INPLASY

Theta burst stimulation for hemiplegic upper extremity after stroke: A meta-analytic review of twenty years of clinical and mechanistic evidence

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ADMINISTRATIVE INFORMATION

Review Stage at time of this submission - Data analysis.

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 17 January 2024 and was last updated on 17 January 2024.

INTRODUCTION

Review question / Objective The objectives of this meta-analytic review were to (1) evaluate the effects of different theta burst stimulation (TBS) protocols on improving upper extremity motor impairment and functional activities in patients with stroke using meta-analyses; (2) identify any significant association between various TBS parameters, patients' demographics and clinical profiles and effect sizes, using subgroup analyses and meta-regression; (3) summarized and interpreted the mechanisms underlying the therapeutic effects of TBS by qualitatively assessing studies that have utilized neuroimaging or neurophysiological outcomes.

Condition being studied Stroke.

METHODS

Participant or population Adult participants diagnosed with stroke.

Intervention Theta burst stimulation (TBS).

Comparator Sham TBS or no stimulation control.

Study designs to be included RCT.

Eligibility criteria Population (P): studies recruiting adult participants diagnosed with stroke; Intervention (I): intervention using TBS that was applied to the primary motor cortex cortical representations of proximal or distal upper extremity; Comparison (C): sham TBS or no stimulation control; Outcomes (O): studies that provided at least one outcome assessing upper

limb motor impairment and/or functional activity, or neural functions (neurophysiological or neuroimaging outcomes).

Information sources PubMed, EMBASE, Web of Science, and Medline.

Main outcome(s) The upper extremity subscores of the Fugl-Meyer Assessment (FMA-UE).

Additional outcome(s) The action research arm test(ARAT).

Quality assessment / Risk of bias analysis PEDro scale.

Strategy of data synthesis Statistical analyses were performed using the Comprehensive Meta-analysis software version 3.0.

Subgroup analysis Meta-regression was performed to identify any association between effect sizes and TBS parameters in case of at least 5 articles per subgroup. Univariate meta-regression was performed with various patients' demographics, i.e., age and sex (expressed by the ratio of males), clinical information, i.e., the chronicity of stroke, the baseline severity, the ratio of subcortical patients, and the ratio of patients with cerebral infarction, as well as TBS parameters, including the total number of applied pulses, the number of sessions, pulse per session, and stimulation intensity.

Sensitivity analysis Sensitivity analysis was performed using the leave-one-out method in case of significant results.

Language restriction English.

Country(ies) involved Hong Kong SAR, China.

Keywords stroke, theta burst stimulation, meta-analysis.

Contributions of each author
Author 1 - Jack Jiaqi Zhang - Conceptualization, methodology, software, data analysis, writing–original draft, writing–review and editing.
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