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REVIEW ARTICLE

Facilitating recovery from post-stroke depression with acupuncture: A comprehensive analysis of systematic reviews

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Abstract

Post-stroke depression (PSD) is the most common psychological complication among stroke survivors and is strongly associated with poor outcomes and increased mortality. Acupuncture has been proposed as a potential treatment for PSD. In this overview, 13 meta-analyses (MAs) of randomized controlled trials published up to August 2023 that evaluated acupuncture for PSD were identified. Across these MAs, acupuncture generally demonstrated greater efficacy than control interventions in alleviating depressive symptoms. However, methodological assessment using the A MeaSurement Tool to Assess Systematic Reviews 2 (AMSTAR-2) rated all included studies as having critically low quality, indicating pervasive design and reporting weaknesses. Reporting quality, as evaluated by the Preferred Reporting Items for Systematic Reviews and MAs guidelines, was relatively high, with over 90% of checklist items being rated "yes" or "partially yes." When the quality of evidence was appraised through the grading of recommendations assessment, development, and evaluation system, only nine of 61 outcomes were classified as moderate quality, 29 as low quality, and the remainder as very low quality. Although acupuncture appears to be a safe and potentially beneficial option for managing PSD, the overall strength of evidence remains limited. Thus, these findings should be interpreted with caution. Future research should prioritize rigorous trial design, standardized intervention protocols, and comprehensive meta-analytic methods to enhance the reliability and clinical applicability of evidence on acupuncture for PSD.

Keywords: Acupuncture; Overview; Post-stroke depression; Systematic review; AMSTAR-2; GRADE; PRISMA; Treatment

1. Introduction

Stroke is a prevalent cerebrovascular disease marked by high incidence, mortality, and disability rates.[1] Among its sequelae, post-stroke depression (PSD) represents the most common psychiatric complication, affecting approximately one-third of survivors, according to epidemiological data.[2,3] As the global population continues to age, the prevalence of PSD is expected to increase, imposing a substantial societal and healthcare burden.[1] Clinically, PSD is associated with impaired physical and cognitive rehabilitation, suboptimal functional recovery, and reduced quality of life, often hindering patients' participation in rehabilitation programs.[4] Moreover, individuals with PSD exhibit higher risks of self-harm or suicidal ideation[5,6] and are more susceptible to recurrent cerebrovascular events – factors that contribute to poorer prognoses and elevated mortality rates.[7,8]

Present PSD management typically involves pharmacological and non-pharmacological approaches. Antidepressant medications – including monoamine oxidase inhibitors, selective serotonin reuptake inhibitors, and tricyclic antidepressants – constitute the standard pharmacotherapy. Nevertheless, the efficacy of these agents remains contested, and their use can be accompanied by adverse effects.[9,10] As a result, non-pharmacological interventions have been adopted to mitigate side effects and enhance overall therapeutic outcomes.

Acupuncture, as a prominent non-pharmacological modality, has demonstrated therapeutic benefits in PSD. Compared with pharmacotherapy alone, acupuncture is cost-effective, easy to administer, and associated with minimal side effects.[11] Existing studies suggest that combining acupuncture with conventional antidepressants yields superior efficacy, faster onset of action, and favorable tolerability.[12] Given the growing body of literature – often yielding inconsistent results – this overview aims to systematically synthesize and critically appraise high-quality meta-analyses (MAs) of randomized controlled trials (RCTs) on acupuncture for PSD, with the goal of informing future research directions and supporting evidence-based clinical decision-making.

2. Methods

This study systematically searched for MAs of acupuncture therapy for post-stroke functional impairments, encompassing literature from the databases' inception up to August 20, 2023. Seven databases were searched, including Cochrane Library, Embase, PubMed, China National Knowledge Infrastructure, Wanfang Database, China Science and Technology Journal Database, and Chinese Biomedical Literature Database. No restrictions were imposed on publication dates or language.

The search strategy was developed based on a combination of subject headings and free-text terms, focusing on keywords, such as "acupuncture," "stroke," and "systematic review." Adjustments to the search strategy were made according to the unique features of each database. In addition, to ensure comprehensive data collection, the reference lists of relevant reviews were manually searched to identify additional eligible studies.

This protocol has been successfully registered on and can be accessed through PROSPERO (https://www.crd.york.ac.uk/prospero/, ID: CRD42020189173).

2.1. Inclusion criteria

Two reviewers (PL and LW) independently evaluated the eligibility of studies according to the following criteria:

(i). Studies included in MAs were limited to RCTs.

(ii). Study participants were diagnosed following internationally recognized guidelines or consensus, with no restrictions on the version of guidelines used, and there were no limitations based on gender, age, race, disease duration, severity, or source.

(iii). Types of acupuncture included all invasive acupuncture methods, such as acupuncture with needles, including various needle stimulation techniques (e.g., electroacupuncture, manual acupuncture, or warm needling). Non-invasive acupuncture techniques, such as laser acupuncture, ear acupressure pellets, transcutaneous electrical nerve stimulation, and acupoint massage, were excluded. The experimental group comprised acupuncture or acupuncture combined with other conventional treatments, while the control interventions included placebo, sham, or conventional treatments. Antidepressants used in conventional treatments include monoamine oxidase inhibitors, tricyclic antidepressants, tetracyclic antidepressants, selective serotonin reuptake inhibitors for PSD, and other related agents.

(iv). Outcome measures were defined in accordance with internationally recognized clinical trial guidelines and scales. Primary outcomes were focused on the clinical overall effective rate and improvement in functional scale scores, while secondary outcomes included adverse events and adverse reactions.

2.2. Exclusion criteria

The following exclusion criteria were applied:

(i). Duplicate publications or studies published multiple times.

(ii). Participants diagnosed with PSD along with other concurrent medical conditions.

(iii). Studies in which acupuncture was employed as an intervention in the control group.

(iv). Studies where acupuncture was not the sole distinguishing variable between the intervention and control groups.
(v). Studies for which the full text was unavailable for review.
(vi). Studies categorized as opinion articles, evidence summaries, guidelines, editorials, conference abstracts, or those with incomplete or non-extractable data.

2.3. Research selection

The studies retrieved from the search were imported into EndNote X9.3.3 (Clarivate, US). After removing duplicates, two independent researchers (PL and LW) screened the studies based on the inclusion and exclusion criteria. Initial screening was performed by reviewing titles and abstracts, followed by a second screening involving a thorough review of the full texts. Detailed records were kept to document the reasons for excluding studies during the second screening phase. The final selection results were cross-checked by both researchers (PL and LW), and any discrepancies regarding the inclusion of individual studies were resolved through discussion. In cases where consensus could not be reached through discussion, the third researcher (AW) intervened.

2.4. Data extraction

Two reviewers (PL and LW) independently extracted data from the included MAs using a pre-designed table. This table included sections for basic information (e.g., first author, publication year, and information source), methods (e.g., searched databases, number of included RCTs, and sample sizes), study design (e.g., diagnostic criteria, interventions, control treatments, and tools used to assess methodological quality), and outcomes (e.g., main conclusions, safety, and quality outcomes). Discrepancies related to the extracted data were resolved through discussion. In cases where consensus could not be reached through discussion, the third researcher (AW) intervened.

2.5. Quality assessment

2.5.1. Methodological quality

Two researchers (PL and LW) independently used the A MeaSurement Tool to Assess Systematic Reviews 2 (AMSTAR-2)[13] to assess the methodological quality of MAs. AMSTAR-2 comprises 16 items for evaluating the effectiveness of MAs, with seven items (Items 2, 4, 7, 9, 11, 13, and 15) considered crucial for assessing the effectiveness of MAs. Each item has three possible responses: "yes," "partial yes," or "no." Methodological quality is rated as "high" when there are no critical weaknesses or only one non-critical weakness; "moderate" when there is more than one non-critical weakness but no critical flaws; "low" when one critical flaw and numerous non-critical weaknesses exist; and "very low" when there are more than one serious flaw. During the assessment process, any discrepancies were resolved through discussion.

2.5.2. Report quality

Two researchers (PL and LW) independently utilized the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) tool[14] to assess the quality of MAs' reports. PRISMA consists of 27 items that encompass seven aspects of MAs, including titles, abstracts, introductions, methods, results, discussions, and other information. Each item in PRISMA was assessed as "yes," "partial yes," or "no" based on established criteria. In case of any discrepancies, they were resolved through discussion.

2.5.3. Evidence quality

In the context of MA, the evidence quality for each outcome measure was independently assessed by two authors (PL and LW) using the grading of recommendations assessment, development, and evaluation (GRADE) methodology.[15] GRADE ranks evidence based on factors, such as risk of bias, indirectness, imprecision, inconsistency, and publication bias. Each outcome measure was categorized into one of four levels: "high," "moderate," "low," or "very low" quality. In the event of any discrepancies, they were resolved through discussion.

2.5.4. Data analysis

In this overview, a comprehensive analysis of acupuncture treatment for PSD was conducted, and summary estimates of relevant clinical effectiveness and outcomes were extracted from the included MAs. These summary estimates included measures, such as the odds ratio, risk ratio, weighted mean difference, standard mean difference, and 95% confidence intervals (CI). The results of AMSTAR-2 and PRISMA were summarized, with the data presented as percentages and frequencies for each item. Due to significant heterogeneity among the systematic reviews and considerable overlap of constituent RCTs, a quantitative synthesis was deemed infeasible.

3. Results

3.1. Study selection

A total of 2,593 articles were generated from the search across seven databases and were deemed eligible for screening. All studies were imported into EndNote for further screening. Following initial screening and removal of duplicates, 2,333 articles were excluded. After a full-text reading of 260 articles, a final selection of 13 articles

was included for review. Figure 1 illustrates the entire process of study selection. Based on the calculations, the overlap rate is 24.27% and the corrected covered area is 2.6%, indicating a slight overlap according to established thresholds (Table A1).[16,17]

3.2. Characteristics of the included MAs

All 13 MAs incorporated in this analysis exclusively comprised RCTs,[18-30] and the MAs were published between 2012 and 2023. Among these studies, there were eight publications in English[18-25] and five in Chinese,[26-30] with three of the Chinese publications originating from doctoral dissertations.[26-28] The included MAs conducted extensive searches across a spectrum of 11 – 29 databases, enlisting RCTs that ranged from 11 trials encompassing 1,225 participants[18] to 29 trials encompassing 2,394 participants.[29]

The diagnostic criteria for stroke incorporated into the review encompassed various standards, including the Diagnostic Points for Various Cerebrovascular Diseases, the Chinese Disease Diagnosis and Efficacy Standards, the *Chinese Classification of Cerebrovascular Diseases 2015*, and the *Chinese Guidelines for the Diagnosis and Treatment of Acute Ischemic Stroke 2018*, as well as confirmation through computed tomography or magnetic resonance imaging indicating the presence of stroke. In the context of depression, the diagnostic criteria included the *Chinese Classification and Diagnostics of Mental Disorders*,[31] the *Diagnostic and Statistical Manual of Mental Disorders*,[32,33] the Hamilton Depression Scale (HAMD),[34] and the *International Classification of Diseases*.

