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The Effects of Repetitive Transcranial Magnetic Stimulation on Improvement of Mental Health and Clinical Parameters in Hemodialysis Patients – Pilot Study

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Objectives: The prevalence of major depressive disorder in patients with end-stage renal disease (ESRD) is higher than in diabetes or congestive heart failure. However, it is difficult to prescribe antidepressant treatment because of concern about potential adverse effects in CKD patients. Here, we studied the therapeutic effect of repetitive transcranial magnetic stimulation (rTMS) as a nonpharmacologic treatment in depressed hemodialysis patients.

Methods: The patients with more than 5 points in Patient health Questionnaire-9 were randomized to rTMS group and sham group. The rTMS group was stimulated with a 110% motor threshold and 10 hertz on the left dorsolateral prefrontal cortex for 20 minutes, three times a week. In sham group, the “1-wing 90 degree method” was used to prevent the effective magnetic field from being transmitted to the subjects. We collected and analyzed the clinical indices before and after TMS treatment, and also collected data of quantitative electroencephalogram, and the results of various psychiatric questionnaires (Beck's depression index-II [BDI-II], Beck's anxiety index [BAI] and SCL-90R-Somatization subscales [SCL-90R-SOM]).

Results: In this pilot study, a total of 13 patients were randomized, 7 patients assigned to the sham group and 6 were assigned to the rTMS group. When laboratory findings were compared 1 month after TMS, hemoglobin A1c was significantly improved in rTMS group (8.3% to 7.1%, P=0.046). Although there was no statistical significance, K (5.0 mmol/L to 4.8 mmol/L) and intact PTH (209 pg/mL to 152 pg/mL) also showed an improving tendency. The BDI-II score was improved both with sham (24.0 to 18.4, P=0.009) and rTMS group (21.2 to 13.8, P=0.005), the BAI (17.2 to 11.2, P=0.074) and SCL-90R-SOM (27.7 to 20.2, P=0.065) showed improving tendency only in rTMS group.

Conclusions: In hemodialysis patients, rTMS may improve depression, anxiety, and somatization symptoms, which may lead to improvements in clinical measures.