

Biophysical Agents

Efficacy of C-fiber Selective Burst-Modulated Alternative Current Transcutaneous Electrical Nerve Stimulation for Non-specific Chronic Low Back Pain: A Randomized, Placebo-controlled Trial

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Purpose

The use of burst-modulated alternating current transcutaneous electrical nerve stimulation that selectively stimulates C-fibers (C-BMAC) has been proposed as a pain relief method. This study aimed to determine the effects of C-BMAC focusing on the analgesic duration and to identify the optimal frequency setting for the treatment of non-specific chronic low back pain (LBP).

Methods

A randomized, single-blind, placebo-controlled, parallel-group clinical trial. Sixty-three participants with non-specific chronic LBP were randomized to the following four groups: Placebo, BMAC-1 Hz, BMAC-20 Hz, and BMAC-100 Hz. Each group received stimulation to both forearms for 30 minutes. The study's primary outcome measure was movement-evoked pain as assessed by a visual analogue scale (VAS) during the finger-floor distance (FFD) test at baseline, immediately, 90 minutes, and 180 minutes after treatment.

Results

A total of 63 participants; 15, 14, 18, and 16 in the placebo, BMAC-1 Hz, BMAC-20 Hz, and BMAC-100 Hz groups, respectively. FFD VAS scores at 90 minutes post-treatment showed significant reductions in pain for the BMAC-1 Hz ($p = .010$) and BMAC-100 Hz ($p = .028$) groups compared with the placebo group. Notably, the BMAC-1 Hz group demonstrated a higher proportion of participants achieving greater than minimum important change analgesia than the placebo group (100% vs. 40%, $p = .004$).

Conclusions

The 1 Hz burst frequency of C-BMAC produced the highest analgesic effect on pain during movement in individuals with non-specific chronic LBP, with the analgesia duration exceeding 90 minutes.

INTRODUCTION

Globally, an estimated 568.4 million individuals experienced low back pain (LBP) in 2019,¹ with 20.1% suffering from chronic LBP.² Chronic LBP greatly reduces quality of life, contributes to social isolation,³ and has socioeconomic consequences.^{4,5} Approximately 85% of chronic LBP cases

lack a discernible pathoanatomical cause, categorized as non-specific chronic LBP.⁶ Encouraging patients to remain as active as possible is advocated⁷⁻¹⁰; however, movement-evoked pain (MEP) often obstructs adherence to this recommendation, requiring prolonged analgesia to comply with this advice.

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