JHWCR JOURNAL OF HEALTH, WELLNESS AND COMMUNITY RESEARCH 3007-0570

https://doi.org/10.61919/wf74pb06

Original Article

Effects of Gong's Mobilization Versus Spencer Technique On ADLs and Pain in Patients with Adhesive Capsulitis: A Randomized Controlled Trial

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"Cite this Article" Received: 07 March 2026; **Accepted**: 28 May 2026; **Published**: 07 June 2026

Author Contributions: Concept: NF, MZK; Design: NF, MZK; Supervision: MZK, NQ; Co-supervision: NQ; Data Collection: NF; Analysis: SIB; Drafting: NF, MZK; Review and Approval: MZK, NQ, SIA, SIB.. **Ethical Approval**: Al Razi Institute, Lahore, Pakistan. **Informed Consent**: Written informed consent was obtained from all participants; **Conflict of Interest**: The authors declare no conflict of interest. **Funding**: No external funding; **Data Availability**: Available from the corresponding author on reasonable request; **Acknowledgments**: N/A.

ABSTRACT

Background: Adhesive capsulitis is a painful and disabling shoulder disorder characterized by progressive restriction of active and passive glenohumeral motion, pain, stiffness, and difficulty performing activities of daily living. Manual therapy is commonly used in physiotherapy management, but comparative evidence regarding the relative effectiveness of Gong's mobilization and the Spencer technique remains limited. **Objective:** To compare the effects of Gong's mobilization and the Spencer technique on pain intensity, shoulder-related disability, and upper-extremity functional performance in patients with adhesive capsulitis. **Methods:** This randomized controlled trial included 126 participants with adhesive capsulitis who were allocated equally into two groups. The Gong's mobilization group received corrective gliding, distraction, oscillatory mobilization, and sustained stretching, while the Spencer technique group received a standardized sequential shoulder mobilization protocol. Both groups received the same baseline physiotherapy treatment. Outcomes were assessed using the Numeric Pain Rating Scale, Shoulder Pain and Disability Index, and Upper Extremity Functional Index. Data were analyzed using appropriate parametric and non-parametric tests, with significance set at $p < .05$. **Results:** Gong's mobilization produced significantly better post-treatment outcomes than the Spencer technique. NPRS scores were lower in the Gong's mobilization group than in the Spencer technique group (3.56 ± 1.31 vs 4.34 ± 1.39; mean difference -0.78; 95% CI -1.26 to -0.30; $p = .001$). SPADI total scores were also lower (324.60 ± 85.55 vs 470.16 ± 77.48; mean difference -145.56; 95% CI -174.35 to -116.77; $p < .001$), while UEFI scores were higher (105.67 ± 17.53 vs 89.06 ± 12.01; mean difference 16.61; 95% CI 11.31 to 21.91; $p < .001$). **Conclusion:** Gong's mobilization was more effective than the Spencer technique in reducing pain and shoulder-related disability and improving upper-extremity functional performance among patients with adhesive capsulitis. **Keywords:** Adhesive capsulitis; frozen shoulder; Gong's mobilization; Spencer technique; pain; activities of daily living; SPADI; UEFI.

INTRODUCTION

Adhesive capsulitis, commonly referred to as frozen shoulder, is a painful and disabling musculoskeletal condition characterized by progressive restriction of both active and passive glenohumeral range of motion, most prominently involving external rotation, abduction, and internal rotation. The condition is usually associated with capsular inflammation, synovial thickening, fibrosis, and contracture of the glenohumeral joint capsule, leading to persistent pain, stiffness, sleep disturbance, and difficulty in performing activities of daily living such as dressing, grooming, reaching overhead, lifting objects, and

personal care. Although adhesive capsulitis is often described as self-limiting, recovery may be prolonged, and many patients experience residual pain, functional limitation, and reduced quality of life for months or years if appropriate rehabilitation is delayed or inadequately targeted. The disorder commonly affects individuals between 40 and 60 years of age and has been reported more frequently among women and among individuals with metabolic and endocrine conditions, particularly diabetes mellitus and thyroid dysfunction (1).

The clinical burden of adhesive capsulitis is important because the disorder affects both physical capacity and functional independence. Pain limits active participation in exercise, while capsular tightness restricts shoulder mechanics and contributes to compensatory scapulothoracic movements. These limitations may reduce upper-limb efficiency during daily tasks and increase dependence on the unaffected limb. Conservative management therefore aims not only to reduce pain but also to restore capsular mobility, improve joint arthrokinematics, enhance shoulder range of motion, and improve performance in activities of daily living. Common non-surgical treatment options include patient education, analgesics or non-steroidal anti-inflammatory drugs, corticosteroid injections, therapeutic exercise, electrotherapy, stretching, and manual therapy techniques. Among these approaches, physiotherapy-based mobilization remains a central component of rehabilitation because it directly targets joint stiffness, soft-tissue restriction, pain modulation, and functional recovery (2).

Manual therapy techniques used in adhesive capsulitis are believed to produce clinical improvement through mechanical and neurophysiological mechanisms. Mechanically, mobilization may stretch contracted capsular structures, restore accessory gliding movements of the humeral head, and improve alignment between the humeral head and glenoid fossa during functional shoulder movement. Neurophysiologically, graded mobilization may stimulate mechanoreceptors, inhibit nociceptive input, reduce protective muscle guarding, and improve tolerance to movement. These effects are particularly relevant in adhesive capsulitis, where pain and stiffness interact to reduce active use of the affected limb. Improved joint mobility may also support better local circulation and soft-tissue extensibility, thereby enabling patients to participate more effectively in strengthening and functional exercises (3).

