

# CLINICAL AND ULTRASONOGRAPHIC EVALUATION OF HIGH-POWER PAIN THRESHOLD ULTRASOUND AND LOW-LEVEL LASER THERAPY IN MYOFASCIAL PAIN SYNDROME

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## Background and Aims

Myofascial Pain Syndrome (MPS) is a musculoskeletal condition characterized by myofascial trigger points (MTrPs), causing localized and referred pain. Various treatment options exist, but their efficacy lacks objective validation. High-power pain threshold ultrasound (HPPT-US) and low-level laser therapy (LLLT) are promising non-invasive modalities. Aims To assess the efficacy of HPPT-US and LLLT in treating active MTrPs, through clinical and ultrasonographic evaluations.

## Methods

Patients with chronic neck pain and active MTrPs in the upper trapezius were randomly assigned to five groups: HPPT-US, LLLT, sham HPPT-US, sham LLLT, and combined HPPT-US + LLLT. Evaluations were conducted at baseline, the first month, and the third month after treatment. Clinical assessments included pain intensity (VAS), cervical lateral flexion (goniometer), physical function (SF-36), anxiety (Profile of Mood States), and the Neck Disability Index. Ultrasonographic assessments measured treatment effects: trigger point size (B-mode imaging), vascularity - Blood Flow Waveform Score (BFS), tissue elasticity (elastography) and Tissue Imaging Score (TIS). These imaging techniques quantified microstructural and hemodynamic changes.

## Results

HPPT-US improved clinical and ultrasonographic parameters compared to placebo. LLLT showed no clinical improvement but enhanced radiological parameters at the third month. Combined HPPT-US + LLLT improved outcomes at all time points, superior to LLLT alone, though not over HPPT-US except for pain relief in the first month. Significant improvements in tissue elasticity and vascularity were observed, with elasticity values gradually decreasing, resulting in softer and more flexible tissue, particularly in the ultrasound group, and enhanced vascularization with reduced vascular bed resistance, supporting tissue healing (Figure 1, Figure 2). A strong correlation was found between clinical improvements and elasticity/Doppler findings, particularly at 3 months post-treatment.

## Conclusion

HPPT-US significantly improved clinical and ultrasonographic parameters, supporting its role in MPS treatment. While combined therapy provided additional benefits, it was not superior to HPPT-US alone. Considering cost-effectiveness, HPPT-US may serve as a viable standalone treatment, with micro-level tissue changes playing a key role in therapeutic success.

**Keywords:** MPS, Elastography, ultrasound, laser