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Phenotype–outcome alignment in studies of rTMS for sleep disturbances in Parkinson's disease: a systematic review protocol

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ADMINISTRATIVE INFORMATION

Support - Clinical Research Innovation Plan of Shanghai General Hospital (CTCCR-22022B05).

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 7 October 2026 and was last updated on 7 October 2026.

INTRODUCTION

Review question / Objective To assess phenotype–outcome alignment and treatment attribution in studies of rTMS/TBS for sleep disturbances in Parkinson's disease.

Rationale Previous reviews mainly synthesized global sleep scores. This review will examine whether baseline sleep phenotypes, measured outcomes, and study comparisons support phenotype-specific interpretation.

Condition being studied Sleep disturbances in Parkinson's disease, including insomnia, excessive daytime sleepiness, RBD, RLS/PLMS, sleep-disordered breathing, and circadian disturbance.

METHODS

Participant or population Adults with idiopathic Parkinson's disease.

Intervention rTMS or theta-burst stimulation.

Comparator Sham stimulation, usual care, or other active interventions. Noncomparative studies will be included for descriptive evidence.

Study designs to be included Randomized trials, nonrandomized comparative studies, single-arm studies, and case reports or series.

Eligibility criteria Eligible studies must report an independently interpretable sleep outcome. Reviews, protocols, animal studies, neurophysiological testing-only studies, and reports without sufficient sleep data will be excluded.

Information sources PubMed/MEDLINE, Embase, CENTRAL, Web of Science Core Collection, Scopus, SinoMed, CNKI, Wanfang Data, ClinicalTrials.gov, WHO ICTRP, and the Chinese Clinical Trial Registry.

Main outcome(s) Phenotype–outcome alignment at the study–domain level and whether study comparisons can isolate an rTMS-specific effect.

Quality assessment / Risk of bias analysis Two reviewers will independently assess one principal sleep result per randomized trial using the appropriate RoB 2 version. Disagreements will be resolved by consensus.

Strategy of data synthesis A structured narrative synthesis following SWiM will be conducted, stratified by sleep domain, study design, comparator, stimulation configuration, outcome, follow-up, and risk of bias. The suitability for meta-analysis will be evaluated, and quantitative synthesis will be performed where appropriate.

Subgroup analysis If sufficient data are available, subgroup analyses may be considered by sleep phenotype, outcome domain, stimulation target/configuration, comparator type, and study design.

Sensitivity analysis If meta-analysis is performed, sensitivity analyses may be considered by excluding studies at high risk of bias or studies with substantially different design or outcome characteristics. If meta-analysis is not performed, sensitivity will be assessed narratively.

Language restriction No language restriction will be applied at the search stage.

Country(ies) involved China.

Keywords Parkinson's disease; repetitive transcranial magnetic stimulation; sleep disorders; phenotype; systematic review; neuromodulation.

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