Gong's mobilization is an end-range manual therapy technique developed to improve shoulder mobility, particularly in patients with restricted glenohumeral motion. The technique involves corrective gliding of the humeral head, commonly in an anteroposterior direction, combined with distraction, oscillatory mobilization, sustained stretching, and movement at or near the restricted range. In adhesive capsulitis, where altered humeral head mechanics and capsular tightness contribute to painful restriction, Gong's mobilization may help restore more normal arthrokinematics and reduce mechanical stress during shoulder movement. Previous studies have reported beneficial effects of Gong's mobilization on pain, range of motion, and shoulder-related disability, particularly when applied alongside conventional physiotherapy interventions (4,5).

The Spencer technique is another manual therapy approach used for shoulder dysfunction and is commonly described as a sequence of osteopathic mobilization procedures performed through controlled shoulder movements. The technique typically includes shoulder extension, flexion, circumduction with compression and distraction, abduction with internal rotation, adduction with external rotation, and internal rotation movements. These steps are intended to mobilize the glenohumeral and scapulothoracic joints, improve soft-tissue flexibility, enhance circulation, reduce pain, and restore functional shoulder mobility. Evidence suggests that the Spencer technique may improve pain, range of motion, and disability in patients with frozen shoulder, either as a stand-alone manual therapy intervention or as an adjunct to conventional physiotherapy (6,7).

Despite the reported benefits of both Gong's mobilization and the Spencer technique, comparative evidence remains limited, particularly in relation to their effects on pain intensity and activity-related upper-limb function in patients with adhesive capsulitis. Existing studies have often used small samples, variable treatment protocols, different outcome measures, or short follow-up periods, making it difficult

to determine which technique provides greater clinical benefit when applied under similar rehabilitation conditions. This gap is important for physiotherapy practice because clinicians require evidence-based guidance when selecting manual therapy interventions that can produce meaningful improvement in pain and daily functional performance within a practical treatment period (8,9).

Pain intensity and functional capacity are clinically relevant outcomes in adhesive capsulitis because they reflect both symptom severity and the patient's ability to use the affected upper limb during daily activities. The Numeric Pain Rating Scale provides a simple and clinically interpretable measure of pain intensity, whereas the Shoulder Pain and Disability Index evaluates shoulder-specific pain and disability. The Upper Extremity Functional Index complements these measures by assessing broader upper-limb function during activity-based tasks. Together, these outcomes allow a multidimensional assessment of treatment response, covering pain reduction, shoulder-specific disability, and activity-related upper-extremity function (10).

The present randomized controlled trial was therefore designed to compare the effects of Gong's mobilization and the Spencer technique on pain and activities of daily living in patients with adhesive capsulitis. The study was based on the PICO framework, in which the population comprised patients with adhesive capsulitis, the intervention was Gong's mobilization, the comparator was the Spencer technique, and the outcomes were pain intensity, shoulder pain and disability, and upper-extremity functional performance measured using NPRS, SPADI, and UEFI. The objective of the study was to determine whether Gong's mobilization produces greater improvement than the Spencer technique in reducing pain and improving functional activity among patients with adhesive capsulitis. It was hypothesized that patients receiving Gong's mobilization would demonstrate significantly greater improvement in pain and activity-related functional outcomes than patients receiving the Spencer technique.

MATERIALS AND METHODS

This study was conducted as a randomized controlled trial to compare the effects of Gong's mobilization and the Spencer technique on pain intensity and activities of daily living in patients with adhesive capsulitis. A pretest-posttest, two-arm, parallel-group design was used, with eligible participants allocated in a 1:1 ratio to either the Gong's mobilization group or the Spencer technique group. The trial design was selected to allow direct comparison of two active manual therapy interventions under similar clinical conditions and to determine whether one technique produced superior improvement in pain and functional outcomes over the treatment period.

The study was conducted at Nawaz Sharif Hospital, Lahore, Pakistan, after approval from the relevant ethical review committee. The total study duration was six months following ethical approval. Participants were recruited from patients presenting to the physiotherapy department with clinical features consistent with adhesive capsulitis. Potential participants were screened through history, clinical examination, and assessment of shoulder movement restriction. Written informed consent was obtained from all participants before enrollment, and participants were informed about the study purpose, intervention procedures, possible benefits, minimal risks, confidentiality of data, and their right to withdraw at any stage without affecting their routine care.

The target population consisted of adult patients with adhesive capsulitis presenting with shoulder pain, stiffness, progressive loss of range of motion, and limitation in daily functional activities. Participants were included if they had clinical evidence of adhesive capsulitis with painful restriction of active and passive shoulder movements, capsular pattern involvement, and symptoms affecting activities of daily living. Participants were excluded if they had a history of shoulder surgery, fracture, tumor, infection, recent trauma, traumatic shoulder pathology, or any other condition that could interfere with safe application of manual therapy or confound interpretation of treatment response. Patients with shoulder symptoms primarily attributable to non-capsular causes were not enrolled.

A total of 126 participants were enrolled and allocated equally into two treatment arms, with 63 participants in the Gong's mobilization group and 63 participants in the Spencer technique group. The sample size was determined before data collection to provide adequate power for detecting between-group differences in pain and functional outcomes. Participants who fulfilled the eligibility criteria were assigned a study identification code and allocated to one of the two intervention groups. Allocation was implemented before treatment initiation, and outcome assessment was performed using the same standardized tools at baseline and after completion of the intervention period.

