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Comparative Effects of Sequential Versus Non-Sequential Spencer Techniques on Pain, Range of Motion and Functional Outcomes in Patients with Frozen Shoulder

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ABSTRACT

Background: Adhesive capsulitis is a painful and disabling shoulder disorder marked by progressive stiffness and functional decline, frequently requiring prolonged rehabilitation. The Spencer muscle energy technique is widely used, yet whether structured sequencing of its steps improves outcomes remains uncertain. Objective: To compare Sequential versus Non-Sequential application of the Spencer technique for improving pain, range of motion (ROM), and functional outcomes in patients with adhesive capsulitis. Methods: In this single-blind randomized controlled trial, 40 participants with idiopathic adhesive capsulitis were allocated to Sequential Spencer Technique (SST; n=20) or Non-Sequential Spencer Technique (NSST; n=20). Both groups received identical standardized physiotherapy (TENS, hot pack, ultrasound) and exercises. Outcomes included Numeric Pain Rating Scale (NPRS), Shoulder Pain and Disability Index (SPADI), and shoulder ROM in six planes measured pre- and post-intervention after three weeks. Between-group comparisons were performed using independent tests, with within-group analyses using paired tests. Results: Both groups showed significant improvements in NPRS, SPADI, and ROM (all $p<0.001$). SST produced greater post-treatment pain reduction than NSST (NPRS 1.45 ± 0.88 vs 2.40 ± 0.94; $p=0.002$) and superior functional recovery (SPADI 32.85 ± 7.60 vs 40.25 ± 8.05; $p=0.007$). ROM gains were significantly larger in SST across flexion, extension, abduction, adduction, internal rotation, and external rotation (all $p<0.05$). Conclusion: Sequencing within the Spencer technique enhances pain relief, ROM restoration, and functional recovery in adhesive capsulitis, supporting structured progression as a preferred clinical approach.

Keywords

Adhesive capsulitis; frozen shoulder; Spencer technique; muscle energy technique; manual therapy; sequencing; range of motion; SPADI; NPRS

INTRODUCTION

Adhesive capsulitis (frozen shoulder) is a common, disabling shoulder disorder characterized by progressive pain, capsular stiffness, and global restriction of both active and passive glenohumeral motion, often resulting in substantial limitations in sleep, self-care, work tasks, and overhead function (1). The condition typically affects adults in midlife, with a higher prevalence in women and a markedly increased risk among individuals with metabolic or endocrine comorbidities—particularly diabetes mellitus and thyroid dysfunction—suggesting systemic contributions to capsular fibrosis and altered inflammatory signaling (2,3). Clinically, frozen shoulder presents with the classic capsular pattern of motion restriction, with external rotation usually affected earliest and most severely, while imaging is primarily used to exclude alternative causes of shoulder pain such as rotator cuff tears, arthritis, labral injury, or cervical radiculopathy (4,5). The natural course is often described as overlapping freezing, frozen, and thawing phases, and although many patients improve over time, a meaningful proportion continue to report persistent pain, stiffness, or disability years after onset, underscoring the need for effective and time-efficient rehabilitation strategies (2,3).

Conservative management remains the first-line approach and typically includes patient education, analgesics or anti-inflammatory medication, intra-articular corticosteroid injection in selected cases, and structured physical therapy aimed at pain modulation, mobility restoration, and functional recovery (3,6). Contemporary practice surveys indicate wide variability in physiotherapy approaches, reflecting ongoing uncertainty regarding the optimal combination, intensity, and ordering of manual therapy and exercise interventions in frozen shoulder rehabilitation (7). Manual therapy is frequently employed to address capsular restriction and pain-related guarding, with randomized trials supporting mobilization-based approaches for improving pain and motion, although comparative effectiveness across different techniques remains inconsistent (8). The Spencer muscle energy technique (MET), originally described as a structured seven-step osteopathic mobilization approach, has been used to improve glenohumeral and scapulothoracic mobility through graded stretching, joint circulation enhancement, lymphatic facilitation, and neuromuscular relaxation mechanisms (9). Clinical studies have shown that Spencer MET can reduce pain and disability and improve range of motion in adhesive capsulitis, either as a stand-alone intervention or when combined with conventional physiotherapy, with several comparative trials reporting outcomes comparable to or better than other commonly used manual strategies (4,10,11).

