A Double-Blinded RCT of Transcranial Direct Current Stimulation (tDCS) for the Affective Symptoms of Chronic Low Back Pain (CLBP)

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INTRODUCTION

• Pain has both nociceptive (sensory) and emotional (affective) components [1]
• Annual CLBP prevalence: 25%-45% [2]
• Affective symptoms drive CLBP disability and psychiatric comorbidity
• Overreliance on chronic opioid analgesics → deleterious side effects
• Few treatments target the emotional component of CLBP
• Cognitive behavioral therapy (CBT): effective, but access barriers

METHODS

• Participants
  o 30 consented: >18 years, Providence VAMC (PVAMC, N=17), Butler Hospital (BTL, N=4)
  o Randomization balanced by prescription opioid status
• Exclusions
  o Lifetime bipolar disorder, chronic psychotic disorder (per structured interview)
  o Current DSI-V alcohol, sedative/hypnotic, stimulant, or cocaine dependence
  o Current cancer, infection, inflammatory arthritis
  o Uncontrolled medical problems
  o Skull trauma, intracranial surgery, implanted hardware, metal in the cranial cavity
  o Pregnancy
• tDCS Device
• DVRPS

HYPOTHESES

• Active tDCS will be well-tolerated in a clinical CLBP population
• 10 days of active cathodal stimulation targeting left dACC will, relative to sham stimulation:
  o Reduce pain-related interference and distress
  o Increase pain acceptance
  o Pain intensity rated with a visual analog scale, the Defense and Veterans Pain Rating Scale (DVPRS), will be unaffected
• Effects will persist at 6-week follow-up

RESULTS

• 21 completers: finished all 10 tDCS sessions and assessments
  o 1 PVAMC participant lost to 6-week follow-up
• Average follow-up: 6.2 weeks
• Main effects of tDCS: post-hoc test combining D5, D10, D-Wk F/U
  o WHY-MPI-C (X²=4.34, p=0.037)
  o RMDQ (X²=4.84, p=0.028)
• All other stimuli and interactions: |z|<1.51, p>0.13
• Opioid status: lower Day 1 CPAQ only (|z|>3.59, p<0.001)

DISCUSSION

• First double-blinded RCT of repeated tDCS sessions targeting dACC in CLBP patients
• Pain-related functioning and distress (WHY-MPI-C and RMDQ) may improve after cathodal (relative to a contralateral mastoid return) tDCS intended to target dACC
• Post-hoc tests suggest WHY-MPI-C, RMDQ, and PHQ-9 improvements were not merely driven by group baseline differences
• Repeated tDCS well-tolerated
• High treatment satisfaction (Day 5 and 10 CSQ >28/32 regardless of group)
• tDCS effects may be cumulative, increasing over time [8]
• Future RCTs need larger replication samples and longer follow-up
• Considerations: varying number of sessions, “high-definition” tDCS, multimodal treatment (e.g. tDCS-CBT), imaging (e.g. EEG, fMRI) to verify target engagement

REFERENCE