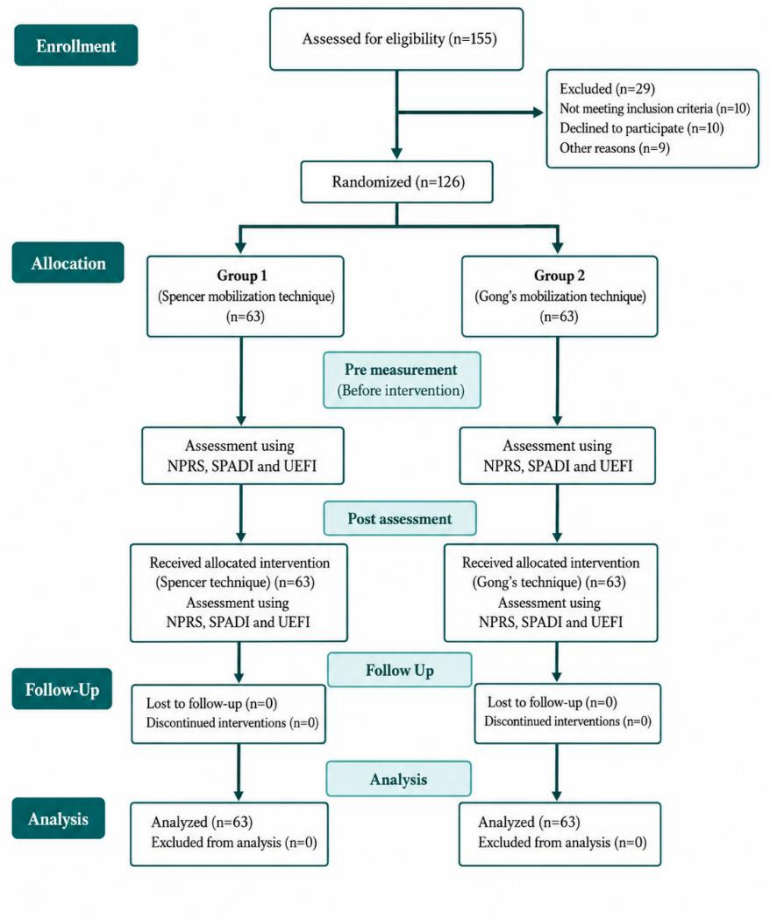

Figure 1 CONSORT Flowchart

Baseline assessment included demographic and clinical information, including age, sex, duration of symptoms, affected shoulder characteristics, pain intensity, shoulder-related disability, and upper-extremity functional performance. A detailed clinical history was obtained to identify the onset, duration, severity, aggravating and relieving factors, functional limitations, previous treatment exposure, and any red flags or comorbid conditions relevant to shoulder rehabilitation. Physical examination included observation of shoulder posture and movement pattern, palpation for tenderness and local tissue response, and assessment of active and passive shoulder movement restriction. Pain and function were assessed using standardized outcome measures before the start of treatment and after completion of the intervention protocol.

Pain intensity was measured using the Numeric Pain Rating Scale, an 11-point scale ranging from 0 to 10, where 0 indicates no pain and 10 indicates the worst imaginable pain. Shoulder pain and disability were measured using the Shoulder Pain and Disability Index, which assesses shoulder-specific pain and difficulty during functional activities. Upper-extremity functional performance was assessed using the Upper Extremity Functional Index, which evaluates perceived difficulty in performing upper-limb activities. These three tools were selected because they provide complementary information regarding symptom intensity, shoulder-specific disability, and activity-related upper-limb function.

Participants in both groups received the same baseline physiotherapy treatment to ensure comparability of co-interventions. Baseline treatment consisted of hot pack application and transcutaneous electrical nerve stimulation for 10 minutes, followed by the group-specific manual therapy intervention. The Gong's mobilization group received Gong's mobilization directed at improving glenohumeral mobility and reducing pain. The technique was applied with the shoulder positioned according to the restricted movement pattern, commonly with the elbow flexed and the shoulder abducted, while the therapist applied corrective gliding of the humeral head with distraction, oscillatory mobilization, sustained stretching, and controlled movement toward the restricted range. Mobilization was performed within patient tolerance while avoiding excessive pain provocation.

Participants in the Spencer technique group received the standardized Spencer shoulder mobilization sequence. The procedure included shoulder extension with elbow flexion, shoulder flexion with elbow extension, circumduction with compression, circumduction with distraction, abduction with internal rotation, adduction with external rotation, and internal rotation. Each movement was performed in a controlled manner by the therapist, with attention to patient comfort, available range, and gradual progression according to tissue tolerance. The purpose of the technique was to mobilize the glenohumeral and scapulothoracic joints, reduce stiffness, improve circulation, and facilitate functional shoulder movement.

Both treatment groups received intervention sessions six times per week for four weeks, giving a total of 24 treatment sessions per participant. The intervention schedule was standardized across groups to maintain comparable treatment exposure. Participants were advised to avoid additional shoulder manual therapy outside the study protocol during the intervention period. Treatment adherence was monitored through attendance records, and each session was documented by the treating therapist. Any discomfort, symptom aggravation, or adverse response during or after treatment was recorded.

The primary outcome was post-intervention pain intensity measured by NPRS. Secondary outcomes were shoulder pain and disability measured by SPADI and upper-extremity functional performance measured by UEFI. Outcome measurements were collected at baseline before initiation of treatment and after completion of the four-week intervention. To minimize measurement bias, outcome data were recorded using standardized instructions and the same measurement approach for both groups. Data were checked for completeness before entry, and participant identifiers were coded to maintain confidentiality.

