Immediate effects of thoracic spine manipulation on active shoulder range of motion: A randomized sham-controlled study

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Background: Studies have indicated that thoracic spinal manipulation techniques (SMT) can improve pain and functional loss in patients with shoulder pain, as well as improve shoulder range of motion (ROM). However, these studies are limited by their pre-post design without a control group.

Purpose: The primary aim was to assess the immediate effects of thoracic SMT on shoulder flexion and internal rotation active ROM as compared to sham comparator interventions. A secondary aim was to assess the believability and perception of effects of the sham interventions compared to active thoracic SMT.

Design and Setting: Prospective pre-post randomized sham-controlled study; research laboratory setting.

Patients or Other Participants: Subjects (n=69) were recruited who had no shoulder or thoracic pain, limited experience with the three study interventions, and no contraindications to the interventions.

Methods: Subjects were randomized to one of three groups: thoracic SMT, sham-thoracic SMT, or sham-ultrasound; the subjects were told they were randomized to manual therapy, ROM, or US respectively. Active ROM shoulder flexion [$ICC_{(3,2)}$=0.92,SEM=1.15°,MDC_{90}=2.67°] and internal rotation [$ICC_{(3,2)}$=0.91,SEM=1.56°,MDC_{90}=3.61°] was measured with a digital inclinometer prior to and following treatment by an examiner blinded to group assignment. Three questions were asked about the perceived effects of the assigned treatment on shoulder motion, pain, and functional use prior to and after treatment. Believability of the sham comparators at post-treatment was assessed by asking subjects if they believed they received the active or inactive intervention.

Results: Active shoulder internal rotation ROM significantly increased in the thoracic SMT group after treatment (t=3.01,p=0.006; mean difference=3.7°,SE=1.2°). No significant changes in internal rotation ROM within the sham-thoracic SMT (p=0.44) or sham ultrasound (p=0.18) groups. Active shoulder flexion ROM was not significantly different pre to post-treatment within any treatment group. Believability of treatment was not significantly different between the thoracic SMT and sham-thoracic SMT groups, but was significantly different between the thoracic SMT and sham-ultrasound (p=0.032). There were no significant differences in perception of treatment effects between any of the treatment groups ($p \geq 0.1$).

Conclusions: Thoracic SMT lead to improved shoulder internal rotation active ROM, while the sham comparator groups did not in subjects without shoulder pain. However, only the sham-thoracic SMT demonstrated adequacy in terms similar expectations and believability as a suitable comparator to thoracic SMT. Sham-US was not sufficient as comparator.

Clinical Relevance: Mechanistically, thoracic SMT can effect shoulder active ROM. Because the sham-thoracic SMT does not have the same mechanistic effects, but has similar expectations and believability as active treatment, the sham-thoracic SMT appears to be an adequate sham comparator. Further research in patients with shoulder pain is needed to assess mechanisms of thoracic SMT and the adequacy of the sham-thoracic SMT.