Despite this growing evidence base, existing trials largely evaluate Spencer MET as a single "package" or compare it against alternative techniques, without isolating whether the sequence of the seven Spencer steps contributes meaningfully to clinical response (10–12). In clinical practice, therapists may apply the Spencer steps sequentially as originally described or in a non-sequential order based on patient tolerance or therapist preference, yet the therapeutic consequences of disrupting the structured progression remain unclear. From a mechanistic perspective, sequencing could plausibly influence outcomes by optimizing graded capsular loading, reducing nociceptive sensitization before higher-demand end-range maneuvers, and improving tissue compliance progressively through viscoelastic and neurophysiological adaptations (9). The absence of direct comparative evidence creates a practical knowledge gap for clinicians, particularly when time constraints and symptom severity force decisions about how to prioritize mobilization steps within a treatment session.

Therefore, this randomized controlled trial aimed to compare the effects of Sequential versus Non-Sequential application of the Spencer technique on pain intensity, shoulder range of motion, and functional outcomes in individuals with adhesive capsulitis. The study hypothesis was that Sequential Spencer Technique would produce superior improvements in pain, mobility, and functional disability compared with a Non-Sequential application over a standardized three-week physiotherapy program (4,9).

MATERIALS AND METHODS

This single-blind, parallel-group randomized controlled trial compared Sequential Spencer Technique (SST) with Non-Sequential Spencer Technique (NSST) for the management of idiopathic adhesive capsulitis. The study was conducted in Sialkot, Pakistan, with participants recruited from Bethania Hospital Sialkot, Gohadpur General Hospital Sialkot, and M.H. Physio Clinic Gohadpur, and the intervention program was delivered at the University of Management and Technology (UMT), Sialkot. The total study duration was four months after synopsis approval, including recruitment, allocation, intervention delivery, and outcome assessment. The trial was designed to determine whether maintaining the original order of Spencer steps yields superior clinical outcomes compared with applying the same steps in a rearranged order, while keeping the total dose of manual therapy, electrotherapy, and exercises constant between groups (9–12).

A non-probability convenience sampling strategy was used to enroll 40 participants diagnosed clinically with primary idiopathic adhesive capsulitis. Eligibility criteria included age 35–75 years, restricted shoulder movements for at least six months, and limitation in at least one major plane of shoulder motion including abduction, flexion, extension, internal rotation, or external rotation (13,14). Participants with diabetes mellitus were eligible given the strong epidemiological association with adhesive capsulitis and clinically relevant rehabilitation challenges in this population (2,15). To ensure enrollment of individuals with clinically meaningful symptoms, participants were required to have moderate pain reflected by an NPRS score between 3 and 8 and moderate-to-severe disability reflected by a SPADI score ≥30 (16,17). Exclusion criteria were recent shoulder dislocation, fracture, or trauma; rotator cuff injury; severe osteoporosis; cardiovascular or cerebrovascular disease; concurrent neurological, psychiatric, or serious systemic disorders; cervical radiculopathy or neck-related referred pain; and positive Hawkins–Kennedy, Neer, Jobe, or Speed's tests indicating alternative shoulder pathology such as subacromial impingement, biceps tendinopathy, or rotator cuff disease (14,18,19). Participants with shoulder pain without glenohumeral mobility restriction were also excluded to avoid including impingement-dominant syndromes rather than adhesive capsulitis (19).

