

Prediction of Worsening Anxiety During TMS Treatment for Depression: A Retrospective Analysis

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Abstract : Background: Transcranial Magnetic Stimulation (TMS) is an established treatment for major depressive disorder (MDD), with evidence suggesting it may also alleviate comorbid anxiety, including FDA-clearance for anxious depression. However, clinical experience indicates that some patients experience worsened anxiety during TMS treatment, sometimes requiring a change in protocol or medication. It remains unclear, however, whether higher baseline anxiety predicts worsening anxiety during TMS treatment for depression, a critical consideration for informing patient expectations and optimizing care. Methods: We conducted a retrospective chart review of 23 adults diagnosed with MDD who underwent ≥ 29 TMS sessions targeting the left dorsolateral prefrontal cortex (DLPFC). Most treatments utilize deep TMS coils with high-frequency (18Hz) stimulation. Anxiety severity was assessed using the Generalized Anxiety Disorder-7 (GAD-7) scale, a validated measure of anxiety symptoms, at baseline and after the treatment course. The percentage change in GAD-7 scores was calculated to evaluate the impact of TMS on anxiety symptoms. Results: Of the 23 patients, 9 (39%) experienced higher post-treatment GAD-7 scores compared to baseline, with 4 patients showing a $>30\%$ worsening in anxiety severity. Baseline GAD-7 scores were weakly correlated with percentage change in anxiety scores (correlation coefficient: -0.21124). Patients who experienced worsened anxiety had a lower mean baseline GAD-7 score (7.11) compared to those who did not (10.15), but this difference was not statistically significant (Two-Sample T-test: $p = 0.192$). Discussion: While a substantial minority (39%) of patients experienced worsening anxiety, baseline anxiety severity did not reliably predict this outcome. Further work is needed to test this among larger patient samples and to explore the impact of alternative protocols, such as right low frequency, on anxiety exacerbation. These findings highlight the need for further investigation into the clinical predictors of anxiety exacerbation because of TMS, as well as targeted interventions to address this potential adverse outcome.

Keywords : anxiety, major depressive disorder, transcranial magnetic stimulation (TMS), mental health outcomes, neuropsychiatric treatment

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