E-Poster

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Efficacy of Repetitive Transcranial Magnetic Stimulation for Multiple System Atrophy: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

Topic: Neurostimulation (rTMS, tDCS, etc.)

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BACKGROUND

Recent studies suggest that repetitive transcranial magnetic stimulation (rTMS) may provide therapeutic benefits for individuals with multiple system atrophy (MSA), particularly by improving motor function and psychological symptoms. However, the efficacy of rTMS in this population remains inconclusive. This study aims to evaluate the impact of rTMS on motor and psychological outcomes in patients with MSA compared to sham stimulation.

METHODS

A comprehensive literature search was independently performed by two investigators in PubMed, EMBASE, Cochrane Library, Web of Science, and ClinicalTrials.gov from inception to February 2025. Eligible studies were identified through a two-step process, including an initial title and abstract screening, followed by a full-text assessment. The primary outcome measure was the Scale for the Assessment and Rating of Ataxia (SARA), which quantifies ataxia severity. Secondary outcomes included the Unified Multiple System Atrophy Rating Scale Part II (UMSARS-II), Hamilton Anxiety Scale (HAMA), Hamilton Depression Rating Scale (HAMD), and Fatigue Severity Scale-9 (FSS-9). All outcomes were analyzed as continuous variables using Review Manager (RevMan, version 5.4.1).

RESULTS

A total of six randomized control trials (RCTs) with 140 patients with MSA were included. Compared to the sham device, rTMS led to significant improvements across multiple outcome measures, including SARA (mean difference [MD]: -6.26, 95% confidence interval [CI]: -8.52 to -4, $p < 0.001$), UMSARS-II (MD: -1.95, 95% CI: -3.91 to 0, $p = 0.05$), HAMA (MD: -6.43, 95% CI: -10.08 to -2.77, $p < 0.001$), HAMD (standardized MD [SMD]: -0.99, 95% CI: -1.6 to -0.38, $p = 0.001$), and FSS-9 (MD: -13.03, 95% CI: -19.18 to -6.87, $p < 0.001$).

CONCLUSION

These findings suggest that rTMS may be an effective intervention for alleviating motor impairment, anxiety, depression, and fatigue in individuals with MSA. Given the limited treatment options for MSA, rTMS may serve as a non-invasive adjunct therapy to improve symptom relief and quality of life. However, further RCTs are needed.

Statement of Disclosures

None

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