The intervention arms comprised acupuncture monotherapy, acupuncture adjunctive to pharmacological treatment, acupuncture combined with standard therapy, and acupuncture administered alongside a placebo. Various forms of acupuncture were employed, including electroacupuncture, manual acupuncture, scalp acupuncture, and the use of filiform needles. Control groups included modern medications, modern medications combined with sham acupuncture, or conventional therapy. Modern medications include fluoxetine, fluoxetine hydrochloride, sertraline, paroxetine, citalopram, venlafaxine, clomipramine, amitriptyline, alprazolam, triazolam, flupentixol, and melitracen, administered either individually or in combination.

Outcome measurements primarily consisted of four categories: Clinical effective rate, depression scores (HAMD scores and self-rating depression scale [SDS] scores), neurodeficiency scores (Barthel index, National Institutes of Health Stroke Scale [NIHSS] scores, neurofunctional deficit scores, and Chinese Stroke Clinical Neurological Functional Deficiency Severity Assessment), and safety outcomes (adverse events). Regarding methodological quality assessment, seven of the MAs opted for the Cochrane Risk of Bias tool to evaluate the methodological quality of the included RCTs,[18,20,21,26-28,30] while five MAs employed the Jadad scale or modified Jadad scale.[19,22,23,25,29] One MA concurrently reported both the Cochrane Risk of

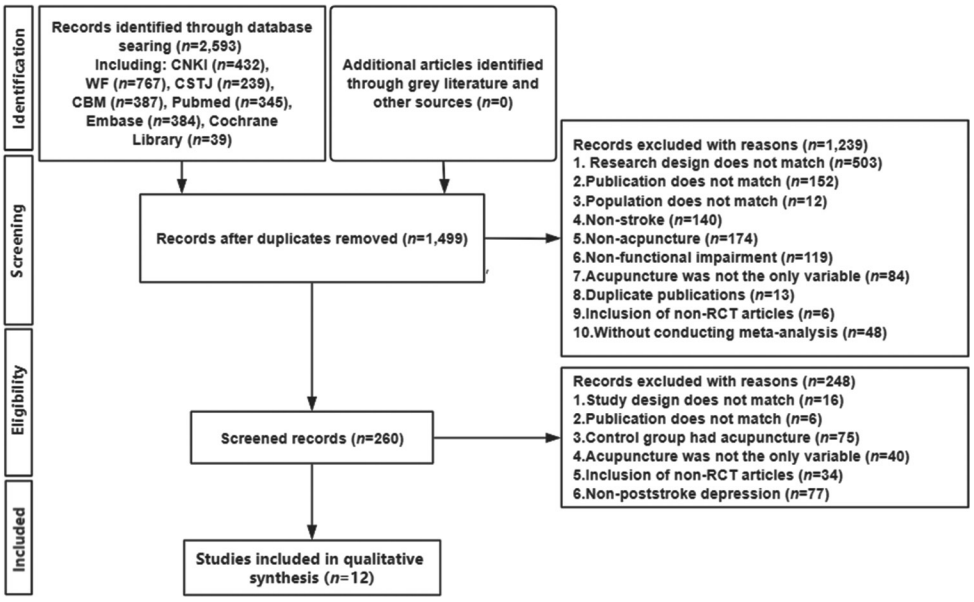

Figure 1. Flow diagram of the meta-analyses selection process
Abbreviations: CBM: Chinese Biomedical Literature Database; CNKI: China National Knowledge Infrastructure; CSTJ: China Science and Technology Journal Database; RCT: Randomized controlled trial; WF: Wanfang Database.

Bias tool and the modified Jadad assessment tool.[24] Safety assessments pertaining to acupuncture were conducted in 10 studies,[18,19,22-28,30] all of which concluded that acupuncture is safe. Finally, it is notable that only three MAs reported the funding sources (Table 1).[18,21,24]

3.3. Inclusion of MAs quality

3.3.1. Methodological quality

Assessments through the AMSTAR-2 tool classified the methodological quality of all 13 included MAs as very low (Table A2). Deficiencies were particularly noted in Items 2, 4, 7, 10, and 16 (Figure 2). Three MAs (15.4%) had registered their protocols before commencing their studies.[18,24,25] None of the MAs provided a list of excluded studies and demonstrated the rationale behind their exclusions. Only one MA (7.7%) disclosed the funding sources of its constituent RCTs,[18] while three MAs (23.1%) explicitly reported having no conflicts of interest.[18,21,24] Conversely, 11 MAs (84.6%) exhibited methodological shortcomings, including incomplete literature retrieval and insufficiently detailed reporting of RCT characteristics (Figure 3).

3.3.2. Report quality

The results of the PRISMA quality assessment are depicted in Figure 4. Among the 27 items assessed, 14 were reported as essentially complete, with a "yes" or "partly yes" response rate exceeding 90%. However, there were three items with inadequate reporting, with response rates of "yes" or "partly yes" falling below 50%.[35-37] The primary reporting deficiencies were observed in the following areas: Protocol and registration (3; 23.1%), search strategy (6; 46.2%), additional analyses (7; 53.8%), and funding (3; 23.1%).

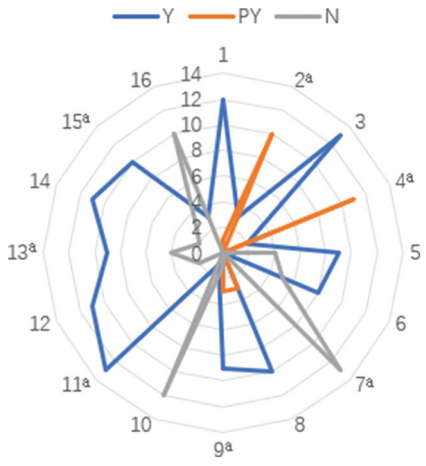

Figure 2. Graphical presentation of the results of A MeaSurement Tool to Assess Systematic Reviews 2 (AMSTAR-2)
Note: [a]Critical items of AMSTAR-2.
Abbreviations: N: No; PY: Partial yes; Y: Yes.

Detailed information regarding PRISMA can be found in Table A3.

3.3.3. Evidence quality

The evidence quality for the primary research outcomes extracted from the included MAs was assessed. In total, 61 study outcomes highlighted the effectiveness of acupuncture in the treatment of PSD. According to the GRADE assessment, among the 61 study outcomes, nine were of moderate quality, 29 were of low quality, and the remaining were of very low quality. Regarding limitations, all study outcomes were downgraded by one level. For

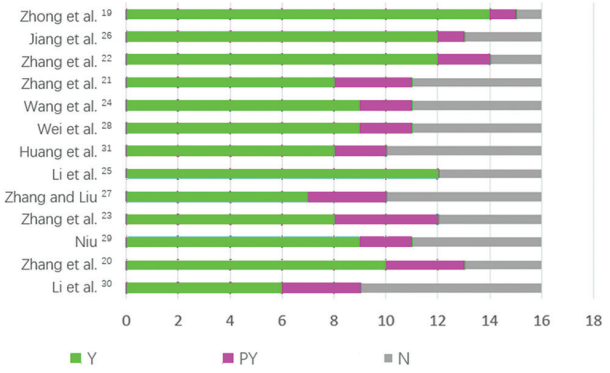

Figure 3. Graphical presentation of the results of a measurement tool to assess systematic reviews 2
Abbreviations: N: No; PY: Partial yes; Y: Yes.

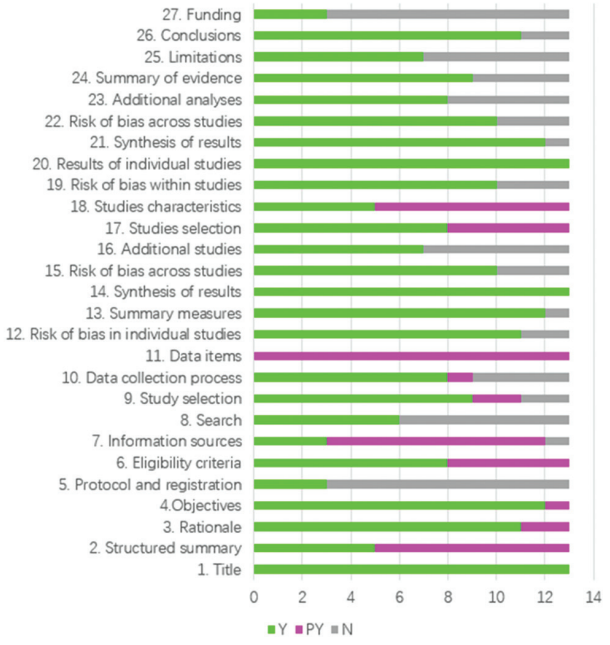

Figure 4. Graphical presentation of the results of Preferred Reporting Items for Systematic Reviews and Meta-analyses
Abbreviations: N: No; PY: Partial yes; Y: Yes.