Several steps were taken to reduce bias and improve data integrity. Eligibility criteria were applied consistently before enrollment, both groups received the same baseline treatment apart from the assigned manual therapy technique, and outcome measures were applied at the same time points in both groups. Data were entered using coded participant identifiers, and entries were checked for completeness and consistency before analysis. The treatment protocol, assessment timing, and outcome tools were standardized to improve reproducibility and reduce variability in intervention delivery and measurement.

Statistical analysis was performed using Statistical Package for Social Sciences software version 26.0. Continuous variables were summarized using means and standard deviations for normally distributed data and medians with interquartile ranges where distributions were non-normal. Categorical variables were summarized using frequencies and percentages. Baseline demographic and clinical characteristics were compared between groups to assess group comparability. Normality of continuous outcome variables was assessed using the Shapiro–Wilk test and visual inspection of distributional patterns. Between-group comparisons were conducted according to data distribution and measurement level. For normally distributed continuous outcomes, independent-samples t-tests were used to compare between-group differences, while non-parametric alternatives such as the Mann–Whitney U test were used for non-normally distributed outcomes. Within-group pre-post changes were assessed using paired tests

appropriate to the distribution of the data. Statistical significance was set at a two-tailed p-value of less than 0.05.

The analysis focused on comparing post-intervention pain and functional outcomes between the Gong's mobilization and Spencer technique groups, while also considering baseline values and within-group change. Where appropriate, results were reported with p-values, confidence intervals, and effect estimates to support clinical interpretation. Missing data were checked before analysis; participants with complete baseline and post-intervention outcome data were included in the final analysis. Ethical principles of voluntary participation, informed consent, confidentiality, and participant safety were maintained throughout the study.

RESULTS

A total of 155 patients were assessed for eligibility, of whom 29 were excluded because 10 did not meet the inclusion criteria, 10 declined participation, and 9 were excluded for other reasons. The remaining 126 participants were randomized equally into two intervention groups, with 63 participants allocated to Gong's mobilization and 63 allocated to the Spencer technique. No participant was lost to follow-up, no participant discontinued the allocated intervention, and all 126 participants were included in the final analysis.

Table 1. Demographic and Clinical Characteristics of the Study Participants (N = 126)

Variable	Overall Sample, N = 126
Age, years, mean ± SD	50.56 ± 6.34
Duration of symptoms, months, mean ± SD	13.27 ± 5.63
Male, n (%)	70 (55.6%)
Female, n (%)	56 (44.4%)

Table 1 shows the demographic and clinical profile of the included participants. The mean age of the study population was 50.56 ± 6.34 years, indicating that the sample mainly represented middle-aged adults, which is consistent with the usual clinical age range of adhesive capsulitis. The mean duration of symptoms was 13.27 ± 5.63 months, suggesting that most participants had persistent shoulder symptoms rather than very acute complaints. Males represented 55.6% of the sample, while females represented 44.4%, giving a relatively balanced sex distribution with a slight male predominance.

Table 2. Post-Intervention Outcome Scores by Treatment Group

Outcome Variable	Gong's Mobilization, n = 63 Mean ± SD	Spencer Technique, n = 63 Mean ± SD	Mean Difference	95% CI for Mean Difference	Effect Size	p-value
NPRS pain score post-treatment	3.56 ± 1.31	4.34 ± 1.39	-0.78	-1.26 to -0.30	Cohen's d = -0.58	.001
SPADI total score post-treatment	324.60 ± 85.55	470.16 ± 77.48	-145.56	-174.35 to -116.77	Cohen's d = -1.78	< .001
UEFI total score post-treatment	105.67 ± 17.53	89.06 ± 12.01	16.61	11.31 to 21.91	Cohen's d = 1.11	< .001

NPRS = Numeric Pain Rating Scale; SPADI = Shoulder Pain and Disability Index; UEFI = Upper Extremity Functional Index; CI = confidence interval. Negative mean differences for NPRS and SPADI favor Gong's mobilization because lower scores indicate less pain and disability. Positive mean differences for UEFI favor Gong's mobilization because higher scores indicate better upper-extremity function.

Table 2 demonstrates clinically and statistically meaningful post-intervention differences between the two groups. Participants treated with Gong's mobilization reported a lower mean post-treatment NPRS pain score than those treated with the Spencer technique, with scores of 3.56 ± 1.31 and 4.34 ± 1.39, respectively. The mean between-group difference was -0.78 points, with a 95% confidence interval from -1.26 to -0.30, indicating significantly lower pain in the Gong's mobilization group. The effect size for pain was moderate, with Cohen's d = -0.58. For SPADI total score, the Gong's mobilization group showed substantially lower post-treatment shoulder pain and disability, with a mean score of 324.60 ± 85.55

compared with 470.16 ± 77.48 in the Spencer technique group. The mean difference was -145.56 points, with a 95% confidence interval from -174.35 to -116.77, and the effect size was large, with Cohen's d = -1.78. For UEFI total score, the Gong's mobilization group achieved a higher functional score than the Spencer technique group, with means of 105.67 ± 17.53 and 89.06 ± 12.01, respectively. The mean difference was 16.61 points, with a 95% confidence interval from 11.31 to 21.91, indicating better upper-extremity functional performance after Gong's mobilization. The corresponding effect size was large, with Cohen's d = 1.11.

