



Instrument Assisted Soft Tissue Mobilization: Effects on Cervical Motion and Movement Control in Postural Neck Pain



Courtney Smith SPT; Ashley Bray SPT, ATC; Jacquelyn Hengler SPT; Janey Prodoehl, PT, PhD
Physical Therapy Program, Midwestern University, Downers Grove, IL

Background

- Postural neck pain is associated with myofascial trigger points and muscle imbalances between the upper trapezius and the serratus anterior which can result in tissue shortening, increased EMG activity, and decreased muscle strength.^{1,2,3}
- Instrument Assisted Soft Tissue Mobilization (IASTM) is a non-invasive manual therapy technique designed to increase the soft tissue mobility, reduce pain, and restore function through various ergonomically designed instruments.^{3,4}
- IASTM allows for a deeper and more targeted penetration of soft tissue changes while at the same time reducing stresses placed on the joints of the physical therapists' hands.⁵
- A gap in the literature exists regarding the acute effects of IASTM regarding cervical ROM, strength, and pain in the treatment of neck pain.

Purpose

1. To examine the immediate effects of IASTM on cervical range of motion (ROM), pressure pain threshold (PPT), and muscle strength (maximum voluntary contraction-MVC) of the upper trapezius muscle in individuals with postural neck pain.

Methods

- 11 participants with acute postural neck pain
- Each subject completed a neck disability index and a visual analog scale.
- Surface electromyographic (EMG) electrode recording of muscle activity (Fig 1)
- Pre and post intervention testing of cervical ROM in six directions; MVC for upper trapezius, anterior deltoid, middle deltoid, and serratus anterior; PPT at three locations; fast and slow arm movement in the scapular plane with EMG. (Fig 2)
- Intervention: 5-minute IASTM treatment to the right upper trapezius (Fig 3)
- A global rating of change (GROC) assessed immediately and 24-hours post

Figure 1 Surface EMG electrode placement of the upper trapezius, the anterior deltoid, the middle deltoid and the serratus anterior