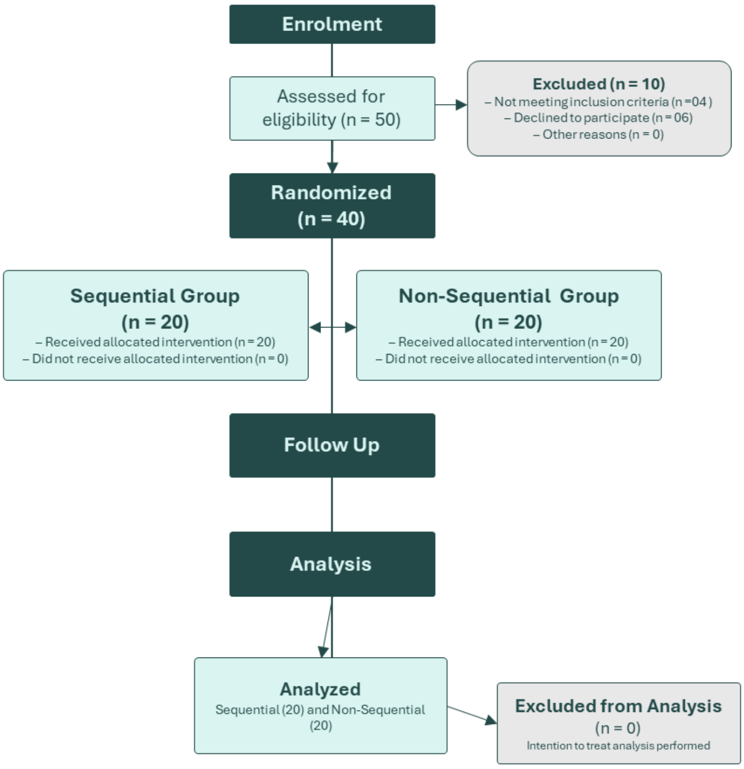

Figure 1 CONSORT Flowchart

After screening for eligibility, participants were provided with study information and gave written informed consent before baseline assessment. Randomization was performed using a random number generator table, allocating participants in a 1:1 ratio to either the Sequential Spencer Technique group (Group A, n=20) or the Non-Sequential Spencer Technique group (Group B, n=20). The study was single-blinded at the participant level to minimize expectation bias. All baseline and post-intervention assessments were performed using standardized procedures and validated instruments to support reproducibility and measurement reliability (16,17,20,21).

Pain intensity was measured using the Numeric Pain Rating Scale (NPRS), a valid and widely used 0–10 scale with established utility for clinical research and sensitivity to change (16). Functional status and disability were measured using the Shoulder Pain and Disability Index (SPADI), a shoulder-specific instrument consisting of 13 items that yields a total score expressed as a percentage, with higher scores indicating greater impairment; SPADI has demonstrated acceptable reliability and validity in frozen shoulder populations (17). Shoulder active range of motion (AROM) was measured using universal goniometry, which is commonly applied in musculoskeletal research and demonstrates acceptable reliability when standardized positioning and anatomical landmarks are used (20,21). Range of motion was assessed in six planes: flexion,

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extension, abduction, adduction, internal rotation, and external rotation. Measurements were taken with participants seated or supine as appropriate, using consistent positioning and the same measurement approach pre- and post-treatment.

Both groups received a standardized physiotherapy protocol consisting of electrotherapy and therapeutic exercises to reduce confounding related to co-interventions. The standardized protocol included burst-mode TENS at 100 Hz for 10 minutes administered concurrently with a hot pack, followed by continuous ultrasound at 3 MHz and 1.5 W/cm² for 8 minutes applied over the shoulder capsule, and then supervised exercises (finger ladder, shoulder wheel, shoulder pulley, pendulum, and suspension exercises) for 10 minutes (22–25). The full session duration was 48 minutes, including 18 minutes of standardized electrotherapy, approximately 20 minutes of Spencer technique application (Sequential or Non-Sequential), and 10 minutes of exercises. Interventions were delivered four times per week for three weeks, with 5 repetitions per set and one set per session. Participants were advised not to receive any other shoulder intervention during the treatment period to reduce contamination bias.

In Group A (SST), the Spencer steps were applied in the sequential order as described: extension with elbow flexed, flexion with elbow extended, compression circumduction, circumduction with traction with elbow flexed, adduction with external rotation with elbow flexed, internal rotation, and stretching/pumping with the arm extended (9,11). In Group B (NSST), the same seven steps were applied but in a non-sequential order: flexion with elbow extended, extension with elbow flexed, circumduction with elbow flexed, compression circumduction, internal rotation, adduction with external rotation, and stretching/pumping with the arm extended. Participant positioning for both groups was sitting or side-lying as per comfort. The intervention targeted the glenohumeral joint of the affected shoulder.