Table 3. Normality Assessment of Post-Treatment Outcomes

Outcome Variable	Group	Kolmogorov–Smirnov p-value	Shapiro–Wilk p-value	Distribution Interpretation
NPRS pain score post-treatment	Gong's Mobilization	.000	.000	Non-normal
NPRS pain score post-treatment	Spencer Technique	.000	.002	Non-normal
SPADI total score post-treatment	Gong's Mobilization	.200	.180	Approximately normal
SPADI total score post-treatment	Spencer Technique	.200	.704	Approximately normal
UEFI total score post-treatment	Gong's Mobilization	.000	.000	Non-normal
UEFI total score post-treatment	Spencer Technique	.061	.118	Approximately normal

Table 3 presents the normality assessment for post-treatment outcomes. NPRS pain scores were non-normally distributed in both groups, with Shapiro–Wilk p-values of .000 in the Gong's mobilization group and .002 in the Spencer technique group. SPADI total scores were approximately normally distributed in both groups, with Shapiro–Wilk p-values of .180 and .704, respectively. UEFI total scores showed a mixed distribution pattern: the Gong's mobilization group was non-normal, while the Spencer technique group was approximately normal. Based on these distributional findings, parametric or non-parametric tests were selected according to the distributional behavior of each outcome.

Table 4. Baseline Comparability and Post-Intervention Inferential Analysis

Outcome Variable	Time Point	Statistical Test	Test Value	p-value	Interpretation
SPADI pain score	Baseline	Mann–Whitney U	1704.50	.219	No significant baseline difference
SPADI disability score	Baseline	Mann–Whitney U	1810.50	.481	No significant baseline difference
SPADI total score	Baseline	Mann–Whitney U	1658.50	.146	No significant baseline difference
SPADI pain score	Post-treatment	Independent-samples t-test	-7.34	< .001	Significant between-group difference
SPADI disability score	Post-treatment	Independent-samples t-test	-7.78	< .001	Significant between-group difference
SPADI total score	Post-treatment	Independent-samples t-test	-10.19	< .001	Significant between-group difference
UEFI total score	Post-treatment	Mann–Whitney U	893.50	< .001	Significant between-group difference
UEFI percentage score	Post-treatment	Mann–Whitney U	893.50	< .001	Significant between-group difference

Table 4 shows that the two treatment groups were comparable at baseline for SPADI pain, disability, and total scores. Baseline SPADI pain did not differ significantly between groups, with Mann–Whitney U = 1704.50 and p = .219. Similarly, baseline SPADI disability showed no statistically significant group difference, with U = 1810.50 and p = .481, while baseline SPADI total score was also comparable, with U = 1658.50 and p = .146. These findings suggest that shoulder pain and disability were not significantly different between groups before intervention. After treatment, significant between-group differences were observed in all reported post-intervention SPADI domains and UEFI outcomes. SPADI pain score showed a significant post-treatment difference, with t = -7.34 and p < .001, while SPADI disability score also differed significantly, with t = -7.78 and p < .001. SPADI total score demonstrated a highly significant post-treatment difference, with t = -10.19 and p < .001. UEFI total and percentage scores also differed significantly between groups, with Mann–Whitney U = 893.50 and p < .001 for both comparisons.

Table 5. CONSORT-Based Participant Flow Summary

Trial Stage	n
Assessed for eligibility	155

Trial Stage	n
Excluded before randomization	29
Not meeting inclusion criteria	10
Declined to participate	10
Other reasons	9
Randomized	126
Allocated to Gong's mobilization	63
Allocated to Spencer technique	63
Lost to follow-up in Gong's mobilization group	0
Lost to follow-up in Spencer technique group	0
Discontinued intervention in Gong's mobilization group	0
Discontinued intervention in Spencer technique group	0
Analyzed in Gong's mobilization group	63
Analyzed in Spencer technique group	63

Table 5 summarizes participant flow through the trial. Of 155 screened patients, 126 were randomized after exclusion of 29 individuals. Allocation was balanced, with 63 participants assigned to each intervention group. No loss to follow-up and no intervention discontinuation were reported in either group, resulting in complete analysis of all randomized participants. This complete follow-up strengthens the internal consistency of the final outcome analysis and reduces the likelihood of attrition-related bias.

Overall, the findings indicate that both groups completed treatment and were included in the final analysis, but post-intervention outcomes favored Gong's mobilization. The Gong's mobilization group demonstrated lower pain intensity, lower shoulder pain and disability, and higher upper-extremity functional performance compared with the Spencer technique group. The largest observed between-group difference was seen in SPADI total score, where the Gong's mobilization group had a 145.56-point lower mean post-treatment score than the Spencer technique group, supported by a large effect size. UEFI also showed a clinically meaningful advantage for Gong's mobilization, with a 16.61-point higher post-treatment functional score. These results suggest that Gong's mobilization produced superior post-treatment improvement in pain-related disability and upper-limb function among patients with adhesive capsulitis.

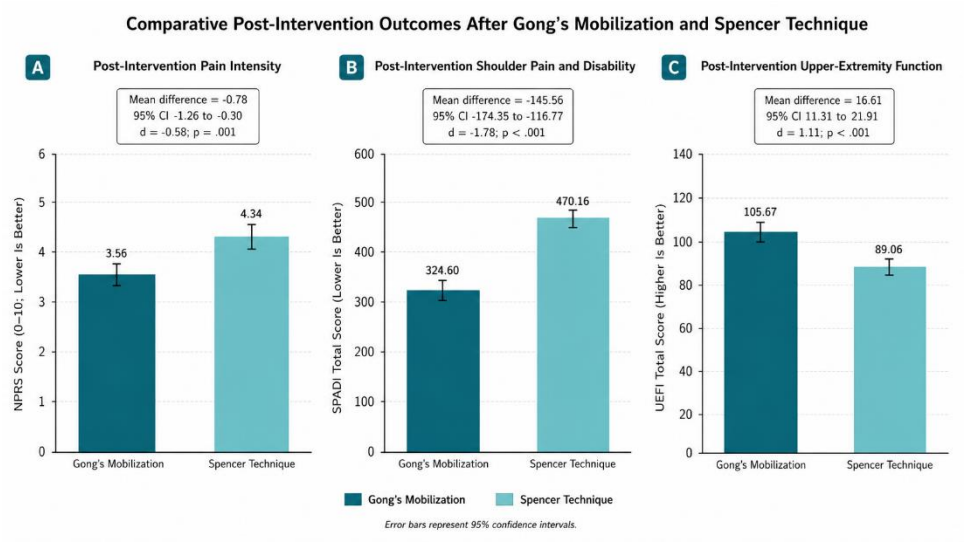

Figure 1. Comparative Post-Intervention Pain, Disability, and Upper-Extremity Function After Gong's Mobilization and Spencer Technique

