

Cervical and Thoracic Manipulation: Acute Effects on Pain Pressure Threshold and Self-Reported Function in Individuals with Experimentally-Induced Shoulder Pain

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Background: Shoulder pain is a common disabling complaint with a lifetime prevalence up to 70%. Emerging evidence has suggested that cervicothoracic joint manipulations may be advocated for treating such pain.

Purpose: The aim of this study was to determine the acute effects of cervical and thoracic joint manipulations on self-reported disability and pain pressure threshold (PPT) in individuals with experimentally induced shoulder pain.

Design and Setting: This was a cross-sectional repeated measures study completed in university laboratory setting.

Patients or Other Participants: 20 participants (age 24.6 ± 1.4 yrs, height 164.6 ± 36.8 cm, mass 68.1 ± 4.0 kg, 10 male) without recent history (6 months) shoulder injury or current shoulder pain were included in this study. Exclusion criteria included previous shoulder surgery/fracture or contraindication to manipulation.

Methods: Testing occurred over 2 sessions. Session 1 consisted of baseline scoring PPT over the infraspinatus muscle belly (averaged over three repetitions), self-reported shoulder function using the shoulder pain and disability index (SPADI), followed by an isokinetic eccentric exercise protocol designed to induce delayed onset muscle soreness. The exercise protocol consisted of 3 sets of 30 external rotations on the non-dominant upper extremity consisting of concentric external rotation (60° /second) followed by an eccentric return (300° /second). Session 2 was scheduled 24-48 hours after session 1. Participants underwent PPT testing and completed the SPADI for the non-dominant shoulder before and immediately after manipulation to the lower cervical and upper thoracic spine by a manually trained physical therapist. Repeated measures ANOVA was used to compare PPT and SPADI scores between the baseline, pre-manipulative and post-manipulative time points. Post hoc paired t-tests were used to quantify differences between testing sessions. Significance was set at $p \leq 0.05$ *a priori*. Effect size (ES) was calculated using the effect size.

Results: Baseline SPADI scores were 0 for all participants. SPADI scores were significantly different between time points ($p < 0.001$). Post hoc testing revealed the exercise protocol significantly increased reported pain and disability [mean increase 11.2, $p < 0.001$]. The manipulation protocol significantly decreased reported pain and disability (mean decrease 5.85, $p < 0.001$, ES = 0.96); however disability remained higher than baseline levels (mean difference 5.84, $p < 0.001$). PPT differences were also found between time points ($p = 0.01$). Post hoc testing revealed manipulation significantly

increased PPT (mean increase 1.39kg, $p < 0.001$, $ES = 0.45$) to values similar to baseline levels ($p = 0.157$).

Conclusions: The eccentric exercise protocol was able to establish clinically relevant self-reported pain and disability. Cervicothoracic manipulation acutely increased (i.e. improved) PPT and decreased self-reported shoulder pain and disability in these participants.

Clinical Relevance: Cervicothoracic manipulations should be considered in patients with musculoskeletal shoulder injury given the measured and reported hypoalgesia found following manipulation. The reported improvements in pain may allow more aggressive physical therapy techniques earlier in the rehabilitation process.