To address potential bias and confounding, random allocation was used to balance both measured and unmeasured factors between groups. Baseline comparability was evaluated for age, pain, and disability outcomes. Standardized co-interventions and identical session duration were applied for both groups to ensure that the only systematic difference was the sequencing of Spencer steps. Assumption checks for parametric testing included Shapiro–Wilk tests for normality and Levene's tests for homogeneity of variance.

Statistical analysis was performed using IBM SPSS. Continuous variables were summarized as mean ± standard deviation and categorical variables as frequency and percentage. Within-group pre–post changes were analyzed using paired-sample t-tests for normally distributed variables or Wilcoxon signed-rank tests if non-normal. Between-group comparisons were performed using independent-sample t-tests for post-treatment outcomes and change scores, or Mann–Whitney U tests if distributions were non-normal. The primary outcome was NPRS change from baseline to post-treatment, and secondary outcomes were SPADI and ROM changes across the six planes. Statistical significance was set at $p<0.05$, and 95% confidence intervals were reported where applicable to support clinical interpretation.

Ethical approval was obtained from the Ethical Review Committee at UMT, Sialkot. The study was conducted in accordance with the Declaration of Helsinki, confidentiality was maintained, and participation was voluntary with the right to withdraw at any stage without penalty.

RESULTS

SPADI scores demonstrated approximately normal distributions at baseline and post-intervention in the SST group (pre p=0.452; post p=0.321). In the NSST group, pre-intervention SPADI was normally distributed (p=0.612), while post-intervention SPADI was borderline (p=0.0498), supporting careful interpretation and, where necessary, use of non-parametric confirmation for post-treatment comparisons.

Table 1. Test of Normality for SPADI (Shapiro–Wilk)

Variable	Group	Statistic	df	p-value
SPADI (pre)	SST	0.968	20	0.452
SPADI (pre)	NSST	0.972	20	0.612
SPADI (post)	SST	0.959	20	0.321
SPADI (post)	NSST	0.965	20	0.0498

Table 2. Demographic Characteristics of Participants

Variable	SST (n=20)	NSST (n=20)
Age (years), mean ± SD	49.25 ± 9.13	49.15 ± 8.23
Male, n (%)	8 (40.0%)	4 (20.0%)
Female, n (%)	12 (60.0%)	16 (80.0%)

The mean age was comparable between groups (49.25 ± 9.13 vs 49.15 ± 8.23 years). Females were the predominant participants in both groups, comprising 60.0% (12/20) in SST and 80.0% (16/20) in NSST, consistent with epidemiological patterns reported for adhesive capsulitis.

Table 3. Baseline Comparability Between Groups

Variable	SST (n=20) mean ± SD	NSST (n=20) mean ± SD	p-value
Age (years)	49.25 ± 9.13	49.15 ± 8.20	0.914
Baseline NPRS	4.85 ± 1.18	5.25 ± 1.16	0.288
Baseline SPADI	64.05 ± 17.77	66.90 ± 15.05	0.587

Baseline comparability was confirmed. Mean NPRS was similar between groups (4.85 ± 1.18 vs 5.25 ± 1.16; p=0.288), indicating comparable baseline pain. Baseline SPADI scores were also similar (64.05 ± 17.77 vs 66.90 ± 15.05; p=0.587), supporting equivalent baseline disability. Both interventions produced statistically significant within-group improvements. Pain decreased by 3.40 points in SST (4.85 to 1.45) and by 2.85 points in NSST (5.25 to 2.40), with both changes highly significant (p<0.001). Function improved substantially, with SPADI decreasing by 32.55 points in SST (65.40 to 32.85) and by 25.85 points in NSST (66.10 to 40.25), also highly significant (p<0.001). Post-treatment pain was significantly lower in SST compared to NSST (1.45 ± 0.88 vs 2.40 ± 0.94), with a mean difference of −0.95 points favoring SST (p=0.002). The absence of a significant baseline difference supports that this advantage reflects treatment effect rather than baseline imbalance.