The panelled figure demonstrates a consistent post-intervention advantage of Gong's mobilization over the Spencer technique across all measured clinical domains. In Panel A, post-treatment pain intensity was lower in the Gong's mobilization group than in the Spencer technique group, with mean NPRS scores of 3.56 ± 1.31 and 4.34 ± 1.39, respectively, producing a mean difference of -0.78 points, 95% CI -1.26 to -0.30, and a moderate effect size (Cohen's d = -0.58; p = .001). In Panel B, shoulder pain and

disability showed the largest treatment separation, with SPADI total scores of 324.60 ± 85.55 in the Gong's mobilization group compared with 470.16 ± 77.48 in the Spencer technique group, corresponding to a mean difference of -145.56 points, 95% CI -174.35 to -116.77, and a large effect size (Cohen's d = -1.78; p < .001). In Panel C, upper-extremity functional performance was higher after Gong's mobilization, with UEFI total scores of 105.67 ± 17.53 compared with 89.06 ± 12.01 after the Spencer technique, yielding a mean difference of 16.61 points, 95% CI 11.31 to 21.91, and a large effect size (Cohen's d = 1.11; p < .001). Collectively, the pattern indicates that Gong's mobilization produced superior post-treatment improvement in pain reduction, shoulder-related disability, and activity-related upper-limb function among patients with adhesive capsulitis.

DISCUSSION

The present randomized controlled trial compared the effects of Gong's mobilization and the Spencer technique on pain intensity, shoulder-related disability, and upper-extremity functional performance in patients with adhesive capsulitis. The findings demonstrated that both interventions were clinically useful, but the post-intervention outcomes consistently favored Gong's mobilization. Participants treated with Gong's mobilization reported lower pain intensity, lower shoulder pain and disability, and higher upper-extremity functional scores than those treated with the Spencer technique. The difference was most pronounced for SPADI total score, where the Gong's mobilization group showed substantially lower post-treatment disability than the Spencer technique group, indicating a stronger effect on shoulder-specific functional recovery. These findings support the study hypothesis that Gong's mobilization would produce greater improvement in pain and activity-related outcomes among patients with adhesive capsulitis.

The mean post-treatment NPRS score was 3.56 ± 1.31 in the Gong's mobilization group compared with 4.34 ± 1.39 in the Spencer technique group, yielding a mean difference of -0.78 points with a 95% confidence interval from -1.26 to -0.30 and a moderate effect size. Although the absolute difference in pain intensity was modest, it was statistically significant and clinically relevant because pain reduction is a key driver of movement tolerance and functional participation in adhesive capsulitis. Pain in frozen shoulder often limits active movement and reinforces protective muscle guarding, which can further restrict capsular mobility and reduce the patient's ability to perform daily tasks. Therefore, even moderate pain reduction may facilitate better participation in exercise, manual therapy, and functional upper-limb use during rehabilitation (1,2).

The most marked between-group difference was observed in SPADI total score. Participants receiving Gong's mobilization had a post-treatment SPADI total score of 324.60 ± 85.55 compared with 470.16 ± 77.48 in the Spencer technique group, producing a mean difference of -145.56 points, a 95% confidence interval from -174.35 to -116.77, and a large effect size. This finding suggests that Gong's mobilization had a stronger effect on shoulder-specific pain and disability than the Spencer technique. The superiority of Gong's mobilization may be explained by its direct effect on glenohumeral joint arthrokinematics, particularly through corrective gliding, distraction, oscillatory mobilization, and sustained stretching near the restricted range. These components may directly address capsular tightness and altered humeral head mechanics, which are central contributors to movement restriction and functional disability in adhesive capsulitis (3–5).

Upper-extremity function also improved more strongly in the Gong's mobilization group. The post-treatment UEFI total score was 105.67 ± 17.53 after Gong's mobilization and 89.06 ± 12.01 after the Spencer technique, with a mean difference of 16.61 points, a 95% confidence interval from 11.31 to 21.91, and a large effect size. This finding indicates that patients who received Gong's mobilization were better able to perform activity-based upper-limb tasks after treatment. Because UEFI reflects broader functional performance rather than shoulder symptoms alone, the observed difference suggests that the benefits of Gong's mobilization extended beyond pain reduction and were reflected in practical activities

requiring upper-limb use. This is particularly important in adhesive capsulitis because the disorder commonly interferes with dressing, grooming, reaching, lifting, and other routine activities that require coordinated shoulder and upper-limb movement (6).

The findings are consistent with previous literature indicating that manual therapy can improve pain and function in adhesive capsulitis when applied as part of a structured physiotherapy program. Gong's mobilization has been reported to improve shoulder mobility and reduce disability by restoring accessory joint motion and correcting altered humeral head positioning during restricted shoulder movements. The posterior or anteroposterior corrective glide used in Gong's mobilization may help normalize glenohumeral mechanics and reduce mechanical stress during movement, thereby allowing patients to tolerate greater functional shoulder use. The present findings support this mechanism because the largest treatment advantage was observed in disability and functional performance outcomes rather than pain alone (4,5).