Table 1. Characteristics of the included meta-analyses

Study	Databases	Diagnosis of stroke	Diagnosis of depression	Trials (subjects)	Intervention	Control	Quality assessment	Outcome	Safety	Conclusion
Li *et al.* (2012)[29]	Ovid Lww, PubMed, Cochrane Library, CNKI, CBM, WF, and CSTJ.	The Diagnostic Points for Various Cerebrovascular Diseases; the Chinese Disease Diagnosis and Efficacy Standards	CCMD; DSM; ICD	29 (2,394)	Acupuncture + modern medications	Modern medications	Jadad scale	①③	Unknown	The use of electroacupuncture may be effective in alleviating PSD, with its efficacy potentially not inferior to antidepressant medication. Electroacupuncture may also facilitate neurological recovery and improve the quality of life in stroke survivors
Zhang *et al.* (2014)[22]	Embase, Cochrane Library, PubMed, WOS, CNKI, CBM, and WF	Not specified	CCMD; DSM; HAMD	13 (845)	Acupuncture; Acupuncture + moxibustion; Electroacupuncture	Modern medications	Cochrane handbook	①⑤	Yes	Treating PSD with acupuncture is more effective compared with modern medication. The results are less reliable, and the quality of evidence is poor
Niu (2014)[28]	Embase, Cochrane Library, PubMed, CNKI, CBM, WF, and CSTJ	The Diagnostic Points for Various Cerebrovascular Diseases; the Chinese Disease Diagnosis and Efficacy Standards	CCMD; DSM; ICD	20 (1,372)	Electroacupuncture	Modern medications	Modified Jadad scale	①③⑤⑥⑧⑨⑪	Yes	The review of electroacupuncture treatment versus fluoxetine for PSD showed a significant difference in the total effective rates in HAMD and FMA scores, but failed to show a significant difference in the recovery of neurological function and daily activity
Zhang *et al.* (2014)[20]	Ovid Lww, PubMed, Cochrane Library, CNKI, CBM, WF, and CSTJ	The Diagnostic Points for Various Cerebrovascular Diseases; the Chinese Disease Diagnosis and Efficacy Standards	CCMD; DSM; ICD	17 (1,029)	Filiform needle	Modern medications	Modified Jadad scale	①②④	Yes	Early filiform needle acupuncture for PSD can effectively control depression. Filiform needle acupuncture is safe and reliable. The therapeutic effects of filiform needle acupuncture are better than those of antidepressant drugs

(Cont'd...)

Table 1. ***(Continued)***

Study	Databases	Diagnosis of stroke	Diagnosis of depression	Trials (subjects)	Intervention	Control	Quality assessment	Outcome	Safety	Conclusion
Zhang *et al.* (2017)[26]	Embase, CENTRAL, PubMed, CNKI, CBM, WF, and CSTJ	Not specified	Not specified	17 (1,522)	Electroacupuncture; Electroacupuncture + modern medications	Modern medications	Cochrane handbook	①③⑤⑦	Yes	The use of electroacupuncture may be effective in alleviating PSD, with its efficacy potentially not inferior to antidepressant medications. Electroacupuncture may also facilitate neurological recovery and improve the quality of life in stroke survivors. Importantly, electroacupuncture is considered safe
Li *et al.* (2018)[24]	Embase, CENTRAL, PubMed, WOS, CNKI, CBM, WF, and CSTJ	Confirmed by CT or MRI	CCMD; DSM; ICD	18 (813)	Electroacupuncture	Modern medications	Cochrane handbook; Jadad scale	①③⑤⑥⑧⑨	Yes	There is no significant difference between the effects of electroacupuncture and antidepressant medications on the severity of depression; however, electroacupuncture caused fewer adverse events
Huang *et al.* (2018)[30]	Embase, Cochrane Library, PubMed, Medline, CNKI, CBM, WF, and CSTJ	The Diagnostic Points for Various Cerebrovascular Diseases; confirmed by CT or MRI	CCMD	13 (1,193)	Electroacupuncture; Acupuncture; Acupuncture + modern medications	Modern medications	Cochrane handbook	①	Unknown	Acupuncture and electroacupuncture are effective therapeutic methods in improving the depressive state of patients with PSD. They can significantly improve the effects of treatment when combined with modern medications
Wei *et al.* (2020)[27]	Embase, Cochrane Library, PubMed, CNKI, CBM, and WF	The Diagnostic Points for Various Cerebrovascular Diseases; *Chinese Guidelines for the Diagnosis and Treatment of Acute Ischemic Stroke 2018*	CCMD; DSM; ICD	14 (1,640)	Acupuncture; Acupuncture + placebo	Modern medications; Modern medications+ sham acupuncture	Cochrane handbook	①②	Yes	Acupuncture intervention in patients with PSD is better than conventional modern medications in improving the HAMD score and curative effects. The number of adverse reactions to acupuncture in the treatment process is lower than that of common modern medications. The safety of acupuncture in the treatment of PSD patients is worth affirming to a certain extent

(Cont'd...)

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Table 1. ***(Continued)***

Study	Databases	Diagnosis of stroke	Diagnosis of depression	Trials (subjects)	Intervention	Control	Quality assessment	Outcome	Safety	Conclusion
Wang *et al.* (2021)[21]	Embase, Cochrane Library, PubMed, CNKI, CBM, WF, and CSTJ	*Chinese Classification of Cerebrovascular Diseases 2015*; confirmed by CT or MRI	CCMD; HAMD	19 (1,606)	Acupuncture	Modern medications	Modified Jadad scale	①⑤	Yes	Compared with antidepressants, electroacupuncture is not less effective in improving depressive symptoms in PSD patients with greater safety
Zhang *et al.* (2021)[21]	Embase, Cochrane Library, Scopus, PubMed, Medline, CNKI, CBM, and WF	The Diagnostic Points for Various Cerebrovascular Diseases; confirmed by CT or MRI	CCMD; DSM	14 (1,124)	Acupuncture	Modern medications	Jadad scale	①②⑦⑧	Unknown	Acupuncture is superior to antidepressants in the treatment of PSD and reduces the incidence of adverse events. Therefore, acupuncture may be a meaningful treatment for PSD
Zhang *et al.* (2021)[21]	Embase, CENTRAL, PubMed, WOS, CNKI, WF, and CSTJ	Confirmed by CT or MRI	CCMD; DSM; ICD	13 (904)	Manual acupuncture + modern medications; Electroacupuncture + modern medications	Modern medications	Cochrane handbook	①②⑤⑥⑦	Unknown	Acupuncture combined with antidepressants shows a more favourable effect on the treatment of PSD than antidepressants alone
Jiang *et al.* (2023)[25]	Embase, Cochrane Library, PubMed, WOS, CNKI, CSTJ, CBM, and WF	Confirmed by CT or MRI	CCMD; DSM; ICD	14 (1,263)	Scalp acupuncture; Scalp acupuncture + electroacupuncture	Modern medications	Cochrane handbook	①②⑤⑩	Yes	Scalp acupuncture may confer more substantial improvements to depression and neurological function in PSD patients, with superior safety and definite clinical efficacy, compared to modern medication treatments.
Zhong *et al.* (2023)[18]	Embase, Cochrane Library, PubMed, WOS, CBM, and CNKI	Confirmed by CT or MRI	HAMD	11 (1,225)	Scalp acupuncture, Scalp acupuncture + conventional therapy	Conventional therapy	Cochrane handbook	①②③④⑤	Yes	While the effectiveness of scalp acupuncture combined with CT in treating PSD still requires further validation through rigorous randomized double-blind trials, this study provides a comprehensive collection of studies that meet the criteria for scalp acupuncture combined with CT in PSD treatment.

Notes: ①1Hamilton depression rating scale; ②Total clinical effective rate; ③Evaluation of self-rating depression scale (SDS); ④Safety evaluation; ⑤Adverse events; ⑥Barthel index score; ⑦National Institutes of Health Stroke Scale score; ⑧Treatment emergency symptom scale; ⑨Modified Edinburgh–Scandinavia stroke scale; ⑩Neurological deficit score; ⑪ Fugl–Meyer motor function assessment.
Abbreviations: CBM: Chinese Biomedical Literature Database; CCMD: *Chinese classification and diagnostic of mental disorders*; CENTRAL: Cochrane Central Register of Controlled Trials; CNKI: China National Knowledge Infrastructure; CSTJ: China Science and Technology Journal Database; CT: Computed tomography; DSM: *Diagnostic and statistical manual of mental disorders*; FMA: Fugl–Meyer motor function assessment; HAMD: Hamilton depression scale; ICD: *International classification of diseases*; MRI, Magnetic resonance imaging; PSD, Post-stroke depression; WF: Wanfang Database; WOS, Web of Science.

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inconsistency, 25 study outcomes were downgraded by one level due to inconsistency, while the remaining 36 study outcomes were not downgraded. Regarding imprecision, 38 study outcomes were downgraded by one level, and 23 were not downgraded. Regarding publication bias, 16 study outcomes were downgraded by one level, and 45 study outcomes were not downgraded. Indirect evidence indicated the highest level of evidence stability (Table 2).

3.4. Effectiveness and safety of acupuncture in the treatment of PSD

3.4.1. Clinical efficacy

A total of five MAs were included, focusing on clinical efficacy and cure rates.[18,20,21,25,27] Among them, two studies[20,25] provided moderate-quality evidence, while three studies[18,21,27] presented low-quality or very low-quality evidence. All five MAs reported that acupuncture, particularly methods, such as manual acupuncture, electroacupuncture, and scalp acupuncture, either used alone or in combination with modern medications or standard treatment, exhibited higher clinical efficacy compared to modern medications or standard treatment.[21,25] Nevertheless, one MA suggested no significant difference in improving PSD between electroacupuncture in conjunction with modern medications and modern medications alone.[21] In addition, one study[27] suggested that acupuncture treatment for PSD had a higher clinical cure rate compared to modern medications.

3.4.2. Depression scores

Six MAs[20,22,23,25-28] reported that acupuncture treatment, especially scalp acupuncture, electroacupuncture, and filiform needle, could improve HAMD scores in PSD patients compared to standalone modern medications. The quality of evidence varied, with some studies rated as moderate,[25,28] low,[20,22,23,25,26] or very low.[20,22] However, three MAs[23,24,30] reported no significant difference in improving HAMD scores between acupuncture and modern medication treatments. In addition, one study[25] found that modern medications were superior to acupuncture in improving HAMD scores.

Five MAs[18,21,24,26,30] reported that acupuncture combined with modern medications or standard treatment could improve HAMD scores in PSD patients compared to standalone modern medications or standard treatment. However, three MAs[18,21,30] reported that scalp acupuncture, manual acupuncture, and electroacupuncture combined with modern medications or standard treatment did not significantly differ from modern medications or standard treatment alone in improving HAMD scores.

Regarding one of the primary outcomes, the SDS, one study[18] concluded that scalp acupuncture combined with conventional treatment was superior to conventional treatment alone in improving SDS scores in PSD patients, while another study[26] reported no significant difference between acupuncture and modern medications in improving SDS scores.

