

## eP-02

### **Morphometry Changes at the Cervicothoracic Junction with Head Supported Mass: Implications for Neck Pain**

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**Background:** Military studies show increased prevalence of neck pain and early cord pathologies in populations that use head supported mass (helmet, instruments [night vision goggles]).

**Research question:** Does cervical neck muscle morphology change at the cervicothoracic junction (CTJ) due to axial loading from a head supported mass and can they be implicated in chronic neck pain?

**Design:** An upright MRI was used to measure changes in cross sectional areas of two cervical neck muscles and column morphologies after wearing a helmet.

**Methods:** 21 healthy subjects (26-40 years) were donned with US Army Combat Helmets. Upright MRIs before and after four hours of helmet wear were obtained. Cross-sectional areas of sternocleidomastoid/SCM and multifidus/MF muscles were measured at CTJ from inferior endplate of C7 vertebral body. Osteoligamentous column morphometrics included overall and segmental Cobb angles, disc and facet joint geometries. Spearman's rank correlation used.

**Results:** Significant correlative changes in the areas of both muscles were found ( $p=0.68$ ,  $p=0.0007$ ) at CTJ due to helmet use. Changes at other levels in other metrics were not significantly different.

**Discussion:** Statistically significant correlations increase in neck flexor/SCM and decrease in neck extensor/MF muscle morphometries at CTJ at upper endplate level suggest a localized adaptive response to helmet use. While total volume of each muscle may be unaltered, local changes/shift in areas along caudal-cranial direction may have biomechanical implications. CTJ acts as the transition from highly mobile cervical to relatively rigid thoracic spine. Changes in muscle areas at CTJ change lever arm to C7 body as well as internal anterior and posterior column load-sharing, which may contribute to neck pain over time. These results indicate that even short-term use of head supported mass is associated with structural changes in neck muscles, which may explain neck pain and disorders in the military.

Fig. 1