The Spencer technique also has a plausible therapeutic basis and has been reported to improve shoulder pain, joint mobility, and functional capacity in frozen shoulder. Its sequential mobilization pattern may improve soft-tissue flexibility, joint circulation, scapulothoracic movement, and neuromuscular control. However, compared with Gong's mobilization, the Spencer technique may provide a more generalized shoulder mobilization effect rather than a more targeted end-range capsular glide. This difference may explain why the Spencer technique group improved but showed less favorable post-treatment scores than the Gong's mobilization group. The present results therefore do not suggest that the Spencer technique is ineffective; rather, they suggest that Gong's mobilization may be more effective when the therapeutic priority is reducing shoulder-specific disability and improving activity-related upper-limb function (6,7).

The clinical relevance of these findings lies in the need for physiotherapists to select manual therapy techniques that provide measurable improvement in both symptoms and functional outcomes. Adhesive capsulitis is not only a pain condition but also a disabling disorder that limits independence in daily life. The consistent advantage of Gong's mobilization across NPRS, SPADI, and UEFI suggests that this technique may be especially useful when patients present with painful stiffness and marked activity limitation. The large effect sizes observed for SPADI and UEFI indicate that the difference was not limited to statistical significance but also reflected a meaningful functional advantage. These findings may help clinicians prioritize Gong's mobilization as part of a structured conservative rehabilitation program for adhesive capsulitis.

The study has several strengths. It used a comparative randomized design, included an adequate total sample of 126 participants, applied the same baseline treatment to both groups, and assessed outcomes using clinically relevant measures of pain, shoulder-specific disability, and upper-extremity function. The participant flow was complete, with no reported loss to follow-up or intervention discontinuation, which reduces attrition-related bias. The use of NPRS, SPADI, and UEFI allowed the treatment effect to be interpreted across symptom intensity, shoulder-specific impairment, and broader activity-related function.

Several limitations should also be acknowledged. First, the study was conducted in a single clinical setting, which may limit generalizability to other populations and healthcare environments. Second, although the manuscript describes random allocation, the allocation process must be reported with sufficient detail to confirm whether true random sequence generation and allocation concealment were used. Third, complete blinding is difficult in manual therapy trials because patients and therapists can often recognize the intervention being delivered; therefore, future studies should clearly distinguish therapist blinding, participant blinding, assessor blinding, and statistician blinding. Fourth, the results were primarily based on post-intervention comparisons; future analyses should emphasize baseline-adjusted effects or change scores with confidence intervals. Fifth, the study did not report adverse events, treatment adherence in detail, or longer-term follow-up outcomes, which limits interpretation of treatment safety and durability. Finally, range-of-motion outcomes were discussed in the background

rationale, but ROM data were not presented in the revised results tables; future studies should include standardized ROM measurements if mobility improvement is a stated outcome.

Future research should use multicenter randomized controlled designs with concealed allocation, assessor blinding, trial registration, predefined primary outcomes, and longer follow-up periods. Baseline-adjusted analysis, intention-to-treat principles, adverse-event reporting, and clinically important difference thresholds should be incorporated to strengthen internal validity and clinical interpretability. Further trials should also examine whether treatment response differs according to disease stage, symptom duration, diabetes status, baseline pain severity, and degree of capsular restriction. Including patient-reported quality of life and objective shoulder range-of-motion measures would also help clarify the broader therapeutic value of Gong's mobilization and the Spencer technique.

CONCLUSION

Gong's mobilization produced superior post-intervention outcomes compared with the Spencer technique in patients with adhesive capsulitis, with significantly lower pain intensity, lower shoulder pain and disability, and higher upper-extremity functional performance. The largest treatment advantage was observed for SPADI total score, followed by UEFI total score, suggesting that Gong's mobilization may provide greater benefit for shoulder-specific disability and activity-related upper-limb function. Although the Spencer technique remained a clinically useful intervention, the findings support the use of Gong's mobilization as a preferred manual therapy option when the goal is to reduce pain-related disability and improve daily functional performance in patients with adhesive capsulitis.

REFERENCES

1. Takele MD, Kibret AK, Belay GJ, Baye M, Getie K, Shiferaw KB, et al. The effectiveness of Spencer muscle energy technique on pain, function and range of motion in patients with frozen shoulder: systematic reviews and meta-analyses. BMC Musculoskelet Disord. 2025;26(1):793.

2. Chan HBY, Pua PY, How CH. Physical therapy in the management of frozen shoulder. Singapore Med J. 2017;58(12):685.

3. Kariya G, Dhage P, Deshmukh NS. "Gongs Mobilization" approach for frozen shoulder. Cureus. 2022;14(10).

4. Prasanth S, Sreedharan S, Subbarayalu A. Comparative effect of Gong's mobilization and Spencer technique to manage frozen shoulder. Physiother Q. 2022;31(3):57-64.

5. Ramteke J, Nagulkar J. To study the effectiveness of Gong's mobilization versus conventional therapy on shoulder pain, abduction and medial rotation ROM in patients with stage II frozen shoulder. Int J Appl Res. 2020;6(7):408-14.

6. Gasibat Q, Rafieda AE, Alajnaf RB, Elgallai AA, Elzidani HA, Sowaid EM. Spencer muscle energy technique versus conventional treatment in frozen shoulder: a randomized controlled trial. Int J Kinesiol Sports Sci. 2022;10(3):28-36.

