RSNA Radiological Society of North America
RADIOLOGICAL SOCIETY OF NORTH AMERICA
820 JORIE BLVD, OAK BROOK, IL 60523
TEL 1-630-571-2670 FAX 1-630-571-7837
RSNA.ORG
NEWS

Neck Pain and Headache Frequency are Associated with Trapezius Muscle T2 from MRI in Young Adults with Tension-type Headache

PURPOSE

Tension-type headache (TTH) is the most prevalent primary headache disorder. Neck pain is commonly associated with primary headaches and the trigeminocervical complex (TCC) refers to the convergence of trigeminal and cervical afferents onto neurons of the brainstem, thus conceptualizes the emergence of headache in relation to neck pain. However, no objective biomarkers exist for the myofascial involvement in primary headaches. This study aimed to investigate the involvement of the trapezius muscles in primary headache disorders by quantitative magnetic resonance imaging (MRI), and to explore associations between muscle T2 values and headache and neck pain frequency.

METHODS AND MATERIALS

Fifty participants (41 females, age range 20-31 years; 16 tension-type headache [TTH-], 12 mixed-type TTH plus migraine episodes [TTH+], and 22 healthy controls [HC]) prospectively underwent fat-suppressed T2-prepared three-dimensional (3D) turbo spin-echo MRI. The bilateral trapezius muscles were manually segmented, followed by muscle T2 extraction. Associations between muscle T2 values and the presence of neck pain, number of days with headache (considering the 30 days prior to imaging using a headache calendar), and number of myofascial trigger points (mTrPs) as determined by manual palpation of the trapezius muscles were analyzed using mixed effects and regression models (adjusting for age, sex, and body mass index).

RESULTS

The TTH+ group demonstrated the highest muscle T2 values (right side: 31.4±1.2 ms, left side: 31.4±0.8 ms) as compared to the TTH- group ($p<0.001$) or HC group ($p<0.001$). Muscle T2 was significantly associated with the number of headache days (β coefficient: 2.04, $p=0.04$) and the presence of neck pain (odds ratio: 2.26, $p=0.04$). With muscle T2 as the predictor, the area under the curve (AUC) for differentiating between HC and the TTH+ group was 0.82. There was no statistically significant association between muscle T2 and the number of mTrPs of the trapezius muscles ($p>0.05$).

CONCLUSIONS

Increased T2 values of the trapezius muscles may represent an objective imaging biomarker for myofascial involvement in primary headache disorders, which could help to improve patient phenotyping and therapy evaluation. Pathophysiologically, the increased muscle T2 values could be interpreted as a surrogate of subtle neurogenic inflammation and peripheral sensitization within myofascial tissues.

CLINICAL RELEVANCE/APPLICATIONS

Muscle T2 mapping could be used to stratify patients with primary headaches and to track potential treatment effects for monitoring (e.g., following peripheral magnetic stimulation or physiotherapy to the neck and shoulder muscles).