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Repetitive transcranial magnetic stimulation for improving motor function after stroke: A systemic review and meta analysis

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ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - The review has not yet started.

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 14 June 2023 and was last updated on 14 June 2023.

INTRODUCTION

Review question / Objective To assess the efficacy and safety of rTMS for improving motor function in people with stroke.

Condition being studied Stroke is the second most common cause of death and the leading cause of adult disability in the world. As a result of the ageingpopulation, the burden of stroke will increase in the next 20 years(Donnan 2008). At present, there are limited effective interventions for patients with acute stroke (Langhorne 2009). Consequently,the management of most patients with stroke remains primarily focused on secondary prevention and rehabilitation (European Stroke Organisation 2009). Any intervention that enables patients to recover more rapidly or gain functional independence would have major benefits for patients and their families. In addition,brain recovery and rehabilitation will also be a prioritised field infuture stroke research (Hachinski 2010).The use of this technique has been investigated in the treatment of many conditions, including depression (Rodriguez-Martin 2002), tinnitus (Meng 2009), movement disorders (Edwards 2008) and obsessive compulsive disorder (Rodriguez-Martin 2003). Although there are a few published studies of the clinical eD icacy of rTMS on motor recovery in stroke patients (Ameli 2009; Khedr 2009; Kirton 2008; Mansur 2005; Takeuchi 2009; Yozbatiran 2009), the potential therapeutic effect of rTMS has been controversial. The aim of this review was to assess systematically all the randomised controlled trials of rTMS on functional recovery in patients with stroke to provide the best available evidence.

METHODS

Participant or population We will include studies with participants of any age or sex after stroke, regardless of the duration of illness or severity of the initial impairment. The clinical definition of stroke was that of the World Health Organization criteria (Stroke 1989), excluding stroke mimics by

computerised tomography (CT) or magnetic resonance imaging (MRI) scan.

Intervention Transcranial magnetic stimulation.

Comparator The control interventions is sham treatment or other conventional treatment.

Study designs to be included Only RCTs will be included.

Eligibility criteria Studies comparing different methods of transcranial magnetic stimulation will not be included.

Information sources Four English-language databases include EMBASE, Medline , Cochrane Central Register of Controlled Trials (CENTRAL) in the Cochrane Library and CINAHL will be searched from inception until May, 2023 with no language restrictions.

Main outcome(s) Motor function: upper limb function (e.g. Motor Assessment Scale (MAS), Action Research Arm Test, Nine-Hole Peg Test, etc); lower limb function (e.g. changes in stride length (centimetres) or speed (time taken to walk a specific distance), Timed Up and Go Test, Rivermead Motor Assessment Scale, etc); Global motor function (e.g. MAS, Rivermead Motor Assessment Scale, etc).

Additional outcome(s) 1. Activities of daily living, such as the Barthel index, the Functional Independence Measure, and the modified Rankin Scale. 2. Death or disability. 3. Any other impairment improvement (e.g. visual, perceptual, depression, cognition, etc). 4. Adverse outcome (e.g. seizure, headache, dizziness, etc).

Data management Two review authors independently will extract details of patient characteristics, methods, interventions and outcomes by using a data extraction form. We will resolve disagreements through discussion with a third author. For dichotomous outcomes we will extract the number of participants experiencing the event and the total number of participants in each arm of the trial. For continuous outcomes we will extract the mean value and standard deviation for the changes in each arm of the trial along with the total number in each group.

Quality assessment / Risk of bias analysis We will assess the methodological quality of selected studies as described in the Cochrane Handbook for Systematic Reviews of Interventions (Cochrane Handbook). We will creat a 'Risk of bias 2' table and includ a description and a judgement (low risk of bias, high risk of bias, or unclear risk of bias) for the following domains for each of the included studies.

Strategy of data synthesis We will perform statistical analysis using RevMan 5.4 and perform all analyses in accordance with the intention-totreat method. We will report the results as RRs with 95% CIs for dichotomous data and as MDs or SMDs with 95% CIs for continuous data. We will use a random-effects model to combine individual results. If there were no suitable studies, we will plan to provide a narrative summary of the study results.

Subgroup analysis We planned a priori subgroup analyses based on: 1. stroke type: ischaemic stroke versus intracranial haemorrhage; 2. ipsilateral or bilateral stimulation; 3. different frequency (low frequency or high frequency); 4. duration of illness; 5. severity of initial impairment; 6. stimulus parameters.

Sensitivity analysis: 1. excluding studies with inadequate concealment of allocation; 2. excluding studies in which outcome evaluation was not blinded; 3. excluding studies in which loss to follow-up was not reported or was greater than 10%; 4. re-analysing the data by removing studies with nonstandard designs if we included these studies; 5. re-analysing the data by removing studies with assumed values to replace missing data.

Language restriction Only studies published in English will be included.

Country(ies) involved China.

Keywords Repetitive transcranial magnetic stimulation; rTMS;Stroke; Motor function; Review.

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