

Efficacy of Intermittent Theta Burst Stimulation in Alzheimer’s Disease: A Systematic Review and Meta-Analysis

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Intermittent theta burst stimulation (iTBS) shows favorable benefits for cognition, mood, and neuropsychiatric symptoms in Alzheimer’s disease, with consistent improvements on MoCA, NPI, and HAMD scores. However, evidence remains preliminary due to limited trials and methodological variability, underscoring the need for more robust studies before clinical adoption.

INTRODUCTION	METHODS	RESULTS	CONCLUSIONS	REFERENCES
Alzheimer’s disease (AD) is a progressive neurodegenerative disorder and the most common form of dementia, affecting over 55 million individuals worldwide. With limited effective treatments available, intermittent theta burst stimulation (iTBS) has emerged as a promising non-invasive neuromodulation approach for managing AD-related symptoms.	A systematic search of PubMed, Scopus, Web of Science, and Cochrane Library was conducted through November 20, 2025. Eligible studies were randomized controlled trials (RCTs) of iTBS in Alzheimer’s disease. Primary outcomes were changes in global cognition measured by (MoCA, MMSE, ADAS-Cog). Data were pooled as standardized mean differences (SMD) with 95% confidence intervals (CI).	Seven RCTs (n = 294; 155 active iTBS, 139 sham) were included, with comparable age (~68 years) and sex distribution (~37% male). Active iTBS significantly improved MoCA scores (SMD = 0.45, 95% CI: 0.11–0.79, p = 0.009), reduced neuropsychiatric symptoms (NPI: SMD = –0.48, 95% CI: –0.87 to –0.09, p = 0.015), and lowered depression severity (HAMD: SMD = –0.61, 95% CI: –0.94 to –0.27, p = 0.0005). No significant effects were observed for MMSE, ADAS-Cog, GDS, or ADL.	iTBS is a safe and promising non-invasive intervention that improves cognition and alleviates neuropsychiatric and depressive symptoms in AD, though its impact on functional independence is limited. These findings should be interpreted cautiously given the small number of studies, protocol heterogeneity, and short follow-up. Larger, well-designed RCTs with standardized protocols and longer follow-up are needed. Furthermore, brain imaging may help clarify mechanisms and guide personalized neuromodulation.	1- Yang CC, Huang KY, Hsu JL, Hu CJ, Lu YH, Kuan YC. Effects of intermittent theta-burst stimulation on cognition and glymphatic system activity in mild cognitive impairment and very mild Alzheimer’s disease: a randomized controlled trial. Journal of NeuroEngineering and Rehabilitation 2- Zhang X, Sun Z, Wu D, Shi X, Song C, Guan X, et al. Effects of cerebellar intermittent theta-burst stimulation on patients with Alzheimer’s disease: A randomized controlled trial. Journal of Alzheimer’s disease Disclosure Nothing to disclose Nothing to declare 