Table 4. Pre–Post Within-Group Changes in NPRS and SPADI

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Outcome	Group	Pre mean ± SD	Post mean ± SD	Mean Change	p-value (within)
NPRS	SST	4.85 ± 1.18	1.45 ± 0.88	−3.40	<0.001
NPRS	NSST	5.25 ± 1.16	2.40 ± 0.94	−2.85	<0.001
SPADI	SST	65.40 ± 8.25	32.85 ± 7.60	−32.55	<0.001
SPADI	NSST	66.10 ± 9.15	40.25 ± 8.05	−25.85	<0.001

Table 5. Between-Group Comparison of NPRS (Independent t-test)

Variable	SST (n=20) mean ± SD	NSST (n=20) mean ± SD	Mean Difference (SST–NSST)	p-value
Pre-treatment NPRS	4.85 ± 1.18	5.25 ± 1.16	−0.40	0.288
Post-treatment NPRS	1.45 ± 0.88	2.40 ± 0.94	−0.95	0.002

Table 6. Within-Group ROM Significance (Paired tests, p-values)

ROM Plane	SST p-value	NSST p-value
Flexion	<0.001	0.001
Extension	0.001	0.001
Abduction	<0.001	0.001
Adduction	<0.001	0.001
Internal Rotation	0.001	0.002
External Rotation	0.001	0.002

Both groups demonstrated statistically significant ROM improvements across all six planes. SST demonstrated stronger significance for flexion, abduction, and adduction (p<0.001) compared with NSST (p=0.001), indicating more robust improvement patterns.

Table 7. Between-Group Comparison of ROM Change Scores (Independent t-test)

ROM Plane	SST Change mean ± SD	NSST Change mean ± SD	Mean Difference	p-value
Flexion	42.25 ± 12.06	28.35 ± 10.38	+13.90	0.001
Extension	17.00 ± 7.42	10.00 ± 5.05	+7.00	0.001
Abduction	35.40 ± 10.82	22.25 ± 8.24	+13.15	0.001
Adduction	16.65 ± 4.38	11.00 ± 4.32	+5.65	0.001
Internal Rotation	21.50 ± 7.41	17.60 ± 4.67	+3.90	0.038
External Rotation	20.00 ± 6.16	15.55 ± 6.37	+4.45	0.021

ROM gains were significantly greater in SST than NSST across all planes. The largest between-group advantages were observed for flexion (+13.90°, p=0.001) and abduction (+13.15°, p=0.001), followed by extension (+7.00°, p=0.001) and adduction (+5.65°, p=0.001). Internal rotation and external rotation also favored SST with smaller but significant differences (+3.90°, p=0.038; +4.45°, p=0.021), indicating that sequencing may particularly enhance end-range restoration in clinically critical movements.

Table 8. Between-Group Comparison of SPADI (Independent t-test)

Variable	SST (n=20) mean ± SD	NSST (n=20) mean ± SD	Mean Difference (SST–NSST)	p-value
Pre-treatment SPADI	65.49 ± 8.25	66.10 ± 9.15	−0.61	0.780
Post-treatment SPADI	32.85 ± 7.60	40.25 ± 8.05	−7.40	0.007

Post-treatment SPADI scores were significantly lower in SST (32.85 ± 7.60) compared with NSST (40.25 ± 8.05), indicating superior functional recovery with sequencing (mean difference −7.40 points; p=0.007). Baseline SPADI was equivalent (p=0.780), strengthening causal inference that the post-treatment difference reflects intervention effectiveness.