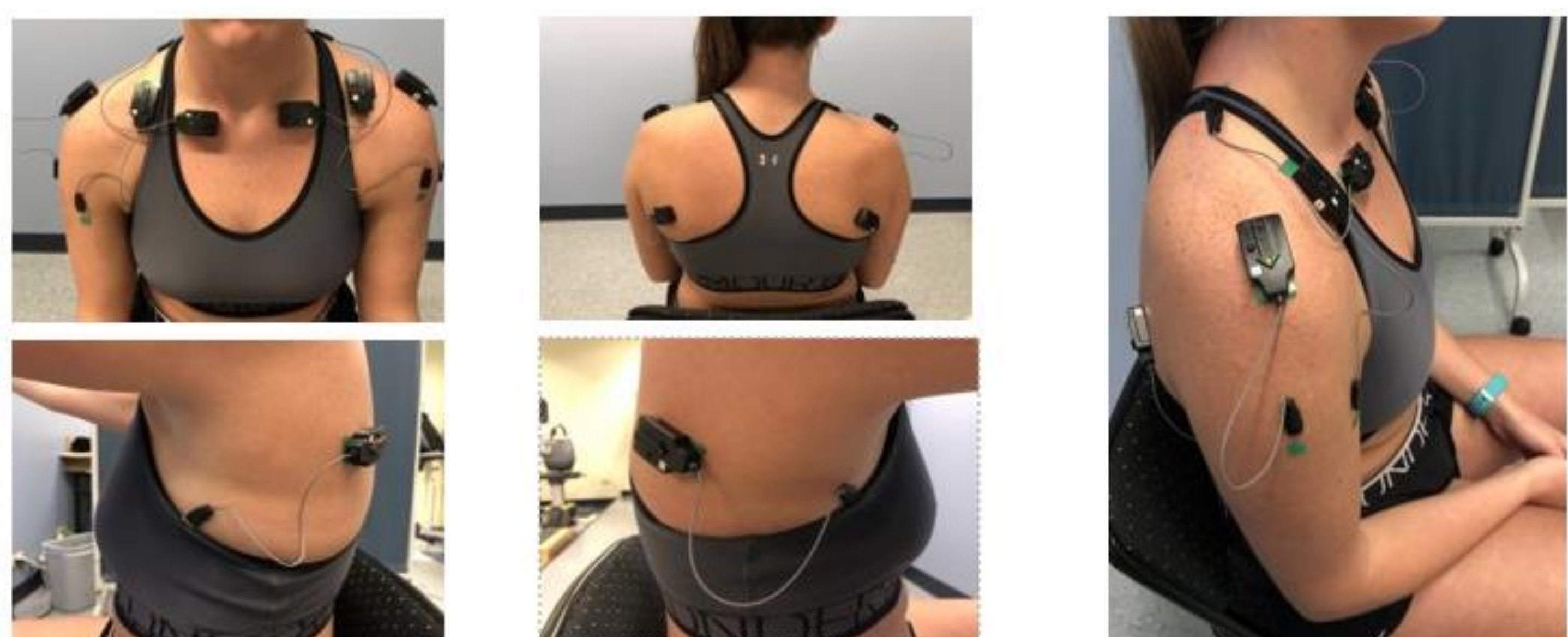


Figure 2 Starting and pause position of movements in the scapular plane

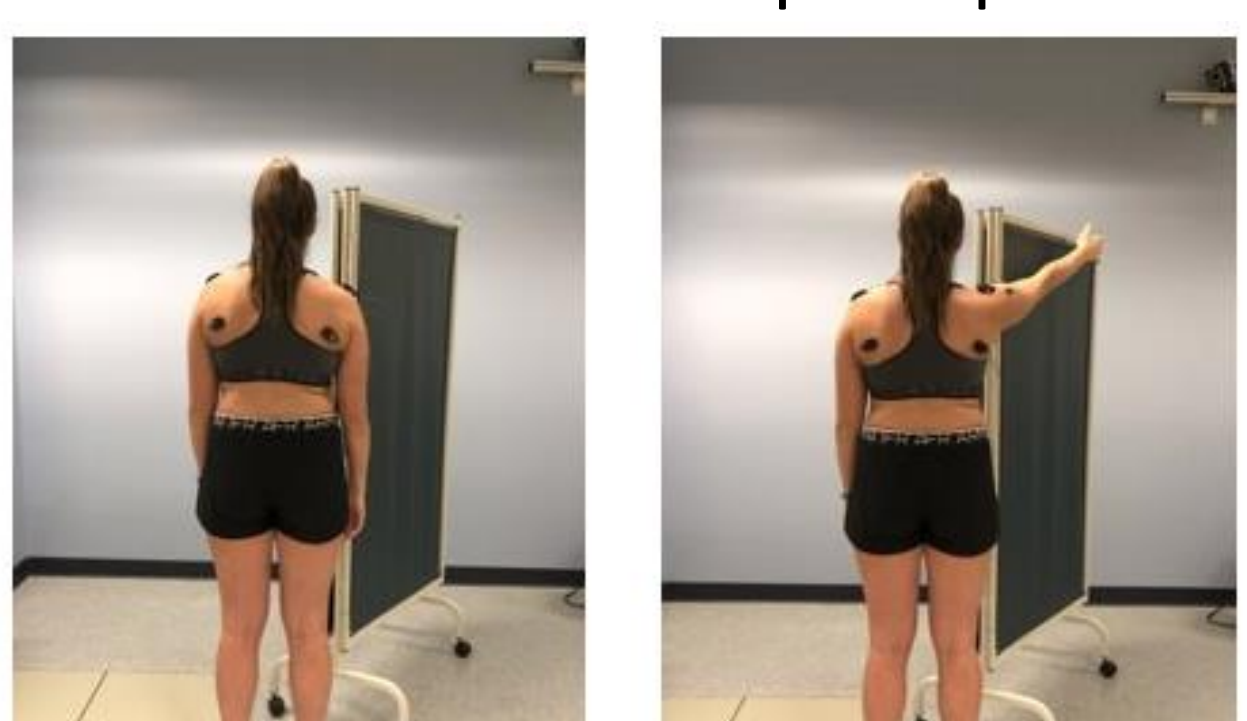


Figure 3 HawkGrips instruments used during IASTM treatment



Results

- Cervical ROM generally increased in all directions following IASTM, but statistically significant increases were seen for flexion, left side-bending, and left rotation with small to medium effect sizes (Fig 4A-F)
- Statistically significant decrease in PPT for the right forearm, but not for ipsilateral or contralateral upper trapezius (Fig 5A-C)
- No statistically significant change in strength following IASTM treatment (Fig 6A-H)
- No statistically significant changes in EMG amplitude during fast or slow movements, but EMG amplitude tended to decrease for slow movements and increase for fast movements bilaterally following IASTM (Fig 7A-D)
- The average GROC immediately post-treatment was 2.1, and 2.6 24-hours post-treatment (minimal clinically important difference = 2 points)

Figure 4 Changes in Cervical Range of Motion from Pre to Post Instrument Assisted Soft Tissue Mobilization Across Direction. Data are the Mean +/- the Standard Error of Measurement.