3.4.3. Neurological function scores

One MA[21] demonstrated that acupuncture produced significantly greater improvements in the Barthel index among PSD patients than pharmacotherapy alone. In contrast, two MAs[26,28] reported no significant differences between either acupuncture monotherapy or acupuncture combined with pharmacotherapy versus pharmacotherapy alone. However, one of the MAs[28] reported that acupuncture had a better effect in improving the Fugl–Meyer assessment of motor function and modified Edinburgh–Scandinavian Stroke Scale scores in PSD patients compared to standalone modern medication treatment. Meanwhile, two MAs[25,26] suggested that acupuncture or acupuncture combined with modern medications could improve the neurological deficit score in PSD patients compared to standalone modern medications. Two MAs[20,21] suggested that acupuncture or acupuncture combined with modern medications could improve the NIHSS score in PSD patients compared to standalone modern medications. One MA demonstrated that acupuncture was superior to modern medications in improving the treatment of the emergency symptom scale score in PSD patients.[20]

3.4.4. Adverse events

Four MAs[19,23-25] assessed adverse events, and all indicated that acupuncture had better safety compared to modern medical treatment.

4. Discussion

This overview synthesized and critically appraised existing MAs of acupuncture for PSD to evaluate its therapeutic efficacy and safety. The methodological rigor, risk of bias, reporting completeness, and outcome data of each MA were assessed to gauge the reliability of the present evidence and inform future research directions. Nevertheless, persistent inconsistencies across studies and the generally low quality of available data preclude definitive conclusions regarding the benefits of acupuncture for PSD.

4.1. Summary of key findings

Based on the inclusion criteria and following comprehensive searching and deduplication, a total of 13 MAs on the efficacy and safety of acupuncture therapy for PSD were ultimately selected. Notably, the quality of the included studies demonstrated a gradual improvement over the years, as evidenced by increasing adherence to the criteria of various evaluation tools.

Table 2. Results of the GRADE assessment

Reference	Interventions	Outcomes	Studies (participants)	Effect (95% CI)	Limitations	Inconsistency	Indirectness	Imprecision	Publication bias	Quality
Wei *et al.* (2020)[27]	Acupuncture versus modern medications	Cure rate	9 (655/657)	RR 1.48 (1.23 – 1.78)	−1①	0	0	0	−1④	Low
Wei *et al.* (2020)[27]	Acupuncture versus modern medications	Effective rate	11 (709/708)	RR 1.13 (1.08 – 1.17)	−1①	0	0	0	−1④	Low
Zhang *et al.*[19]	Manual acupuncture + modern medications versus modern medications	Effective rate	4 (139/137)	RR 1.38 (1.20 – 1.58)	−1①	0	0	−2③	0	Very low
Zhang *et al.*[19]	Electroacupuncture + modern medications versus modern medications	Effective rate	2 (47/46)	RR 1.21 (0.99 – 1.48)	−1①	0	0	−2③	0	Very low
Zhang *et al.*[20]	Manual acupuncture + modern medications versus modern medications; Electroacupuncture + modern medications versus modern medications	Effective rate	6 (186/183)	RR 1.33 (1.19 – 1.49)	−1①	0	0	−1③	0	Low
Zhang *et al.* (2021)[21]	Acupuncture versus modern medications	Effective rate	12 (507/503)	MD 1.15 (1.08 – 1.21)	−1①	0	0	0	0	Moderate
Jiang *et al.* (2023)[25]	Scalp acupuncture versus modern medications; Scalp acupuncture + electroacupuncture versus modern medications	Effective rate	12 (553/543)	RR 1.09 (1.02 – 1.16)	−1①	0	0	0	0	Moderate
Zhong *et al.* (2023)[18]	Scalp acupuncture + conventional treatment versus conventional treatment	Effective rate	8 (328/323)	OR 2.44 (1.61 – 3.70)	−1①	0	0	0	−1④	Low
Li *et al.* (2012)[29]	Acupuncture + modern medications versus modern medications	HAMD score	8 (266/265)	MD−2.20 (−2.62 – −1.79)	−1①	0	0	0	−2④	Very low
Zhang *et al.* (2014)[22]	Acupuncture versus modern medications; Acupuncture + moxibustion versus modern medications; Electroacupuncture versus modern medications	HAMD score	12 (347/417)	MD 0.26 (0.11 – 0.40)	−2①	−1②	0	0	0	Very low

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Table 2. ***(Continued)***

Reference	Interventions	Outcomes	Studies (participants)	Effect (95% CI)	Limitations	Inconsistency	Indirectness	Imprecision	Publication bias	Quality
Zhang *et al.* (2017)[26]	Electroacupuncture versus modern medications	HAMD score	9 (434/432)	MD−0.50 (−0.92 – −0.08)	−1①	−1②	0	0	0	Low
Zhang *et al.* (2017)[26]	Electroacupuncture + modern medications versus modern medications	HAMD score	9 (298/293)	WMD−2.50 (−2.93 – −2.06)	−1①	0	0	−1③	0	Low
Li *et al.* (2018)[24]	Electroacupuncture versus modern medications	HAMD score	15 (636/595)	SMD−0.04 (−0.18 – 0.10)	−1①	0	0	0	0	Moderate
Huang *et al.* (2018)[30]	Acupuncture versus modern medications	HAMD score	3 (152/196)	MD−0.54 (−1.46 – 0.39)	−1①	0	0	−1③	−1○44	Very low
Huang *et al.* (2018)[30]	Electroacupuncture versus modern medications	HAMD score	5 (200/197)	MD 0.13 (−1.07 – 1.33)	−1①	−1②	0	−1③	−1○44	Very low
Huang *et al.* (2018)[30]	Acupuncture + modern medications versus modern medications	HAMD score	3 (98/96)	MD−3.28 (−4.45 – −2.12)	−1①	0	0	0	−1○44	Low
Huang *et al.* (2018)[30]	Electroacupuncture + modern medications versus modern medications	HAMD score	2 (79/80)	MD−0.39 (−8.29 – 2.74)	−1①	−1②	0	0	−1○44	Very low
Wei *et al.* (2020)[27]	Acupuncture versus modern medications; Acupuncture + placebo versus modern medications + sham needle	HAMD score	14 (814/813)	MD−3.87 (−5.22–2.52)	−1①	−1②	0	0	−1○44	Very low
Zhang *et al.* (2021)[19]	Manual acupuncture + modern medications versus modern medications	HAMD score	6 (244/239)	MD−3.54 (−4.54 – 2.55)	−1①	−1②	0	−1③	0	Very low
Zhang *et al.* (2021)[19]	Electroacupuncture + modern medications versus modern medications	HAMD score	7 (212/209)	MD−3.66 (−4.58–−2.74)	−1①	0	0	−1③	0	Low
Zhang *et al.* (2021)[19]	Manual acupuncture + modern medications versus modern medications; Electroacupuncture + modern medications versus modern medications	HAMD score	13 (456/448)	MD−3.60 (−4.25 – −2.95)	−1①	0	0	0	0	Moderate

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Reference	Interventions	Outcomes	Studies (participants)	Effect (95% CI)	Limitations	Inconsistency	Indirectness	Imprecision	Publication bias	Quality
Jiang *et al.* (2023)[25]	Scalp acupuncture versus modern medications	HAMD score	8 (290/283)	MD−2.75 (−4.84 – −0.65)	−1①	−1②	0	0	0	Low
Jiang *et al.* (2023)[25]	Scalp acupuncture + electroacupuncture versus modern medications	HAMD score	2 (61/60)	MD−1.07 (−1.60 – −0.55)	−1①	0	0	0	0	Moderate
Zhong *et al.* (2023)[18]	Scalp acupuncture + conventional treatment versus conventional treatment	HAMD score	7 (427/407)	MD−3.79 (−8.51 – 0.92)	−1①	−1②	0	0	−1④	Very low
Zhang *et al.* (2014)[20]	Acupuncture versus modern medications	HAMD score (2 weeks after treatment)	4 (98/94)	MD−2.34 (−3.46 – −1.22)	−1①	0	0	−2③	0	Very low
Zhang Lincheng, (2021)[18]	Acupuncture versus modern medications	HAMD score (3 weeks after treatment)	2 (70/70)	MD−1.17 (−2.18 – −0.16)	−1①	0	0	−2③	0	Very low
Zhang *et al.* (2014)[22]	Acupuncture versus modern medications	HAMD score (4 weeks after treatment)	7 (191/191)	MD−0.49 (−1.72 – −0.74)	−1①	−1②	0	−1③	0	Very low
Li *et al.* (2018)[24]	Electroacupuncture versus modern medications	HAMD score (4 weeks after treatment)	7 (272/231)	SMD−0.11 (−0.31 – 0.10)	−1①	0	0	−1③	0	Low
Wang *et al.* (2021)[23]	Acupuncture versus modern medications	HAMD score (4 weeks after treatment)	13 (468/426)	SMD−0.30 (−0.58 – −0.01)	−1①	−1②	0	0	0	Low
Zhang *et al.* (2021)[21]	Acupuncture versus modern medications	HAMD score (4 weeks after treatment)	3 (91/84)	MD−4.44 (−5.64 – −3.23)	−1①	−1②	0	−2③	0	Very low
Li *et al.* (2018)[24]	Electroacupuncture versus modern medications	HAMD score (6 weeks after treatment)	3 (93/93)	SMD 0.04 (−0.43 – 0.51)	−1①	−1②	0	−2③	0	Very low
Wang *et al.* (2021)[23]	Acupuncture versus modern medications	HAMD score (6 weeks after treatment)	4 (133/133)	SMD 0.04 (−0.38 – 0.36)	−1①	0	0	−1③	0	Low
Zhang *et al.* (2021)[21]	Acupuncture versus modern medications	HAMD score (6 weeks after treatment)	6 (205/201)	MD−1.20 (−1.92 – −0.49)	−1①	−1②	0	−1③	0	Very low
Li *et al.* (2018)[24]	Electroacupuncture versus modern medications	HAMD score (8 weeks after treatment)	5 (271/271)	SMD−0.01 (−0.23 – 0.22)	−1①	0	0	−1③	0	Low
Wang *et al.* (2021)[23]	Acupuncture versus modern medications	HAMD score (8 weeks after treatment)	5 (271/271)	SMD−0.01 (−0.23 – 0.22)	−1①	0	0	0	0	Moderate
Zhang *et al.* (2021)[21]	Acupuncture versus modern medications	HAMD score (8 weeks after treatment)	4 (224/224)	MD−4.33 (−4.96 – −3.70)	−1①	0	0	−1③	0	Low
Niu (2014)[28]	Electroacupuncture versus modern medications	The reduction rate of the HAMD score	11 (496/490)	OR 1.61 (1.09 – 2.38)	−1①	0	0	0	0	Moderate