DISCUSSION

This randomized controlled trial demonstrated that both Sequential and Non-Sequential Spencer Technique protocols, when delivered alongside a standardized physiotherapy program, produced statistically significant improvements in pain intensity, shoulder range of motion, and functional disability over three weeks in individuals with adhesive capsulitis. However, the magnitude of improvement was consistently greater in the Sequential Spencer Technique group, particularly for post-treatment pain reduction (NPRS 1.45 ± 0.88 vs 2.40 ± 0.94; p=0.002), functional recovery (SPADI 32.85 ± 7.60 vs 40.25 ± 8.05; p=0.007), and ROM change scores across all six planes (all p<0.05). These findings reinforce the clinical relevance of structured mobilization progression in frozen shoulder rehabilitation, a condition widely recognized for its prolonged course, high symptom burden, and variable response to conservative interventions (26–28). Because baseline demographics and clinical indices were comparable between groups, the observed superiority of sequencing is most plausibly attributable to the order of applied Spencer steps rather than baseline imbalance, supporting the internal validity of the comparative inference (29).

The overall improvements in both groups align with established evidence that physical therapy and manual mobilization are effective first-line strategies for frozen shoulder, targeting pain inhibition, capsular tightness, and functional restriction (30–33). International practice patterns show substantial variation in mobilization selection and dosing, reflecting uncertainty around optimal technique ordering and progression, particularly in patients with severe stiffness or pain-dominant phases (34). In this context, the present study adds a clinically pragmatic contribution: it isolates sequencing as an independent therapeutic determinant within an already validated manual therapy approach, addressing a gap that prior Spencer trials did not specifically evaluate (35,36). Importantly, the study design controlled co-intervention exposure by applying identical electrotherapy and exercise programs to both groups, making it unlikely that adjunct modalities alone explain the between-group differences (35–37).

The pain findings suggest that sequencing may influence neurophysiological modulation beyond the mechanical effects of the technique. In the Sequential group, the NPRS decreased by 3.40 points compared to 2.85 points in the Non-Sequential group, and post-treatment pain was nearly

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one point lower than in NSST, a difference that is statistically significant and clinically meaningful in symptomatic adhesive capsulitis management. Pain reduction is central because pain inhibits movement, amplifies fear-avoidance behaviors, and contributes to sleep disruption and disability in frozen shoulder (28,30). Spencer MET is believed to facilitate pain modulation through controlled patient-assisted isometric or isotonic contractions that activate post-isometric relaxation and reciprocal inhibition, thereby reducing muscle guarding and improving tolerance to end-range mobilization (4). A sequential approach may enhance these neurophysiological benefits by progressively preparing the capsule and periarticular tissues through graded loading, reducing nociceptive sensitivity before higher-demand steps such as traction circumduction and terminal rotational maneuvers. Such ordering is consistent with broader evidence that graded mobilization intensity influences pain and motion outcomes in adhesive capsulitis, with high-grade mobilization often producing superior functional results when tolerated (26).

The functional outcomes (SPADI) further support the added value of sequencing. Although both groups improved substantially, the Sequential group achieved a 32.55-point reduction, compared with 25.85 points in the Non-Sequential group, and post-treatment disability remained significantly lower in the Sequential group (32.85 ± 7.60 vs 40.25 ± 8.05; p=0.007). Functional disability in frozen shoulder is multifactorial and includes pain provocation during tasks, reduced end-range mobility, and compensatory scapulothoracic movement patterns that can perpetuate symptoms (27). The superiority of sequencing on SPADI likely reflects a combined effect of greater pain reduction and more complete restoration of clinically critical motion arcs, particularly flexion and abduction, which underpin overhead reach and many SPADI activities. This aligns with findings from Spencer trials showing clinically meaningful SPADI improvements compared with self-assisted ROM exercise or passive stretching protocols, suggesting that MET-based mobilization may better translate mobility gains into functional performance (37,38). It is also consistent with earlier evidence that combining Spencer MET with conventional physiotherapy improves functional disability more than conventional care alone (39).

The ROM results provide strong mechanistic coherence for the observed functional advantage. The Sequential group achieved significantly greater change scores in flexion (+42.25° vs +28.35°), abduction (+35.40° vs +22.25°), and extension (+17.00° vs +10.00°), with smaller but still significant advantages in internal and external rotation. In adhesive capsulitis, rotational losses—particularly external rotation—are typically early and pronounced due to capsular contracture and fibrosis, and their recovery is often slower and more treatment-resistant than elevation gains (31). The finding that sequencing improved both elevation and rotational planes suggests that structured progression may optimize capsular compliance globally rather than selectively improving only one motion domain. This is clinically relevant because restoration of external rotation and internal rotation is strongly associated with improved dressing, grooming, reaching behind the back, and lifting capacity, which are prominent determinants of SPADI disability scores (17). Comparable studies evaluating Spencer MET against Maitland or stretching interventions have also reported broad improvements in mobility and disability but have not clarified whether the internal ordering of Spencer steps influences the magnitude and speed of these changes (4,38).