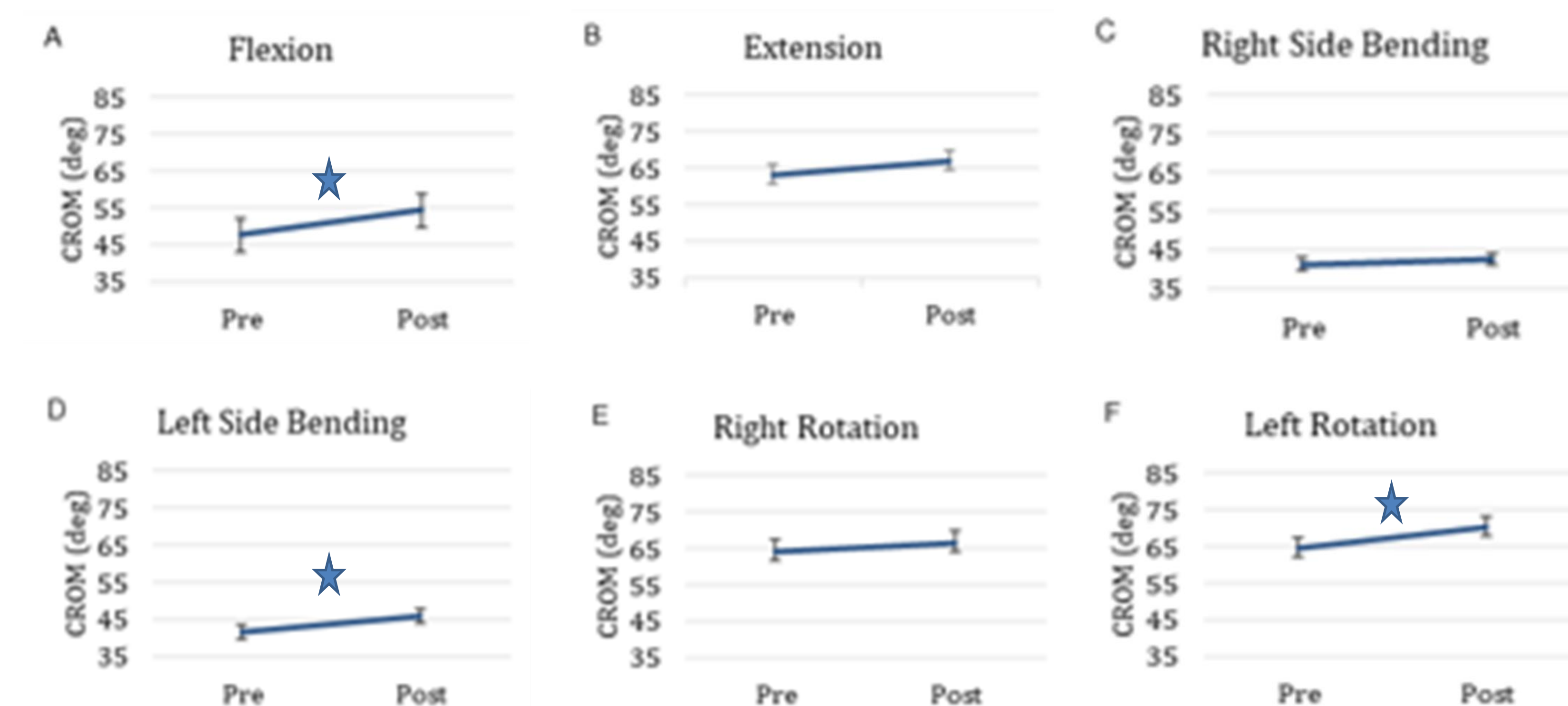


Figure 5 Changes in Pressure Pain Threshold from Pre to Post Instrument Assisted Soft Tissue Mobilization. Data are the Mean +/- the Standard Error of Measurement.