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Table 2. *(Continued)*

Reference	Interventions	Outcomes	Studies (participants)	Effect (95% CI)	Limitations	Inconsistency	Indirectness	Imprecision	Publication bias	Quality
Zhang *et al.* (2014)[20]	Filiform needle versus modern medications	The reduction rate of the HAMD score (4 weeks after treatment)	8 (211/211)	RR 1.11 (1.03 – 1.21)	−1①	0	0	−1③	0	Low
Zhang *et al.* (2014)[20]	Acupuncture versus modern medications	The reduction rate of the HAMD score (6 weeks after treatment)	3 (93/90)	RR 1.10 (0.98 – 1.28)	−1①	0	0	−2③	0	Very low
Zhang *et al.* (2017)[26]	Electroacupuncture versus modern medications	SDS score	2 (96/93)	MD−1.91 (−9.51 – 5.70)	−1①	−1②	0	−2③	0	Very low
Zhong *et al.* (2023)[18]	Scalp acupuncture + conventional treatment versus conventional treatment	SDS score	3 (139/135)	MD−8.72 (−9.71 – −7.73)	−1①	0	0	0	−1④	Low
Niu (2014)[28]	Electroacupuncture versus modern medications	Barthel index	5 (171/171)	WMD 1.38 (−1.88 – 4.65)	−1①	−1②	0	−1③	−1④	Very low
Zhang *et al.* (2017)[26]	Electroacupuncture+ modern medications versus modern medications	Barthel index	2 (85/82)	WMD−11.59 (−55.86 – 32.67)	−1①	−1②	0	−2③	0	Very low
Zhang *et al.* (2021)[19]	Manual acupuncture + modern medications versus modern medications	Barthel index	2 (105/102)	MD 6.11 (2.40 – 9.82)	−1①	0	0	−1③	0	Low
Zhang *et al.* (2021)[19]	Electroacupuncture + modern medications versus modern medications	Barthel index	1 (40/40)	MD 10.93 (6.50 – 15.36)	−1①	−1②	0	−2③	0	Very low
Zhang *et al.* (2021)[19]	Manual acupuncture + modern medications versus modern medications; Electroacupuncture + modern medications versus modern medications	Barthel index	3 (145/142)	MD 8.10 (5.25 – 10.94)	−1①	0	0	−1③	0	Low
Niu (2014)[28]	Electroacupuncture versus modern medications	Fugl–Meyer motor function assessment	2 (76/76)	WMD 3.50 (0.14 – 6.86)	−1①	−1②	0	−2③	−1④	Very low
Niu (2014)[28]	Electroacupuncture versus modern medications	MESS score	2 (65/65)	WMD−1.89 (−4.77 – 0.99)	−1①	−1②	0	−2③	−1④	Very low
Niu (2014)[28]	Electroacupuncture versus modern medications	The reduction rate of the MESS score	2 (65/65)	OR 1.80 (0.61 – 5.31)	−1①	0	0	−2③	−1④	Very low

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Table 2. ***(Continued)***

Reference	Interventions	Outcomes	Studies (participants)	Effect (95% CI)	Limitations	Inconsistency	Indirectness	Imprecision	Publication bias	Quality
Zhang *et al.* (2017)[26]	Electroacupuncture versus modern medications	Neurological deficit score	2 (67/67)	MD−3.72 (−5.51 – −1.94)	−1①	0	0	−2③	0	Very low
Zhang *et al.* (2017)[26]	Electroacupuncture + modern medications versus modern medications	Neurological deficit score	2 (52/50)	WMD−6.31 (−9.28 – −3.34)	−1①	−1②	0	−2③	0	Very low
Jiang *et al.* (2023)[25]	Scalp acupuncture versus modern medications; Scalp acupuncture + electroacupuncture versus modern medications	Neurological deficit score	6 (196/190)	MD−3.06 (−5.91 – −0.21)	−1①	−1②	0	−1③	0	Very low
Zhang *et al.* (2021)[19]	Manual acupuncture + modern medications versus modern medications	NIHSS score	3 (154/149)	MD−2.29 (−3.69 – −0.90)	−1①	−1②	0	−1③	0	Very low
Zhang *et al.* (2021)[19]	Electroacupuncture + modern medications versus modern medications	NIHSS score	1 (43/43)	MD−2.70 (−3.72 – −1.68)	−1①	−1②	0	−2③	0	Very low
Zhang *et al.* (2021)[19]	Manual acupuncture + modern medications; Electroacupuncture + modern medications versus modern medications	NIHSS score	4 (197/192)	MD−2.39 (−3.37 – −1.41)	−1①	−1②	0	−1③	0	Very low
Zhang *et al.* (2021)[18]	Acupuncture versus modern medications	NIHSS score	2 (154/154)	MD−2.31 (−2.53 – −2.09)	−1①	0	0	−1③	0	Low
Zhang *et al.* (2021)[21]	Acupuncture versus modern medications	TESS score	3 (162/161)	MD−4.70 (−4.93 – −4.48)	−1①	−1②	0	−1③	0	Very low
Zhang *et al.* (2014)[22]	Acupuncture versus modern medications; Acupuncture + moxibustion versus modern medications; Electroacupuncture versus modern medications	Adverse events	8 (251/251)	RR 0.32 (0.19 – 0.53)	−2①	0	0	−1③	0	Very low
Li *et al.* (2018)[24]	Electroacupuncture versus modern medications	Adverse events	8 (397/401)	RR 0.21 (0.14 – 0.33)	−1①	0	0	0	0	Moderate

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Table 2. ***(Continued)***

Reference	Interventions	Outcomes	Studies (participants)	Effect (95% CI)	Limitations	Inconsistency	Indirectness	Imprecision	Publication bias	Quality
Wang *et al.* (2021)[23]	Acupuncture versus modern medications	Adverse events	9 (428/431)	RR 0.21 (0.14 – 0.32)	−1①	0	0	0	0	Moderate
Jiang *et al.* (2023)[25]	Scalp acupuncture versus modern medications; Scalp acupuncture + electroacupuncture versus modern medications	Adverse events	5 (270/266)	RR 0.12 (0.05 – 0.29)	−1①	0	0	0	0	Moderate

Notes: −2: Downgrade by two levels; −1: Downgrade by one level; 0: Not downgrade; ① The experimental designs of included studies exhibit significant bias in terms of randomization, blinding, allocation concealment, data integrity, or selective reporting; ② There is limited overlap in confidence intervals, a small *p*-value in the heterogeneity test, or a high I^2 value; ③The sample size is small, or the confidence intervals are wide; ④ The funnel plot is asymmetric, or there is a limited number of studies included.

Abbreviation: GRADE: Grading of recommendations, assessment, development, and evaluation; RR: Risk ratio; OR: Odds ratio; MD: Weighted mean difference; SMD: Standardized mean difference; WMD: Weighted mean difference; HAMD: Hamilton rating scale for depression; SDS: Self-rating depression scale; MESS: Modified Edinburgh–Scandinavia stroke scale; NIHSS: National Institutes of Health Stroke Scale; TESS: Treatment emergency symptom scale.

According to AMSTAR-2 criteria, the quality of all included MAs was rated as very low. Primary methodological deficiencies include failing to publish pre-registered study protocols, lacking comprehensive literature search strategies, lacking detailed exclusion criteria lists, non-disclosure of funding sources for included RCTs, and failing to report conflicts of interest. Among the critical items, substantial reporting deficiencies were observed in Item 2 (23.08%), Item 4 (15.38%), and Item 7 (0%). The main reasons are as follows: (i) Only three MAs[18,24,25] registered a protocol in advance and provided a registration number; (ii) only two MAs[18,24] employed a comprehensive and appropriate literature search strategy; and (iii) None of the included MAs explicitly listed the excluded studies or provided reasons for each exclusion.

Results from the PRISMA checklist indicated that none of the MAs completed all 27 items, highlighting five major deficiencies that warrant attention: (i) The absence of reporting study protocols and registration, (ii) incomplete reporting of database search strategies, (iii) absence of additional analyses, (iv) limitations of the studies, and (v) reporting of funding support.

In the GRADE evaluation, "risk of bias" was the primary factor leading to downgrading, followed by "imprecision." Methodological shortcomings in the included trials – such as inadequate randomization, lack of blinding, insufficient allocation concealment, incomplete data, and selective reporting – resulted in every outcome being penalized for study bias. Furthermore, small sample sizes and wide CIs also introduced imprecision into the findings.

4.2. Comparison with previous studies

Prior research has predominantly focused on the efficacy and safety of acupuncture for post-stroke neurological deficits,[38-40] pain,[41] and cognitive impairment,[42] with relatively fewer systematic investigations targeting PSD. Publications have also reported using acupuncture to treat depression,[43] depression comorbid with cardiovascular disease,[44] cancer-related depression,[45] post-trigeminal neuralgia depression,[46] perimenopausal depression,[47] and postpartum depression.[48,49]

Notably, there are presently three overviews of systematic reviews on similar topics (two in Chinese and one in English), all conducted at least five years ago.[50-52] One such study, which included 12 systematic reviews, evaluated non-invasive acupuncture interventions – such as auricular acupuncture and acupoint plasters – with comparators, including traditional Chinese herbs, proprietary Chinese medicines, and psychotherapy. Another overview, incorporating 10 systematic reviews, reported findings for two primary outcomes – HAMD

scores and adverse event rates – that were directionally consistent with the present results.[52]

Building on these foundations, the present study incorporated several recently published, high-quality RCTs, thereby expanding both the sample size and the breadth of included research. In addition to using the HAMD as the primary outcome measure, the SDS was also included to capture subjective depressive symptoms, as well as incorporating various functional and quality-of-life scales that indirectly reflect the impact of depression and its comorbid features. Moreover, the effects of different needling techniques and treatment regimens were systematically catalogued, and subgroup analyses were conducted. Overall, the findings align with previous reviews in supporting acupuncture's efficacy for PSD, although some individual trials did not demonstrate significant differences. By adopting stricter inclusion criteria, a more comprehensive search strategy, and a more rigorous quality-assessment framework, this study has further minimized heterogeneity and strengthened the interpretability of the evidence. In particular, the detailed analysis of "acupuncture modalities" and "acupuncture combined with medications" addresses gaps in earlier literature.

