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Synchronizing Scalp Acupuncture with Rehabilitation Training for Post-Stroke Recovery: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION

Support - No funding received.

Review Stage at time of this submission - Data analysis.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202590028

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 8 September 2025 and was last updated on 8 September 2025.

INTRODUCTION

Review question / Objective Population (P): Adults (≥18 years) with a confirmed diagnosis of stroke and motor dysfunction.
Intervention (I): Scalp acupuncture (including motion-style or dynamic techniques) synchronized with rehabilitation training.
Comparator (C): Any type of rehabilitation.
Outcome (O): Improvement in activities of daily living, assessed by the Modified Barthel Index (MBI) and Fugl-Meyer Assessment (FMA).

Rationale Stroke is a leading cause of long-term disability, with motor impairments significantly affecting activities of daily living and patient independence. Although conventional rehabilitation provides benefits, many individuals continue to experience persistent functional deficits. Scalp acupuncture, particularly when applied concurrently with rehabilitation training, has been proposed as a treatment strategy to promote neuroplasticity and enhance motor recovery. While several randomized controlled trials have reported promising outcomes, the overall evidence remains inconsistent, and no systematic review has specifically examined the effects of synchronized scalp acupuncture with rehabilitation. This systematic review and meta-analysis aims to evaluate the efficacy of this combined intervention, and provide guidance for clinical practice and future research.

Condition being studied Stroke (ischemic or hemorrhagic) with motor impairments affecting activities of daily living.

METHODS

Search strategy Databases: PubMed, Embase, Cochrane Library, Medline, CNKI
Time frame: From database inception to the present
Search terms (keywords):
"scalp acupuncture" OR "scalp needling" OR "head needling" OR "head acupuncture" AND "stroke" OR "apoplexy" OR "cerebral infarction" OR "post-stroke hemiplegia" OR "cerebrovascular

disease" OR "cerebrovascular accident" OR "cerebrovascular disorders" OR "spastic hemiplegia" OR "CVA"
Study type: Only human studies and randomized controlled trials will be included
Additional sources: Reference lists of relevant articles and previous reviews will be screened to identify further eligible studies.

Participant or population 1.Adults (≥18 years) with a confirmed diagnosis of stroke (ischemic or hemorrhagic)
2.Experiencing motor dysfunction affecting activities of daily living
3.Exclusion criteria: Patients with severe comorbidities or pregnant women.

Intervention Scalp acupuncture administered simultaneously with rehabilitation exercises of any type.

Comparator Any type of rehabilitation therapy.

Study designs to be included Randomized controlled trials.

Eligibility criteria Inclusion criteria:
1-Randomized controlled trials (RCTs).
2-Intervention group received clearly defined scalp acupuncture with needle retention applied concurrently with rehabilitation training.
3-Trials reporting data for pre- and post-intervention assessments of changes in activities of daily living.
4-At least one outcome measure included the Modified Barthel Index (MBI).
Exclusion criteria:
1-Non-RCT study designs.
2-Interventions involving electroacupuncture, body acupuncture, or other co-interventions.
3-Insufficient or unavailable data for analysis.
4-Suspected overlapping participant populations.

Information sources Electronic databases: PubMed, Embase, Cochrane Library, Medline, CNKI
Additional sources: Reference lists of relevant studies and previous systematic reviews will be manually screened to identify further eligible studies.
Search timeframe: From database inception to the present.
Language restrictions: No language restrictions will be applied.

Main outcome(s) Improvement in activities of daily living measured using the Modified Barthel Index (MBI).

Additional outcome(s) Improvement in motor recovery measured using the Fugl-Meyer Assessment (FMA).

Data management
1.Two reviewers will independently extract data from included studies using a pre-designed data extraction form.
2.Extracted data will include: study characteristics, participant demographics, intervention details, comparator details, outcomes (post-intervention MBI scores), and adverse events.
3.Any discrepancies between reviewers will be resolved through discussion or consultation with a third reviewer.

Quality assessment / Risk of bias analysis
1.The Cochrane Risk of Bias 2 (RoB 2) tool will be used to assess the methodological quality of included randomized controlled trials.
2.Two authors will independently evaluate each study for bias across the following domains:
-Randomization process
-Deviations from intended interventions
-Missing outcome data
-Measurement of the outcome
-Selection of the reported result
3.Discrepancies will be resolved through discussion or consultation with a third reviewer.
4.The results of the risk of bias assessment will be presented in tables and figures and considered when interpreting the meta-analysis.

Strategy of data synthesis Data will be synthesized using meta-analysis. Continuous outcomes, such as MBI scores, will be analyzed using Hedges' g with 95% confidence intervals. Heterogeneity will be assessed using the I^2 statistic; a random-effects model will be applied in the presence of significant heterogeneity, otherwise a fixed-effect model will be used.

Subgroup analysis Subgroup analyses will explore potential sources of heterogeneity, including:
-Time since stroke onset (early ≤7 days, subacute 7–90 days, chronic >90 days)
-Treatment duration (≤4 weeks, 4–8 weeks, >8 weeks)
-Needle retention time (≤60 minutes vs. >60 minutes)
-Type of rehabilitation (conventional vs. device-assisted).

Sensitivity analysis Sensitivity analyses will be performed by removing one study at a time to assess the robustness of the results.

Language restriction No language restrictions will be applied. Studies published in languages other than English or Chinese will be translated as needed to extract relevant data.

Country(ies) involved Taiwan (Taichung Veterans General Hospital, Department of Traditional Medicine).

Keywords Stroke; Post-stroke motor dysfunction; Scalp acupuncture; Rehabilitation; Physical therapy; Activities of daily living; Modified Barthel Index (MBI); Fugl-Meyer Assessment (FMA).

Contributions of each author

Author 1 - Jeng-Yi Chang - Author 1 conceived and designed the study, conducted the literature search, performed data extraction and statistical analysis, and drafted the manuscript.
Email: yierfox02@gmail.com
Author 2 - Chia-I Tsai - Author 2 was responsible for overall supervision and acted as the guarantor of the review.
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Author 3 - Yun-Yu Chen - Author 3 contributed to statistical analysis and interpretation, and participated in manuscript drafting and revision.
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Author 4 - Pei-Jung Chiang - Author 4 contributed to study design, conducted database search and study selection, performed final manuscript revision, and served as the corresponding author.
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