Executive Summary

Background/Objective

Repetitive transcranial magnetic stimulation (rTMS) is increasingly used as an intervention for treating substance addiction. In this study, we aimed to examine the effects of high-frequency rTMS applied to the left dorsolateral prefrontal cortex (DLPFC) as an adjunct treatment of common illicit drugs addiction in Hong Kong.

Methods

We conducted a within-subject, crossover design study enrolling adults with history of using amphetamine/cocaine currently receiving counselling or rehabilitation services from the community centres. Participants were allocated to either a 6-session (3 sessions/week) real rTMS (10Hz, 2000 pulses, 100% RMT) or sham rTMS groups to the left dorsolateral prefrontal cortex in a random order, with a 2-week washout period between 2 phases. We measured outcomes including craving scores, self-reported substance consumption, executive functioning, and mood at baseline, after Phase I, start of Phase II, and end of Phase II.

Results

Forty-eight participants with illicit drugs abuse were recruited from 6 non-government organizations, 24 participants were randomly assigned to the TMS-Sham group (rTMS first, then sham) and 24 participants to the Sham-TMS group (sham first, then rTMS). There were 18 dropouts at various phases. 'Intention-to-treat' using 'last observation carried forward' was used for the missing data in the final analysis for the carry-over and treatment effects. Both real and sham rTMS significantly reduced the craving scores and improved performance in executive functional tests, however, only real rTMS significantly reduced the anxiety and depression levels in illicit drug users (P=0.020), as measured using the Depression Anxiety Stress Scales, and on increasing motivation for change ($p<0.001$).

Conclusion

Both real rTMS and sham rTMS improved craving and executive functioning showing that placebo effect of rTMS on craving and executive functioning in illicit drug users is large. Real rTMS, but not sham, appears to improve the mood and motivation for change of illicit drugs users. Future studies are required to investigate the neural mechanism underlying the therapeutic effect in substance abuse in association with rTMS as well as to determine an optimal stimulation setting for clinical application for SUD in future.

(335 words)