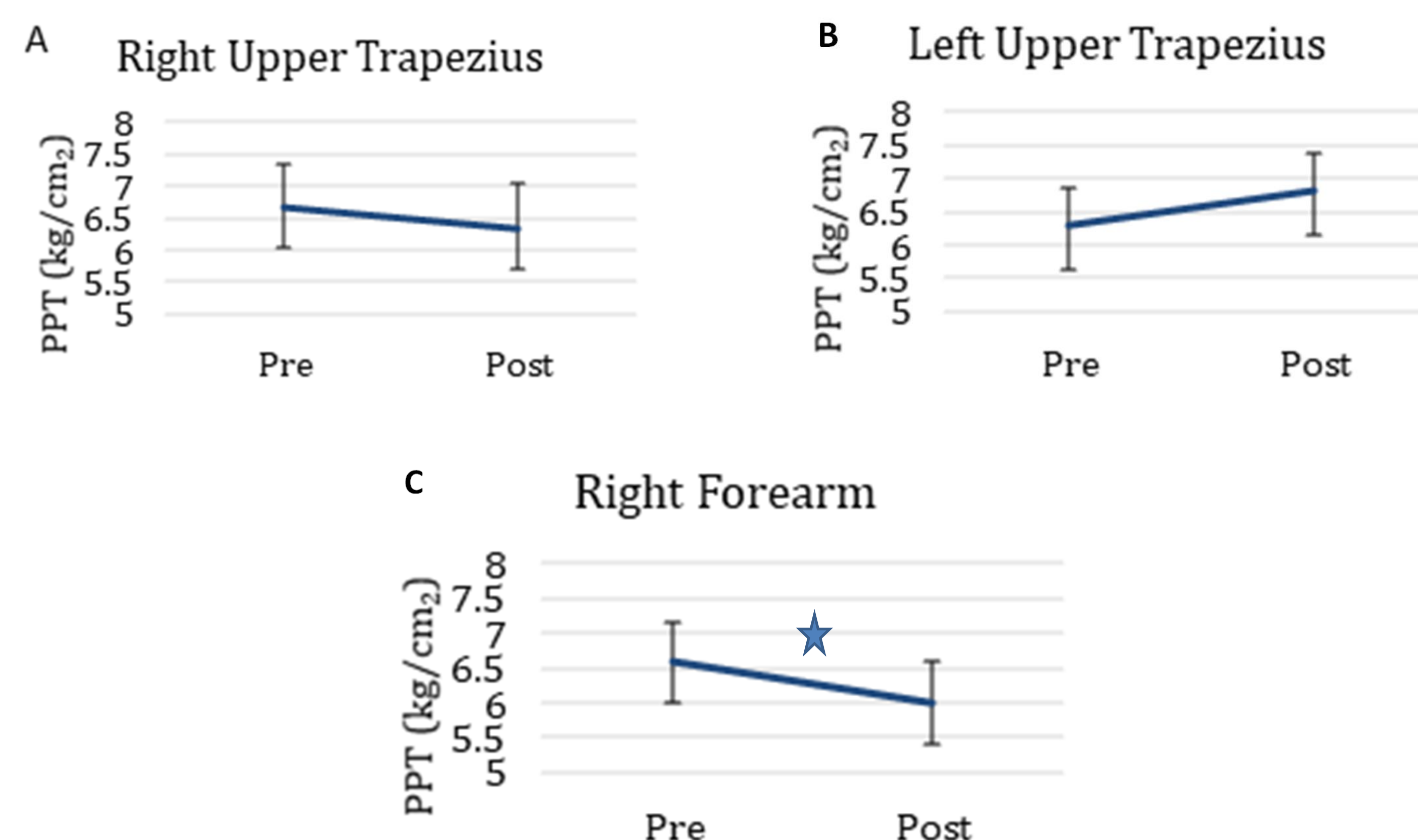


Figure 6 Changes in Muscle Strength from Pre to Post IASTM Across Direction. Data are the Mean +/- SEM

