

**Substance misuse To Psychiatric disorders for Cannabis – repetitive
Transcranial Magnetic Stimulation for people with Cannabis Use Disorder
(SToP-C-rTMS X CUD)**

Executive Summary

Background

Repetitive transcranial magnetic stimulation (rTMS) is a non-invasive brain stimulation technique. Preliminary studies using rTMS targeting the dorsolateral prefrontal cortex (DLPFC) have shown therapeutic potential in treating substance use disorders. However, its clinical application for cannabis use disorder (CUD) remains underexplored.

Aims

This study aimed to evaluate the efficacy of high frequency rTMS targeting the left DLPFC in reducing cannabis craving and dependence, severity of CUD, frequency of cannabis use and abstinence in individuals with CUD. It also compared if there were similar efficacies from three different rTMS treatment schedules, ranging from two to five weeks of rTMS treatments.

Method

This interventional study employed a two-phase, three-arm, prospective, open-labelled design over a 12-month period. In the initial “active rTMS phase”, each consented participant was randomized in the 1:1:1 ratio to receive 20 rTMS sessions according to three different schedules ranging from two to five weeks. Participants were then followed for a total of 12 months in the observational “maintenance phase”. Outcomes including MCQ-SF, SDS, severity of DSM-5 defined CUD, frequency of cannabis use, days of abstinence from cannabis use, CPQ, BAI and BDI-II were assessed by investigators at baseline, post rTMS treatment schedules, 3rd, 6th and 12th months.

Results

Eighteen participants (including 12 males, mean age 25.92, 6 females, mean age 22.83) with moderate to severe CUD were randomized into six participants per groups. Every

participant completed the 20 sessions of 15 Hz rTMS over the left DLPFC across two weeks, four weeks, or five weeks. Across all treatment groups, rTMS significantly reduced cannabis craving, psychological dependence, severity of CUD, frequency of monthly cannabis use and problems related to cannabis use (all p s < 0.05) throughout the whole 12-month study period. No significant differences were revealed over rTMS treatment efficacy between the three different rTMS treatment schedules over time, except that rTMS treatment over five weeks showed a longer abstinence period at three months (p < 0.05). No significant intolerability or side-effect was reported.

Recommendations

20-session high frequency rTMS over the left DLPFC is a well-tolerated and promising intervention for individuals with moderate to severe CUD in reducing cannabis addiction and related problems. In particular, it has potential application as clinical treatment in cannabis abusers with cannabis dependence. While different rTMS treatment schedules may influence over short-term outcomes on craving and abstinence, further large-scale trials are needed to determine the optimal treatment schedules in treating CUD. Future research should also explore combined treatment approaches that integrate rTMS with psychotherapeutic interventions to maximize immediate therapeutic efficacy and facilitate long-term substantial improvement in individuals with CUD.