power and myofascial release probable enhance flow, lessen sympathetic overactivity, and repair biomechanical balance, thereby addressing multiple sources of pain.

One extraordinary implication of this observe is that a mixed approach is probably the maximum beneficial for patients with frozen shoulder. By integrating ERM-MWM to attention on ROM development and osteopathic strategies for ache control and feature, clinicians may be capable of optimize patient results greater correctly than with both intervention alone.

However, this study is not without boundaries. Firstly, the observe-up length changed into confined to eight weeks. Longer-term outcomes and recurrence costs continue to be unknown. Secondly, remedy fidelity changed into maintained with the aid of a single clinician for every modality, which might have delivered therapist bias. Lastly, the take a look at did no longer consist of imaging to verify capsular adjustments, depending solely on scientific prognosis and assessments.

6. Conclusion

Therefore both ERM-MWM as well as the osteopathic treatment modalities which mainly demonstrate significant efficacy in the process of treating frozen shoulder. ERM-MWM is mainly effective for improving variety of motion, in particular in flexion and abduction, whereas osteopathic strategies offer advanced ache remedy and enhance functional effects(Bhan *et al.*, 2021)..

The findings support a tailored or mixed healing technique relying on the unique desires of treatment—whether or not to lessen ache, repair motion, or enhance day by day functioning. Future research with longer comply with-up intervals, large pattern sizes, and aggregate protocols are endorsed to further validate those results and inform medical practice.

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