Traditional Chinese medicine emphasizes syndrome differentiation, leading to individualized acupuncture protocols in which acupoint selection, needle retention time, treatment frequency, and overall course are tailored to each patient's specific presentation. Previous research has identified GV20 as the most frequently used acupoint for treating depression, followed by GV24+, LR3, LI4, PC6, and HT7.[53] Given the heterogeneity of clinical manifestations during depressive episodes, core acupoints are often supplemented with additional, personalized selections. For example, liver qi stagnation is typically addressed with a combination of BL18, LR14, LI4, LR3, and RN17. When stagnated qi transforms into fire, acupoints, such as LR2, ST44, SJ6, and GB43 are employed. Patterns characterized by grief and mental distress frequently involve PC6, HT5, and BL15, whereas cases of heart–spleen deficiency tend to use BL15, BL20, and ST36. For yang deficiency, RN5 and RN4 are recommended.[54] Although specific acupoint combinations vary slightly between studies, all adhere rigorously to the diagnostic and therapeutic principles of acupuncture.

Moreover, needle manipulation techniques are critical for eliciting *deqi*, the characteristic "arrival of qi" sensation. One study reported that high-frequency rotating manipulations at scalp acupoints can transmit needle sensations to the pathological focus, thereby regulating the primordial spirit and enhancing therapeutic effects. After rapid needle insertion, applying small unidirectional rotations at limb acupoints prolongs the *deqi* sensation, further augmenting efficacy. In addition, prior experimental data have confirmed that prolonged needle retention can significantly improve somatic symptoms and sleep disturbances – a benefit that is particularly evident in patients with mild depression.[55]

By delving into the mechanisms of PSD, some promising techniques have the potential to lay the foundation for early diagnosis and quantitative assessment of PSD.[56] Research indicates that the location of post-stroke damage is a crucial factor in depression, with individuals having lesions near the frontal lobe and basal ganglia in the left hemisphere more prone to depression and cognitive deficits.[57,58] Computed tomography has revealed an enlarged ratio of lateral ventricles and the third ventricle to brain volume in patients with PSD. In addition, lacunar infarctions resulting from occlusions in deep hemispheric regions, a consequence of intracranial atherosclerosis, are more likely to lead to depression following a stroke.[59] Furthermore, functional imaging studies have identified specific alterations in the functional connectivity between PSD and the dorsolateral pre-frontal cortex within the depression circuit.[60-62] These impactful changes are strongly associated with the severity of depression in PSD and may serve as optimal targets for repetitive transcranial magnetic stimulation therapy. Moreover, significant correlations are observed between stroke progression-related quantitative electroencephalography parameters, such as delta/alpha ratio or delta/theta/alpha ratio (DTABR), and hospital anxiety and depression scale-depression subscale (HADS-D) scores. Elevated DTABR can serve as early indicators of neuropsychiatric disorders before changes in depressive symptoms and HADS-D scores become evident, and these have been applied in the context of neurological and psychiatric symptom monitoring.[63,64] DTABR can also be employed to assess the dominance of slow or fast waves in patients with ischemic stroke, which may be associated with increased depressive symptoms and depressive tendencies.[65,66] Exploring the disease mechanisms contributes to the identification of measurable indicators for PSD, providing a reference for the assessment of subsequent clinical treatments.

4.3. Implications for future research

This overview has identified methodological, reporting, and evidence quality deficiencies in the included literature, resulting in a relatively weak level of evidence for the studies. To enhance the quality of methodology, future research should draft study protocols and register them on platforms, such as Cochrane before conducting MAs. This practice contributes to maximizing research transparency and reducing the risk of methodological bias. Second,

literature searches should be as comprehensive as possible, including references from studies and grey literature searches, which are particularly important. Furthermore, studies should provide more detailed information about exclusion lists and reasons to ensure research replicability. Publication bias should be examined when a sufficient number of studies are included. When heterogeneity in the results of data synthesis analysis is significant, efforts should be made to identify the sources of heterogeneity through subgroup analyses or meta-regression, where possible, and explain the impact of bias risk in the discussion. In addition, MAs should comprehensively describe the characteristics of the RCTs they include, aiding in clarifying the sources of heterogeneity. Reporting funding sources for both the MA and individual RCTs is essential to identify potential conflicts of interest. Finally, two or more researchers should independently and repeatedly conduct screening and data extraction. Following these methods and reporting standards will ensure the quality of MAs.

According to the GRADE approach for evaluating the quality of evidence, a total of seven moderate-quality studies were identified in this review. Specifically, two moderate-quality studies suggest that acupuncture, scalp acupuncture, and scalp acupuncture combined with electroacupuncture are more effective than conventional modern medications alone in improving the overall treatment efficacy for PSD. Another two moderate-quality studies indicate that acupuncture shows no significant difference compared to modern medications alone in improving HAMD scores. One moderate-quality study demonstrates that electroacupuncture is superior to modern medications alone in reducing HAMD scores in PSD patients. In addition, two moderate-quality studies support that acupuncture combined with modern medications is more effective than modern medications alone in improving depressive symptoms. Furthermore, three moderate-quality studies suggest that acupuncture, electroacupuncture, scalp acupuncture, and scalp acupuncture combined with electroacupuncture are associated with a lower incidence of adverse events compared to modern medications alone. The remaining evidence in this review was rated as low or very low quality. Future research should focus on standardizing methods, such as randomization, blinding, and allocation concealment in the trial design process, striving to provide high-quality, large-sample, RCT evidence.

This study suggests that acupuncture treatment may help improve HAMD scores and enhance the overall clinical efficacy in patients with PSD, with a lower risk of adverse events compared to conventional pharmacological therapy. However, substantial heterogeneity was observed among the included systematic reviews, which may affect the stability and interpretability of the results. The potential sources of heterogeneity include:

(i). Variability in patient characteristics: Some reviews did not clearly stratify patients by stroke type, disease stage, or depression severity, leading to heterogeneity in the study populations.

(ii). Inconsistent intervention duration: There is currently no standardized treatment course for acupuncture in PSD, and some reviews did not specify the duration of intervention, resulting in limited comparability of treatment exposure.

(iii). Diverse outcome assessment tools: A wide range of depression-related scales were used across the included reviews, lacking uniformity, which compromises the consistency and reliability of outcome evaluation.

These heterogeneity factors may confound the overall judgment of acupuncture efficacy. Future studies should improve methodological rigor, ensure clear stratification of patient populations, standardize intervention protocols, and adopt consistent outcome measures to enhance the quality of evidence and clinical applicability.

4.4. Limitations

This study inevitably has some limitations. First, the overall assessment's robustness is directly limited by the poor quality of the original studies. In addition, describing and assessing acupuncture's point selection and operational techniques was impossible because most of the included SRs did not specify these parameters. Finally, the subjectivity of assessors may lead to bias; hence, the reported results must be interpreted cautiously.

5. Conclusion

Based on the evidence provided in this overview, acupuncture appears to be a safe therapeutic approach and may potentially serve as an effective complementary treatment for PSD to some extent. However, due to the low quality of evidence from the included studies and inconsistent conclusions, this conclusion should be approached with caution. It is recommended that future reviews adhere to recognized reporting standards to enhance the quality of evidence.

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Conflict of interest

The authors declare that they have no competing interests.

Author contributions

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Visualization: Pengyu Liu
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Writing – review & editing: All authors

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data

The datasets analyzed during the present study are available from the corresponding author on reasonable request.

Reference

1. Guo J, Wang J, Sun W, Liu X. The advances of post-stroke depression: 2021 update. *J Neurol*. 2022;269(3):1236-1249.

   doi: 10.1007/s00415-021-10597-4

2. Members WG, Roger VL, Go AS, *et al*. Heart disease and stroke statistics-2012 update: A report from the American Heart Association. *Circulation*. 2012;125(1):e2-e220.

   doi: 10.1161/CIR.0b013e31823ac046

3. Paolucci S. Epidemiology and treatment of post-stroke depression. *Neuropsychiatr Dis Treat*. 2008;4(1):145-154.

   doi: 10.2147/ndt.s2017

4. Villa RF, Ferrari F, Moretti A. Post-stroke depression: Mechanisms and pharmacological treatment. *Pharmacol Ther*. 2018;184:131-144.

   doi: 10.1016/j.pharmthera.2017.11.005

5. Sturm JW, Donnan GA, Dewey HM, *et al*. Quality of life after stroke: The North East Melbourne stroke incidence study (NEMESIS). *Stroke*. 2004;35(10):2340-2345.

   doi: 10.1161/01.str.31.9.2087

6. Pompili M, Venturini P, Campi S, *et al*. Do stroke patients have an increased risk of developing suicidal ideation or dying by suicide? An overview of the current literature. *CNS Neurosci Ther*. 2012;18(9):711-721.

   doi: 10.1111/j.1755-5949.2012.00364.x

7. Cai W, Mueller C, Li YJ, Shen WD, Stewart R. Post stroke depression and risk of stroke recurrence and mortality: A systematic review and meta-analysis. *Ageing Res Rev*. 2019;50:102-109.

   doi: 10.1016/j.arr.2019.01.013

8. Das J, Rajanikant GK. Post stroke depression: The sequelae of cerebral stroke. *Neurosci Biobehav Rev*. 2018;90:104-114.

   doi: 10.1016/j.neubiorev.2018.04.005

9. Hackett ML, Anderson CS, House AO. Management of depression after stroke: A systematic review of pharmacological therapies. *Stroke*. 2005;36(5):1092-1097.

   doi: 10.1161/01.STR.0000162391.27991.9d

10. Qin B, Chen H, Gao W, *et al*. Efficacy, acceptability, and tolerability of antidepressant treatments for patients with post-stroke depression: a network meta-analysis. *Braz J Med Biol Res*. 2018;51(7):e7218.

    doi: 10.1590/1414-431x20187218

11. Nabavi SF, Turner A, Dean O, Sureda A, Mohammad S. Post-stroke depression therapy: Where are we now? *Curr Neurovasc Res*. 2014;11(3):279-89.

    doi: 10.2174/1567202611666140522123504

12. Wang Z, Wang X, Liu J, *et al*. Acupuncture treatment modulates the corticostriatal reward circuitry in major depressive disorder. *J Psychiatr Res*. 2017;84:18-26.

    doi: 10.1016/j.jpsychires.2016.09.014

13. Shea BJ, Reeves BC, Wells G, *et al*. AMSTAR 2: A critical appraisal tool for systematic reviews that include randomised or non-randomised studies of healthcare interventions, or both. *BMJ*. 2017;358:j4008.

    doi: 10.1136/bmj.j4008

14. Wang X, Chen Y, Liu Y, *et al*. Reporting items for systematic reviews and meta-analyses of acupuncture: The PRISMA for acupuncture checklist. *BMC Complement Alternat Med*. 2019;19(1):208.