7. Phansopkar P. Impact of Spencer technique on pain, range of motion, and functional disability in patients with frozen shoulder: a pilot study. Cureus. 2024;16(1).

8. Amjad F, Asghar H. Comparative effects of Gong's mobilization and mobilization with movement in patients with adhesive capsulitis: a randomized clinical trial. Sci Rep. 2025;15(1):4272.

9. Qayyum S, Babar MN, Sanaullah M, Tariq S, Khalid M, Nassar H. Comparison of Spencer technique and conventional physical therapy in adjunct to corticosteroid injection in frozen shoulder. Healer J Physiother Rehabil Sci. 2025;5(2):12-8.

10. Zappia M, Di Pietto F, Aliprandi A, Pozza S, De Petro P, Muda A, et al. Multi-modal imaging of adhesive capsulitis of the shoulder. Insights Imaging. 2016;7(3):365-71.

11. Ahn Y, Lee SJ, Moon YS, Lee YJ, Park JH, Chun Y, et al. The disease-modifying effects of a single intra-articular corticosteroid injection during the freezing phase of frozen shoulder in an animal model. Int J Mol Sci. 2024;25(17):9585.

12. Amin A, Malik R, Memon SI, Awan ZZ, Almas F, Hussain RT, et al. Comparison of Spencer muscle energy technique and conventional physiotherapy on pain and disability in shoulder adhesive capsulitis: a quasi-experimental study. Bull Fac Phys Ther. 2025;30(1):38.

13. Challey T, Dutta A, Kalita A, Pyngrope HR. Effectiveness of Gong's mobilization over myofascial release technique in patients with adhesive capsulitis. Int J Life Sci Pharma Res. 2023;13(3):L134-L144.

14. Chen ZY, Wang MH, Ye Z. Effect of electroacupuncture combined with rehabilitation techniques on shoulder function in patients with rotator cuff injuries. World J Clin Cases. 2024;12(21):4582.

15. Navarro-Ledesma S. Frozen shoulder as a systemic immunometabolic disorder: the roles of estrogen, thyroid dysfunction, endothelial health, lifestyle, and clinical implications. J Clin Med. 2025;14(20):7315.

16. Nilkar N, Pathan UI. Comparison of Gongs mobilization and Maitland's mobilization in post operative shoulder stiffness. Cuestiones de Fisioterapia. 2025;54(4):938-52.

17. Onggo JD, Gupta M, Low E, Tan LTJ, Lee KT, Ho SWL, et al. Hydrodilatation: a comparison between diabetics and non-diabetics with adhesive capsulitis. Int Orthop. 2025;49(2):475-83.

18. Pathania S, Parwe S, Sawarkar P, Nisargandha M. Evaluation of the comparative efficacy of honey thermal microcautery, standard physiotherapy, and Sida cordifolia oil via nasal administration in the management of frozen shoulder: protocol for a randomized controlled trial. JMIR Res Protoc. 2025;14(1):e64066.

19. Phansopkar P. An integrated physical therapy using Spencer's technique in the rehabilitation of a patient with a frozen shoulder: a case report. Cureus. 2023;15(6).

20. Rangan A, Hanchard N, McDaid C. What is the most effective treatment for frozen shoulder? BMJ. 2016;354.

21. Rizwan M, Razzaq A, Ijaz S, Amin T. Comparing the effect of Kaltonborn and Maitland mobilization on pain and disability in adhesive capsulitis.

22. Sah MK, Nagaraj S, Pearlson K. Gong's mobilization versus Cyriax manipulation on range of motion and function recovery in subject with frozen shoulder: a comparative study. Int J Dev Res. 2017;7:13260-8.

23. Sajid N. Comparison of Spencer's MET and post-facilitation stretch in patients with adhesive capsulitis. Pak J Rehabil. 2025;14(2):37-48.

24. Shrestha M. Effect of Gong's mobilization on pain, range of motion and disability in frozen shoulder: a pilot study. Int J Healthc Sci. 2020.

25. Siddiqua A, Kiran Q, Khan F, Naseer A, Nazir S, Azfar H, et al. Comparison of Spencer technique and isotonic exercises in patients with adhesive capsulitis. Healer J Physiother Rehabil Sci. 2025;5(2):7-11.

26. Sivacioglu S, Tunali O, Cetin O, Atalar AC. Simultaneous arthroscopic treatment of adhesive capsulitis and rotator cuff tear: a retrospective analysis of clinical outcomes. Acta Orthop Traumatol Turc. 2025;59(5):265.

27. Sofia AS, Triyanita M. Physiotherapy management of right frozen shoulder: a case report. Majalah Ilmiah Fisioterapi Indonesia. 2025;13(3):567-74.

28. Sohban MU. Comparison of outcomes frozen shoulder treatment with physiotherapy alone versus physiotherapy intraarticular injection. Indus J Biosci Res. 2025;3(5):310-4.

29. Tang HY, Wei W, Yu T, Zhao Y. Physical therapy for the treatment of frozen shoulder: a protocol for systematic review of randomized controlled trial. Medicine. 2019;98(32):e16784.

30. Wang H, Fan D, Lan Q, Gong H. Clinical efficacy of adhesion release under brachial plexus block plus silver needle warm acupuncture on frozen shoulder and recovery of limb function. Altern Ther Health Med. 2025;31(1):251-7.

31. Yang SM, Hsu SC, Shih PX, Hsiao MY. Comparing non-surgical treatment strategies for adhesive capsulitis: a narrative review. J Formos Med Assoc. 2025.

32. Likhitha S, Rizvi SRA. Effectiveness of positional release technique versus Spencer muscle energy technique in management of chronic frozen shoulder.