

Jennifer Mullins¹ • Matt Hoch, PhD¹ • Art Nitz, PhD¹

¹Rehabilitation Science, University of Kentucky

Abstracts will be considered for both poster and platform presentations

Neurorehabilitation

Purpose/Hypothesis: Dry Needling (DN) is a neurophysiological treatment that targets muscular trigger points (MTrPs) and is hypothesized to alter the excitability of gamma motor neurons via the chemical environment and muscle filament overlap.¹ MTrPs are found in healthy and injured populations and are associated with sensorimotor dysfunction, with the potential to affect standing balance.²⁻⁴ Addressing MTrPs in the fibularis longus (FL) may be of particular relevance as this muscle has demonstrated sensitivity to changes in postural demands in the presence of injury.⁵⁻⁷ However, the effects of FL DN on sensorimotor function in healthy adults is unknown. Therefore, the purpose of this study is to examine the effect of FL DN on clinical balance measures and spinal reflex excitability in healthy young adults.

Subjects: Twenty-five healthy adults (10m; 25.8±5.45 years; 169.47±9.43cm; 68.47±13kg) volunteered.

Materials/Methods: Outcome measures included the Star Excursion Balance Test (SEBT) and FL Hoffmann Reflex (H-Reflex) which were assessed before and immediately following a single FL DN treatment. The anterior, posterolateral, and posteromedial directions of the SEBT were tested in a randomized order and reach distance were normalized to leg length. A composite SEBT score was calculated by dividing the normalized, average scores in each direction by three.⁸ FL spinal reflexes (H-Max, H/M Ratio, H-Latency) were obtained with a clinical EMG unit by providing an electrical stimulation to the common fibular nerve with subjects lying in a prone position. The DN treatment was performed on the FL using a “pistoning” technique. Descriptive statistics (mean change ± SD of change), paired t-tests, and standardized response mean effect sizes were calculated to compare balance and spinal reflex measures before and after the intervention ($p \leq 0.05$).

Results: Post-DN improvements were identified in composite ($1.58 \pm 2.54\%$, $p=0.006$, $ES=0.62$) and posterolateral reach distances ($2.55 \pm 4.63\%$, $p=0.013$, $ES=.55$) but not in the anterior ($1.20 \pm 2.95\%$, $p=0.057$, $ES=0.41$) or posteromedial ($0.99 \pm 5.12\%$, $p=0.35$, $ES=0.19$) reach distances. FL H-Max significantly increased ($479.74 \pm 1111.05\text{mV}$, $p=0.041$, $ES=0.43$), however, there was no change in the H/M ratio ($0.07 \pm 0.27\text{mV}$, $p=0.218$, $ES=0.25$) or H-Latency ($0.39 \pm 1.01\text{ms}$, $p=0.06$, $ES=0.39$) following DN.

Conclusions: FL DN immediately improved dynamic balance which may reflect the modest increases in spinal reflex excitability.

Clinical Relevance: DN provides immediate improvement to dynamic balance and spinal reflex excitability in healthy adults. These findings are supported by moderate effect sizes which suggest these changes may carry clinical relevance. Observed changes in balance and FL spinal reflex excitability warrant further investigation in a clinical population.

Keywords: Dry Needling, Balance, Hoffmann Reflex

References:

1. Knutson GA. The role of the gamma-motor system in increasing muscle tone and muscle pain syndromes: a review of the Johansson/Sojka hypothesis. *Journal of manipulative and physiological therapeutics*. 2000;23(8):564-572.
2. Ibarra JM, Ge HY, Wang C, Martinez Vizcaino V, Graven-Nielsen T, Arendt-Nielsen L. Latent myofascial trigger points are associated with an increased antagonistic muscle activity during agonist muscle contraction. *J Pain*. 2011;12(12):1282-1288.
3. Ge HY. Accelerated Muscle Fatigability of Latent Myofascial Trigger Points in Humans. *Pain Medicine* 2012;13:9.
4. Zuñil-Escobar JC, Martínez-Cepa CB, Martín-Urrialde JA, Gómez-Conesa A. The Prevalence of Latent Trigger Points in Lower Limb Muscles in Asymptomatic Subjects. *PM R*. 2016;8(11):1055-1064.
5. Donahue MS, Docherty CL, Riley ZA. Decreased fibularis reflex response during inversion

- perturbations in FAI subjects. *Journal of electromyography and kinesiology : official journal of the International Society of Electrophysiological Kinesiology*. 2014;24(1):84-89.
6. Kim KM, Hart JM, Saliba SA, Hertel J. Modulation of the Fibularis Longus Hoffmann Reflex and Postural Instability Associated With Chronic Ankle Instability. *J Athl Train*. 2016;51(8):637-643.
 7. Mora I, Quinteiro-Blondin S, Perot C. Electromechanical assessment of ankle stability. *European journal of applied physiology*. 2003;88(6):558-564.
 8. Gribble PA, Hertel J, Plisky P. Using the Star Excursion Balance Test to assess dynamic postural-control deficits and outcomes in lower extremity injury: a literature and systematic review. *J Athl Train*. 2012;47(3):339-357.