Efficacy of repetitive transcranial magnetic stimulation for post-stroke depression: a systematic review and meta-analysis of randomized clinical trials

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Background： Post-stroke depression (PSD) is a severe and fearful complication that occurs in nearly one third of patients who suffer stroke, and is also the main factor limiting recovery and rehabilitation in stroke patients. The treatment of post-stroke depression is helpful to the recovery of function and quality of life in patients with stroke. In the past decades, rTMS has been widely used in the treatment of psychiatric disorders. Some studies have demonstrated rTMS has a promising result in PSD, but the conclusions were limited by the small sample size. Therefore, a well-designed meta-analysis to pool the comprehensive clinical evidence is needed to guide the application of rTMS in this population.

Purpose： To evaluate the efficacy of repetitive transcranial magnetic stimulation in the treatment of post-stroke depression.

Participants/population

1) A history of stroke or have at least three cardiovascular risk factors.
2) Patients met a diagnosis of depressive disorder according to a standardized diagnostic interview (e.g. the Diagnostic and Statistical Manual of Mental Disorders(DSM)), or present a current depressive status defined as scoring above a validated cut-off on a depressive rating scale (e.g., HAMD-17>17).

Exclusion criteria
Patients with a history of depression before stroke.

Interventions/ Comparators

1) rTMS vs. sham rTMS
2) rTMS+ routine treatment vs. routine treatment
3) rTMS+ antidepressant drugs vs. antidepressant drugs

Outcomes

Primary outcome: the mean change scores from baseline to post-treatment in depressive rating scales.

Secondary outcomes:

1) The remission rate of depression: the proportion of patients who achieved a validated depressive rating score below the determined threshold.
2) The stroke recovery: the mean change scores from baseline to post-treatment in stroke severity or functioning rating scales, e.g., National Institute of Health stroke scale (NIHSS).
3) The cognitive function recovery: the mean change scores from baseline to post-treatment in cognitive rating scales, e.g., Mini-Mental State Examination (MMSE).
4) Recovery of activities of daily living: the mean change scores from baseline to post-treatment in rating scales, e.g., Barthel Index (BI).

Types of study to be included: randomized controlled trials.

Search strategy

1. Key words
   1) ("Transcranial Magnetic Stimulations"[Title/Abstract] OR "Transcranial Magnetic Stimulation, Repetitive"[Title/Abstract] OR TMS[Title/Abstract]) OR r-TMS[Title/Abstract] OR rTMS[Title/Abstract] OR TMS[Title/Abstract])
   2) (Stroke[Title/Abstract] OR poststroke[Title/Abstract] OR post stroke[Title/Abstract] OR post-stroke[Title/Abstract] OR vascular[Title/Abstract])
   3) (depress*[Title/Abstract]) OR dysthymi*[Title/Abstract] OR mood disorder*[Title/Abstract] OR affective disorder*[Title/Abstract])
2. Electronic database

PubMed, CENTRAL(Cochrane Central Register of Controlled Trials), Embase, Web of Science, CINAHL, and PsycINFO

Data extraction

Two independent reviewers will independently extract data, extracted information will include: study setting; study population and participant demographics and baseline characteristics; details of the intervention and control conditions; outcomes and times of measurement.

Statistical analysis

We will be perform meta‐analysis using the Review Manager 5.3 or Stata 14.

Quality assessment

Two review authors will assess the risk of bias in the included studies using the Cochrane 'Risk of bias' assessment tool as described in the Cochrane Handbook for

Systematic Reviews of Interventions.

Subgroup analysis

We will conduct subgroup analysis on primary outcome to evaluate the influence of the following potential moderators: (1) stimulation pattern; (2) number of treatment sessions; (3) augmentation with antidepressants (augmentation vs. non-augmentation); (4) depression diagnosed criteria; (5) control conditions; (6) region

Sensitivity analysis

We will perform sensitivity analysis on primary outcome by omitting trials that were rated as high risk of bias.