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LETTER

Trigger Point Electrical Dry Needling with Different Waveforms for Knee Osteoarthritis: Mechanistic Insights and Methodological Considerations [Letter]

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Dear editor

We read with great interest the article by Lin et al entitled "Trigger Point Electrical Dry Needling with Different Waveforms Plus Intra-Articular Corticosteroid for Knee Osteoarthritis: A Prospective Randomized Controlled Trial", recently published in the Journal of Pain Research.[1] Using a rigorous assessor-blinded randomized design, the authors demonstrated that the dense-disperse waveform (2/10 Hz) provided superior pain relief at later follow-up compared with continuous 2 Hz stimulation when combined with intra-articular corticosteroid injection. The authors should be commended for their well-designed study and for directly comparing stimulation parameters in this clinically relevant population. Nevertheless, several mechanistic and methodological considerations may help further contextualize the interpretation of these findings.

First, the authors attributed the superior efficacy of the dense-disperse waveform to reduced neural habituation and broader engagement of analgesic pathways, a view that aligns with Han's seminal work showing that alternating frequencies can synergistically activate μ- and κ-opioid systems.[2] However, the 2/10 Hz pairing used in the study represents a relatively narrow frequency alternation. Given that broader alternations (eg, 2/100 Hz) have been shown to enhance neuropeptide release in experimental settings,[2] future dose–response studies comparing narrow versus wide frequency ranges could help identify the optimal parameter window for knee osteoarthritis. The modest between-waveform difference (0.5 NRS points at week 12, below the predefined MCID of 2.0 points[1]) might reflect suboptimal frequency pairing rather than a fundamental limitation of waveform modulation.

Second, the intervention's inclusion of proximal muscles (glutei, quadratus lumborum, rectus abdominis) alongside peri-knee targets is commendable. This approach reflects the contemporary understanding that knee osteoarthritis involves dysfunctional force transmission along myofascial chains.[3] Notably, these needling sites overlap with classical acupoints: the gluteal region corresponds to GB 30 (Huantiao), while the lumbar area approximates BL 23 (Shenshu). In traditional Chinese medicine, these points regulate the Gallbladder and Bladder meridians, which traverse the lateral and posterior aspects of the lower limb and are clinically used for knee disorders. This convergence suggests that the therapeutic effect may partly arise from modulating pain pathways at both segmental and supraspinal levels. Future studies incorporating quantitative sensory testing or pressure pain threshold measurements at remote sites could help disentangle local versus central mechanisms.

Third, the sham group received mechanical dry needling without electrical stimulation. While this design controls for the specific contribution of electrical current, it does not account for the non-specific physiological effects of needle

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insertion itself, including local twitch responses and deqi sensation.[4] Prior research indicates that even superficial or sham needling can activate Aδ fibers and trigger diffuse noxious inhibitory control (DNIC), producing measurable anti-nociceptive effects.[5] Consequently, the observed differences between electrical-DN and sham groups might underestimate the true additive value of electrical stimulation, because the sham condition was not biologically inert. A CSI-only control group or the use of non-penetrating sham needles would strengthen the attribution of benefit specifically to electrical waveform parameters.

Fourth, the between-waveform difference at week 12 did not reach the predefined MCID of 2.0 NRS points.[1] However, responder analysis might reveal a more clinically meaningful picture: what proportion of patients in the dense-disperse group achieved ≥50% reduction from baseline in pain intensity or maintained clinically important improvement throughout follow-up? Furthermore, the generalized estimating equations analysis showed a significant group-by-time interaction, with the dense-disperse group exhibiting a substantially slower rate of pain recurrence.[1] This durability advantage—rather than a static point difference at a single timepoint—may represent the true clinical value of waveform modulation. Time-to-relapse or area-under-the-curve analyses would quantify this sustained benefit more robustly. In conclusion, Lin et al provide valuable evidence supporting electrical-DN as an adjunct to CSI for knee osteoarthritis. By optimizing frequency parameters, integrating myofascial chain theory with meridian-based frameworks, and refining control conditions, future research could further clarify the neurobiological mechanisms and clinical magnitude of waveform-specific effects.

Disclosure

The authors report no conflicts of interest in this communication.

References

1. Lin Y, Jia W, Liu C, Tang Y, Yuan Y. Trigger point electrical dry needling with different waveforms plus intra-articular corticosteroid for knee osteoarthritis: a prospective randomized controlled trial. *J Pain Res*. 2026;19:595268. PMID: 42051751; PMCID: PMC13118705. doi:10.2147/JPR.S595268
2. Han JS. Acupuncture: neuropeptide release produced by electrical stimulation of different frequencies. *Trends Neurosci*. 2003;26(1):17–22. PMID: 12495858. doi:10.1016/s0166-2236(02)00006-1
3. Dunning J, Butts R, Young I, et al. Periosteal electrical dry needling as an adjunct to exercise and manual therapy for knee osteoarthritis: a multicenter randomized clinical trial. *Clin J Pain*. 2018;34(12):1149–1158. PMID: 29864043; PMCID: PMC6250299. doi:10.1097/AJP.0000000000000634
4. Vickers AJ, Vertosick EA, Lewith G, et al. Acupuncture trialists' collaboration. acupuncture for chronic pain: update of an individual patient data meta-analysis. *J Pain*. 2018;19(5):455–474. PMID: 29198932; PMCID: PMC5927830. doi:10.1016/j.jpain.2017.11.005
5. Langevin HM, Churchill DL, Cipolla MJ. Mechanical signaling through connective tissue: a mechanism for the therapeutic effect of acupuncture. *FASEBJ*. 2001;15(12):2275–2282. PMID: 11641255. doi:10.1096/fj.01-0015hyp

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