When comparing the present results to the broader manual therapy literature, several parallels and distinctions emerge. Spencer MET has demonstrated superiority over passive stretching and self-ROM programs in pain and ROM outcomes (37,38), while other mobilization approaches—such as Mulligan or Gong mobilization—have shown strong performance in some trials, potentially due to their combined mechanical and sensorimotor effects (23,42). Yet the present study indicates that even within a single manual therapy approach, the dosing structure and progression may be key effect modifiers. This concept is clinically important because it suggests that the debate should not only be between techniques (e.g., Spencer vs Mulligan), but also about how a technique is delivered—specifically, whether step progression respects biomechanical tissue readiness and symptom-mediated tolerance (41,42). Some evidence suggests that adjunct strategies and structured programs enhance the effectiveness of Spencer MET, including in diabetic stiff shoulder populations where capsular fibrosis and metabolic factors may limit recovery (40). The current findings support the inference that a structured sequential protocol may be particularly valuable in complex patients by reducing symptom flares and improving adherence to end-range mobilization steps, which are often the most limited and painful in adhesive capsulitis.

Measurement reliability and validity also support the credibility of the reported changes. NPRS has strong validity and utility in musculoskeletal research and is sensitive to clinically meaningful shifts in pain intensity (50,51). SPADI is validated in frozen shoulder populations and captures both pain and activity-limiting disability, supporting interpretation beyond pain alone (49). Universal goniometry, while susceptible to measurement error, remains widely acceptable when standardized, and contemporary evidence supports its reliability and concurrent validity for shoulder ROM assessment when anatomical landmarks and consistent protocols are applied (48). The consistent direction of effect across all outcomes and the significant between-group differences across multiple ROM planes reduce the likelihood that results are attributable solely to random measurement variability.

Several considerations should inform interpretation. The short-term design provides high internal validity for immediate response but limits inference on long-term sustainability, which is clinically relevant given the prolonged natural course and recurrence risk of symptoms in a subset of frozen shoulder patients (30,32). Additionally, convenience sampling and a modest sample size (n=40) may limit generalizability, and subgroup effects by stage of adhesive capsulitis, diabetes status, or baseline stiffness severity were not evaluated. Nonetheless, the magnitude and consistency of superiority with sequencing, coupled with controlled co-intervention exposure and randomized allocation, provide strong evidence that step ordering is a meaningful determinant of clinical response. Future trials should incorporate stratified randomization by frozen shoulder stage and metabolic comorbidity, longer follow-up (3–12 months), and potentially imaging confirmation of capsular or synovial changes to clarify whether sequencing influences structural remodeling or primarily modulates pain and movement tolerance (2,8,33).

Collectively, this study supports a clinically actionable conclusion: Spencer MET is effective in adhesive capsulitis, but delivering it in a structured sequential progression yields superior reductions in pain, greater restoration of ROM, and better functional recovery. This emphasizes that mobilization techniques should be conceptualized not only as discrete maneuvers but as ordered therapeutic progressions designed to optimize biomechanical and neurophysiological recovery in a condition where pain, stiffness, and disability interact dynamically (31,34).

CONCLUSION

In patients with adhesive capsulitis, both Sequential and Non-Sequential Spencer Technique protocols produced significant short-term improvements in pain intensity, shoulder range of motion, and functional disability when combined with standardized physiotherapy; however, the Sequential Spencer Technique achieved significantly superior outcomes, including greater pain reduction, larger ROM gains across all planes, and a more pronounced improvement in SPADI-based function, indicating that structured progression of Spencer steps enhances therapeutic effectiveness and should be considered a preferred clinical approach for optimizing recovery in frozen shoulder.

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