    doi: 10.1186/s12906-019-2624-3

15. Atkins D, Best D, Briss PA, *et al*. Grading quality of evidence and strength of recommendations. *BMJ*. 2004;328(7454):1490.

    doi: 10.1136/bmj.328.7454.1490

16. Kirvalidze M, Abbadi A, Dahlberg L, Sacco LB, Calderendations. cupuncture: andomised or non-isorder. e depression: a network mConsiderations for using the corrected covered area (CCA) index methodology. *Res Synth Methods*. 2023;14(5):764-767.

    doi: 10.1002/jrsm.1658

17. Hennessy EA, Johnson BT. Examining overlap of included studies in metaureviews: Guidance for using the corrected

covered area index. *Res Synth Methods*. 2020;11(1):134-145.

doi: 10.1002/jrsm.1390

18. Zhong D, Cheng H, Pan Z, *et al*. Efficacy of scalp acupuncture combined with conventional therapy in the intervention of post-stroke depression: A systematic review and meta-analysis. *Complement Ther Med.* 2023;77:102975.

doi: 10.1016/j.ctim.2023.102975

19. Zhang W, Sun JH, Gao Y, *et al*. System review on treating post-stroke depression with acupuncture. *World J Acupunct Moxibustion*. 2014;24(2):52-59.

doi: 10.1016/S1003-5257(14)60026-X

20. Zhang L, Chen B, Yao Q, *et al*. Comparison between acupuncture and antidepressant therapy for the treatment of poststroke depression: Systematic review and meta-analysis. *Medicine* (*Baltimore*). 2021;100(22):e25950.

doi: 10.1097/md.0000000000025950

21. Zhang K, Cui G, Gao Y, Shen W. Does acupuncture combined with antidepressants have a better therapeutic effect on post-stroke depression? A systematic review and meta-analysis. *Acupunct Med*. 2021;39(5):432-440.

doi: 10.1177/0964528420967675

22. Zhang J, Chen J, Chen J, *et al*. Early filiform needle acupuncture for poststroke depression: A meta-analysis of 17 randomized controlled clinical trials. *Neural Regen Res*. 2014;9(7):773-784.

doi: 10.4103/1673-5374.131590

23. Wang X, Cai W, Wang Y, Huang S, Zhang Q, Wang F. Is electroacupuncture an effective and safe treatment for poststroke depression? An updated systematic review and meta-analysis. *Biomed Res Int*. 2021;2021:8661162.

doi: 10.1155/2021/8661162

24. Li XB, Wang J, Xu AD, *et al.* Clinical effects and safety of electroacupuncture for the treatment of post-stroke depression: A systematic review and meta-analysis of randomised controlled trials. *Acupunct Med.* 2018;36(5):284-293.

doi: 10.1136/acupmed-2016-011300

25. Jiang W, Jiang X, Yu T, Gao Y, Sun Y. Efficacy and safety of scalp acupuncture for poststroke depression: A meta-analysis and systematic review. *Medicine* (*Baltimore*). 2023;102(31):e34561.

doi: 10.1097/md.0000000000034561

26. Zhang YY, Liu ZS. *Systematic Review and Meta-analysis of Electroacupuncture for Post-stroke Depression*. *Beijing Univ Chin Med* [Master's Thesis]; 2017.

27. Wei JF, Lan L, Wu P. *Systematic Review of Acupuncture for Post-stroke Depression. Chengdu Univ Tradit Chin Med* [Master's thesis]; 2020.

28. Niu L. *Systematic Review of Electroacupuncture for Post-stroke Depression*. *Chengdu Univ Tradit Chin Med* [Master's thesis]; 2014.

29. Li XH, Chen JQ, Hu YN, Wang HT, Wang SX. Meta-analysis of acupuncture combined with Chinese medicine versus western medicine for post-stroke depression. *Shaanxi J Tradit Chin Med.* 2012;33(9):1263-1267.

30. Huang YJ, Li LX, Zhou YL, *et al.* Meta-analysis of acupuncture and electroacupuncture for post-stroke depression. *Modern Hospital.* 2018;18(1):120-124.

31. Dai YF, Xiao ZP. Comparison between the 3rd edition of the Chinese classification of mental disorders and ICD-10. *J Clin Psychiatry (China)*. 2013;23(6):426-427.

32. Mittal VA, Walker EF. Diagnostic and statistical manual of mental disorders. *Psychiatry Res*. 2011;189(1):158-9.

doi: 10.1016/j.psychres.2011.06.006

33. Robinson RG, Spalletta G. Poststroke depression: A review. *Can J Psychiatry*. 2010;55(6):341-349.

doi: 10.1177/070674371005500602

34. Hamilton M. A rating scale for depression. *J Neurol Neurosurg Psychiatry*. 1960;23(1):56.

doi: 10.1136/jnnp.23.1.56

35. Lu TT, Lu CC, Li MX, Ke LX, Cai H, Yang KH. Reporting and methodological quality of meta-analyses of acupuncture for patients with migraine: A methodological investigation with evidence map. *J Integr Med*. 2022;20(3):213-220.

doi: 10.1016/j.joim.2022.02.003

36. Yang H, Xiao ZY, Yin ZH, *et al*. Efficacy and safety of acupuncture for polycystic ovary syndrome: An overview of systematic reviews. *J Integr Med*. 2023;21(2):136-148.

doi: 10.1016/j.joim.2022.12.002

37. Li X, Liang L, Li S, *et al*. Effect of acupuncture in eczema: An overview of systematic reviews. *Complement Ther Med*. 2023;73:102925.

doi: 10.1016/j.ctim.2023.102925

38. Guo H, Pan X, Zheng Y, *et al.* Current state of research on acupuncture for the treatment of post-stroke dysphagia: A scoping review. *Front Neurosci*. 2024;18:1391576.

doi: 10.3389/fnins.2024.1391576

39. Tian ZY, Liao X, Gao Y, *et al*. An overview of systematic reviews and meta- analyses on acupuncture for post-acute stroke dysphagia. *Geriatrics* (*Basel*). 2019;4(4):68.

doi: 10.3390/geriatrics4040068

40. Xin Z, Xue-Ting L, De-Ying K. GRADE in systematic reviews of acupuncture for stroke rehabilitation: Recommendations based on high-quality evidence. *Sci Rep.* 2015;5:16582.

doi: 10.1038/srep16582

41. Wang L, Chi X, Lyu J, *et al*. An overview of the evidence

to guide decision-making in acupuncture therapies for early recovery after acute ischemic stroke. *Front Neurol*. 2022;13:1005819.

doi: 10.3389/fneur.2022.1005819

42. Li W, Yin P, Lao L, Xu S. Effectiveness of acupuncture used for the management of postpartum depression: A systematic review and meta-analysis. *Biomed Res Int*. 2019;2019:6597503.

doi: 10.1155/2019/6597503

43. Smith CA, Armour M, Lee MS, Wang LQ, Hay PJ. Acupuncture for depression. *Cochrane Database Syst Rev*. 2018;3(3):CD004046.

doi: 10.1002/14651858.CD004046.pub4

44. Lu L, He W, Guan D, *et al*. Acupuncture in treating cardiovascular disease complicated with depression: A systematic review and meta-analysis. *Front Psychiatry*. 2022;13:1051324.

doi: 10.3389/fpsyt.2022.1051324

45. Li X, Wang Y, Wu L, Zhao X, Zhu T. Acupuncture for tumor-related depression: A systematic review and meta-analysis. *Front Oncol*. 2023;13:1198286.

doi: 10.3389/fonc.2023.1198286

46. Liao CC, Lin CL, Liao KR, Li JM. Long-term beneficial effects of acupuncture with reduced risk of depression development following trigeminal neuralgia: A nationwide population-based cohort study. *Neuropsychiatr Dis Treat*. 2020;16:2961-2973.

doi: 10.2147/ndt.S284857

47. Zheng L, Sun Z, Liu C, Zhang J, Jin Y, Jin H. Acupuncture-adjuvant therapies for treating perimenopausal depression: A network meta-analysis. *Medicine* (*Baltimore*). 2023;102(33):e34694.

doi: 10.1097/md.0000000000034694

48. Park SY, Heo I, Hwang MS, Hwang EH, Shin BC. Effectiveness of scalp acupuncture and comparison with traditional acupuncture for stroke: An overview of systematic reviews and updated evidence. *Syst Rev*. 2025;14(1):108.

doi: 10.1186/s13643-025-02819-x

49. Dyer S, Mordaunt DA, Adey-Wakeling Z. Interventions for post-stroke shoulder pain: An overview of systematic reviews. *Int J Gen Med*. 2020;13:1411-1426.

doi: 10.2147/ijgm.S200929

50. Yang H, Li J, Luo L, *et al*. Re-evaluation of the systematic review of acupuncture for post-stroke depression systematic reviews of acupuncture for post-stroke depression. *Chin J Rehabil Med*. 2019;34(9):1071-1076

51. Zhang W. An overview of systematic reviews of acupuncture for post-stroke depression. *J Jiangxi Univ Tradit Chin Med*. 2018;30(3):51-55.

52. Hung CYF, Wu XY, Chung VCH, Tang ECH, Wu JCY, Lau AYL. Overview of systematic reviews with meta-analyses on acupuncture in post-stroke cognitive impairment and depression management. *Integr Med Res*.impairment and depression management. *Integr Med Res*. 2019;8(3):145-159.

doi: 10.1016/j.imr.2019.05.001

53. Tu M, Xiong S, Lv S, *et al*. Acupuncture for major depressive disorder: A data mining-based literature study. *Neuropsychiatr Dis Treat*. 2023:1069-1084.

doi: 10.2147/NDT.S405728

54. Xie J, Li J, Sun Q, Jiang J. Clinical efficacy of mind-regulating acupuncture on post-stroke depression based on the "microbiota-gut-brain axis" theory: A randomized controlled study. *Neuropsychiatr Dis Treat*. 2025:1349-1358.

doi: 10.2147/NDT.S525238

55. Liang R, Tang L, Li L, *et al*. The effect of pressing needle therapy on depression, anxiety, and sleep for patients in convalescence from COVID-19. *Front Neurol*. 2024;15:1481557.

doi: 10.3389/fneur.2024.1481557

56. Livinț Popa L, Chira D, Dăbală V, *et al*. Quantitative EEG as a biomarker in evaluating post-stroke depression. *Diagnostics* (*Basel*). 2022;13(1):49.

doi: 10.3390/diagnostics13010049

57. Haider IT, Simonian N, Schnitzer TJ, Edwards WB. Chapter 26 - Bone loss at the knee after spinal cord injury: Radiographic imaging, fracture risk, and treatment. In: Rajendram R, Preedy VR, Martin CR, editors. *Cellular, Molecular, Physiological, and Behavioral Aspects of Spinal Cord Injury*. United States: Academic Press; 2022. p. 315-326.

