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Effectiveness of the Spencer Technique on Pain, Disability, and Range of Motion in Patients with Frozen Shoulder: A Systematic Review and Meta-Analysis with Meta-Regression of Randomized Controlled Trials

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ADMINISTRATIVE INFORMATION

Support - Non.

Review Stage at time of this submission - Data analysis.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 3 September 2025 and was last updated on 3 September 2025.

INTRODUCTION

Review question / Objective To evaluate the effects of Spencer technique on pain intensity, disability, and shoulder range of motion in individuals with frozen shoulder. In addition, subgroup and meta-regression analyses will be performed to further explore the influence of potential moderating factors on treatment outcomes.

Rationale Frozen shoulder is a common shoulder disorder, affecting 2–5% of the population, particularly individuals aged 40–60 years and those with diabetes. It can be classified as primary (idiopathic) or secondary (e.g., diabetic frozen shoulder) and progresses through three clinical stages. Diagnosis is based on history and physical examination, with global restriction of motion—especially loss of external rotation—being a hallmark feature. Management commonly includes manual therapy, modalities, and exercise. Among these, the Spencer technique—a seven-step mobilization protocol—aims to restore mobility through passive oscillations, tissue stretching, and fluid pumping, and is often combined with muscle energy technique to enhance outcomes. Although multiple RCTs have evaluated the Spencer technique, findings remain inconsistent, with some reporting greater benefits than controls, and others showing the opposite. These discrepancies highlight the need for a systematic review and meta-analysis. The present study therefore aims to evaluate the effectiveness of the Spencer technique for frozen shoulder on pain, disability, and range of motion, and to explore moderating factors through subgroup and meta-regression analyses.

Condition being studied This meta-analysis was conducted using the PICO framework as follows: Population (P): frozen shoulder; Intervention (I): Spencer technique; Comparison (C): the control group who did not undergo Spencer technique; Outcomes (O): reductions in pain and disability, along with gains in shoulder range of motion.

METHODS

Search strategy Two authors made independent electronic searches in the PubMed, Medline-Ovid, and ClinicalTrials.gov with keyword of ("Spencer technique" OR "Spencer muscle energy technique" OR "Spencer method") AND ("adhesive capsulitis" OR "frozen shoulder") through the earliest record to August 2025.

Participant or population Frozen shoulder.

Intervention Spencer technique.

Comparator Conventional physical therapy programs or other manual therapies.

Study designs to be included Randomized controlled trials.

Eligibility criteria The inclusion criteria were as follows: (1) RCTs evaluating both pain intensity, disability and shoulder range of motion (flexion, extension, abduction, external rotation and internal rotation) outcomes before and after Spencer technique; (2) enrolling adults diagnosed with frozen shoulder based on clinical presentation ; (3) Intervention group was included if the Spencer technique was applied and explicitly defined by the study authors as the Spencer technique; (4) at least one comparator group receiving interventions other than Spencer technique.

Information sources Two authors (Y.-Y.T. and Y.-J.C.) conducted a literature search through PubMed, the Physiotherapy Evidence Database (PEDro), the Cochrane Library, and ClinicalTrials.gov, using the keywords ("Spencer technique" OR "Spencer muscle energy technique" OR "Spencer method" AND "adhesive capsulitis" OR "frozen shoulder").

Main outcome(s) Main outcome: Pain intensity, the primary outcome, was evaluated before and after the intervention using either the Visual Analogue Scale or the Numeric Pain Rating Scale.

Additional outcome(s) Secondary outcomes comprised disability, assessed using the Shoulder Pain and Disability Index, and shoulder range of motion. Range of motion was evaluated with a goniometer in three commonly restricted directions: external rotation, abduction, and internal rotation.

Data management Two authors independently extracted data from eligible studies, including publication year, first author, sample size, demographic characteristics, study design, intervention details, outcome measures, and assessment time points. Reasons for exclusion were documented. When data were missing or unclear, corresponding authors were contacted for clarification or original data. For studies reporting multiple post-intervention time points, only end-of-intervention data were analyzed.

Quality assessment / Risk of bias analysis The methodological quality of included RCTs was evaluated using the Physiotherapy Evidence Database (PEDro) scale, which contains 11 items assessing internal validity and statistical reporting. As Item 1 (external validity) is excluded from scoring, total scores range from 0 to 10, with higher values indicating better quality. Each study was independently rated by one reviewer. Based on Cashin and McAuley (2020), scores of ≤3 indicate 'poor,' 4–5 'fair,' 6–8 'good,' and 9–10 'excellent.

Strategy of data synthesis Given the variability in treatment protocols, a random-effects model was employed for data synthesis using Comprehensive Meta-Analysis software (version 4; Biostat, Englewood, NJ, USA). Statistical significance was set at $p < 0.05$ (two-tailed). Effect sizes were calculated as Hedges' g, interpreted as small (0.2), moderate (0.5), and large (0.8). Between-study heterogeneity was examined using Cochran's Q and the I^2 statistic, with I^2 values of 25%, 50%, and 75% indicating low, moderate, and high heterogeneity, respectively.

Subgroup analysis Subgroup analyses were performed according to treatment regimen and type of control. Spencer technique interventions were classified as Spencer only or Spencer plus (combined with conventional physical therapy programs or other manual therapies), and the impact of different control groups. Meta-regression analyses further examined treatment duration, addition of muscle energy technique, and presence of diabetic frozen shoulder as potential moderators of treatment effects.

Sensitivity analysis To assess the robustness of the meta-analysis findings, sensitivity analyses were conducted using a leave-one-out approach.

Language restriction No language limit.

Country(ies) involved Taiwan.

Keywords Frozen Shoulder, Spencer technique, Meta-Analysis, Shoulder Joint.

Contributions of each author

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