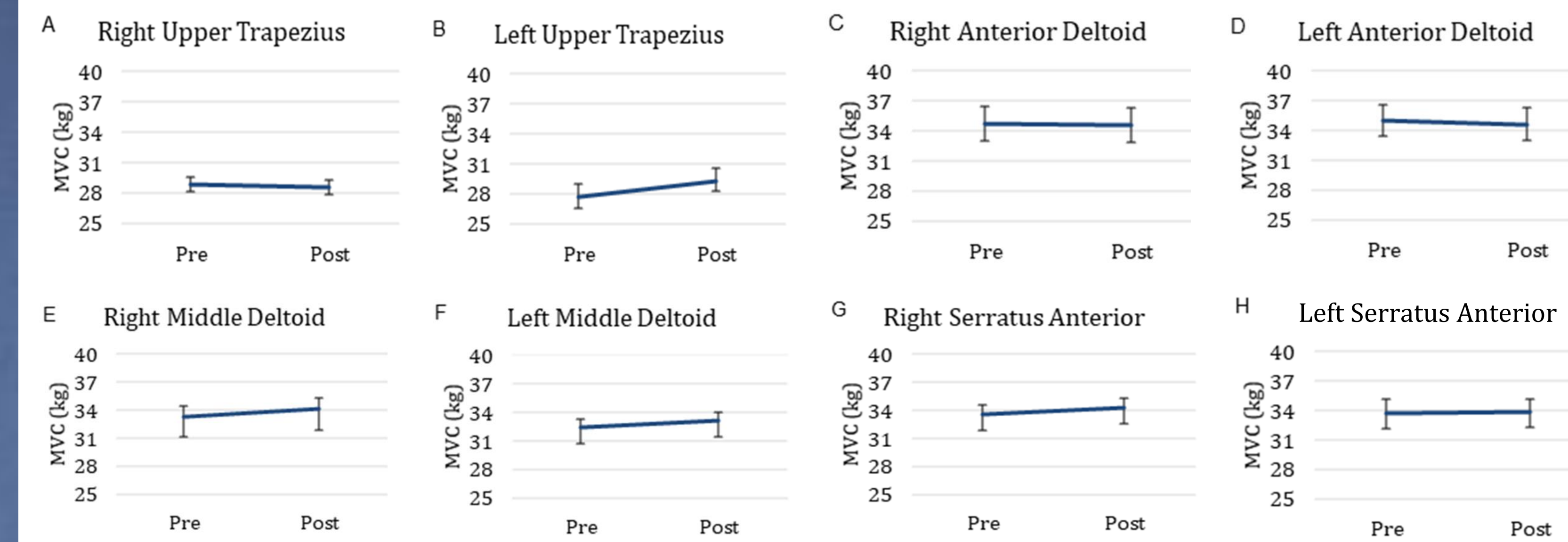
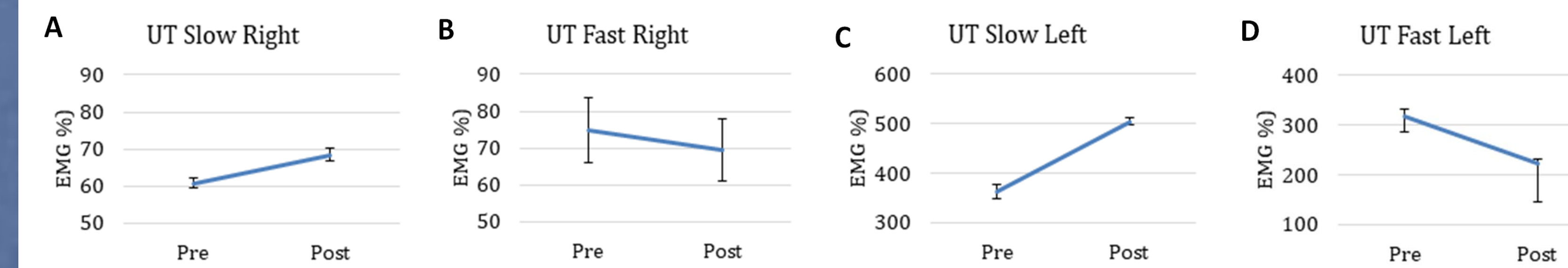


Figure 7 Changes in Mean EMG Amplitude from Pre to Post IASTM Across Movement Speed (Slow and Fast) and Side (Contralateral and Ipsilateral). Data are the Mean +/- SEM



Conclusion

- One application of a 5-minute IASTM treatment to the upper trapezius resulted in a statistically and clinically significant increase in cervical flexion and contralateral side bending and rotation consistent with lengthening of the right upper trapezius.
- Participants rated themselves as improved immediately and 24 hour later.
- However, a single application of a 5-minute IASTM treatment to the upper trapezius did not change tissue sensitivity of the upper trapezius, muscle strength, or muscle activation.

Take Home Points

- IASTM to the upper trapezius may be used to immediately increase cervical flexion, and contralateral side bending and rotation of the neck with patient perceived improvement in discomfort, but not to change upper trapezius muscle activation during arm elevation.
- A 5-minute IASTM treatment is sufficient to produce short-term improvements in cervical ROM consistent with muscle lengthening.
- There are inconsistencies in the literature regarding IASTM treatment protocol.

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