58. Nickel A, Thomalla G. Post-stroke depression: Impact of lesion location and methodological limitations-a topical review. *Front Neurol*. 2017;8:498.

doi: 10.3389/fneur.2017.00498

59. Garc389/fneur.2017.00498a-Peña K, Cano-Vindel A, Herrera-Martínez SX, Medrano LA. Validity and reliability of the beck depression inventory (BDI-II) in general and hospital population of Dominican Republic. *PLoS One*. 2018;13(6):e0199750.

doi: 10.1371/journal.pone.0199750

60. Lipsey J, Pearlson G, Robinson R, Rao K, Price T. Nortriptyline treatment of post-stroke depression: A double-blind study. *Lancet*. 1984;323(8372):297-300.

doi: 10.1016/s0140-6736(84)90356-8

61. Fan Y, Wang L, Jiang H, *et al*. Depression circuit adaptation in post-stroke depression. *J Affect Disord*. 2023;336:52-63.

doi: 10.1016/j.jad.2023.05.016

62. Wu X, Wang L, Jiang H, *et al*. Frequency-dependent and time-variant alterations of neural activity in post-stroke depression: A resting-state fMRI study. *Neuroimage Clin*. 2023;38:103445.

doi: 10.1016/j.nicl.2023.103445

63. Finnigan SP, Walsh M, Rose SE, Chalk JB. Quantitative EEG indices of sub-acute ischaemic stroke correlate with clinical outcomes. *Clin Neurophysiol*. 2007;118(11):2525-2532.

doi: 10.1016/j.clinph.2007.07.021

64. Finnigan SP, Rose SE, Walsh M, *et al*. Correlation of quantitative EEG in acute ischemic stroke with 30-day NIHSS score: Comparison with diffusion and perfusion MRI. *Stroke*. 2004;35(4):899-903.

doi: 10.1161/01.STR.0000122622.73916.d2

65. Davidson RJ. Anterior cerebral asymmetry and the nature of emotion. *Brain Cognit*. 1992;20(1):125-151.

doi: 10.1016/0278-2626(92)90065-t

66. Li X, Yue L, Liu J, Lv X, Lv Y. Relationship between abnormalities in resting-state quantitative electroencephalogram patterns and poststroke depression. *J Clin Neurophysiol*. 2021;38(1):56-61.

doi: 10.1097/wnp.0000000000000708

Appendices

Table A1. Summary of duplicate studies

Serial number	Duplicate article title	Frequency of duplication
1	Effects of electric-acupuncture and fluoxetine on depression and neurological function of post-stroke depression patients	3
2	Clinical observation on the efficacy of electroacupuncture in the treatment of post-stroke depression (in Chinese)	3
3	Interventional effects of point-through-point acupuncture on post-stroke depression and its influence on plasma cortisol levels (in Chinese)	2
4	Clinical observation on treatment of post-stroke depression with back-shu point-based acupuncture (in Chinese)	2
5	Clinical study on acupuncture combined with pharmacotherapy for post-stroke depression (in Chinese)	2
6	Clinical observation of electroacupuncture in the treatment of post-stroke depression (Chen, 2012)[14]	2
7	Clinical observation of electroacupuncture in the treatment of post-stroke depression (Long *et al*., 2004)[15]	2
8	Clinical observation of electroacupuncture with different current frequencies for post-stroke depression	2
9	Clinical observation of electroacupuncture for elderly post-stroke depression	2
10	Observation on the effect of "*Xingshen Jieyu*" acupuncture method in treating post-stroke depression	2
11	A clinical observation of acupuncture treatment of 72 cases with post-stroke depression	2
12	Clinical research into the treatment of PSD with an electrical needle for invigorating the brain and easing mental stress	2
13	Effect of electroacupuncture on regional cerebral blood flow in patients with post-stroke depression	2
14	Electroacupuncture versus fluoxetine capsule for post-stroke depression: a randomized controlled trial	2
15	Clinical observation on head point-through-point electroacupuncture for treatment of post-stroke depression	2
16	Clinical observation on combined acupuncture and pharmacotherapy in the treatment of 30 cases of post-stroke depression (in Chinese)	2
17	Clinical observation on electroacupuncture combined with fluoxetine (Prozac) for post-stroke depression (in Chinese)	2
18	Clinical study on electroacupuncture combined with fluoxetine for post-stroke depression in young patients (in Chinese)	2
19	Observation on oral fluoxetine combined with acupuncture at eight confluent points in the treatment of post-stroke depression (in Chinese)	2
20	Effect of electroacupuncture combined with fluoxetine on depressive status and neurological function in patients with post-stroke depression (in Chinese)	2
21	Clinical observation on scalp electroacupuncture combined with "*Kai Siguan*" method for post-stroke depression (in Chinese)	2
22	Clinical observation on electroacupuncture combined with paroxetine for post-stroke depression (in Chinese)	2
23	Randomized controlled trial of electroacupuncture and fluoxetine capsule in the treatment of post-stroke depression (in Chinese)	2
24	Clinical observation of head point-through-point electroacupuncture for post-stroke depression (in Chinese)	2
		50

Table A2. Results of the AMSTAR-2 assessment

Reference	1	2[a]	3	4[a]	5	6	7[a]	8	9[a]	10	11[a]	12	13[a]	14	15[a]	16	Compliance (*n* [%])	Overall quality
Li *et al.* (2012)[1]	Y	PY	Y	PY	N	N	N	PY	Y	N	Y	Y	Y	N	N	N	6 (37.50)	Very low
Zhang *et al.* (2014)[2]	Y	PY	Y	PY	Y	Y	N	Y	PY	N	Y	Y	Y	Y	Y	N	10 (62.50)	Very low
Niu. (2014)[3]	Y	PY	Y	PY	Y	Y	N	Y	Y	N	Y	N	N	Y	Y	N	9 (56.25)	Very low
Zhang *et al.* (2014)[4]	Y	PY	Y	PY	N	Y	N	PY	PY	N	Y	Y	Y	Y	Y	N	8 (50.00)	Very low
Zhang and Liu (2017)[5]	Y	PY	Y	PY	Y	Y	N	PY	Y	N	Y	N	N	N	Y	N	7 (43.75)	Very low
Li *et al.* (2018)[6]	Y	Y	Y	Y	N	N	N	Y	Y	N	Y	Y	Y	Y	Y	Y	12 (75.00)	Very low
Huang *et al.* (2018)[7]	Y	PY	Y	PY	Y	N	N	Y	Y	N	Y	Y	N	Y	N	N	8 (50.00)	Very low
Wei *et al.* (2020)[8]	Y	PY	Y	PY	Y	N	N	Y	Y	N	Y	Y	Y	Y	N	N	9 (56.25)	Very low
Wang *et al.* (2021)[9]	Y	PY	Y	PY	Y	N	N	Y	N	N	Y	Y	Y	Y	Y	N	9 (56.25)	Very low
Zhang *et al.* (2021)[10]	PY	PY	Y	PY	N	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	8 (50.00)	Very low
Zhang *et al.* (2021)[11]	Y	PY	Y	PY	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	12 (75.00)	Very low
Jiang *et al.* (2023)[12]	Y	Y	Y	PY	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	N	12 (75.00)	Very low
Zhong *et al.* (2023)[13]	Y	Y	Y	Y	Y	Y	N	Y	PY	Y	Y	Y	Y	Y	Y	Y	14 (87.50)	Very low

Note: [a]The key items of the AMSTAR-2.

Abbreviations: AMSTAR: A measurement tool to assess systematic reviews; N: No; PY: Partial yes; Y: Yes.

Table A3. Results of the PRISMA checklist

Section/topic	Items	Li *et al.* (2012)[1]	Zhang *et al.* (2014)[2]	Niu (2014)[3]	Zhang *et al.* (2014)[4]	Zhang and Liu (2017)[5]	Li *et al.* (2018)[6]	Huang *et al.* (2018)[7]	Wei *et al.* (2020)[8]	Wang *et al.* (2021)[9]	Zhang *et al.* (2021)[10]	Zhang *et al.* (2021)[11]	Jiang *et al.* (2023)[12]	Zhong *et al.* (2023)[13]
Title	1. Title	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Abstract	2. Structured summary	Y	PY	PY	Y	PY	Y	PY	PY	PY	Y	PY	PY	Y
Introduction	3. Rationale	PY	Y	Y	Y	PY	Y	Y	Y	Y	Y	Y	Y	Y
	4. Objectives	Y	Y	Y	Y	Y	Y	Y	Y	Y	PY	Y	Y	Y
Methods	5. Protocol and registration	N	N	N	N	N	Y	N	N	N	N	N	Y	Y
	6. Eligibility criteria	Y	Y	Y	PY	PY	Y	Y	Y	PY	PY	Y	Y	PY
	7. Information sources	N	PY	PY	PY	Y	PY	Y	PY	PY	PY	Y	PY	PY
	8. Search	N	Y	N	Y	N	N	N	N	N	Y	Y	Y	Y
	9. Study selection	Y	Y	Y	Y	Y	N	Y	PY	Y	N	Y	PY	Y
	10. Data collection process	N	Y	Y	Y	N	Y	N	PY	N	Y	Y	Y	Y
	11. Data items	PY	PY	PY	PY	PY	PY	PY	PY	PY	PY	PY	PY	PY
	12. Risk of bias in individual studies	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y
	13. Summary measures	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
	14. Synthesis of results	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	15. Risk of bias across studies	Y	Y	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y
Results	16. Additional studies	N	Y	N	Y	N	N	Y	N	Y	N	Y	Y	Y
	17. Studies selection	Y	PY	Y	Y	Y	Y	Y	PY	PY	PY	Y	PY	Y
	18. Studies characteristics	PY	PY	Y	PY	PY	Y	Y	PY	PY	Y	Y	PY	PY
	19. Risk of bias within studies	Y	Y	Y	N	N	Y	N	Y	Y	Y	Y	Y	Y
	20. Results of individual studies	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

(Contd...)

Table A3. (*Continued*)

Section/topic	Items	Li *et al.* (2012)[1]	Zhang *et al.* (2014)[2]	Niu (2014)[3]	Zhang *et al.* (2014)[4]	Zhang and Liu (2017)[5]	Li *et al.* (2018)[6]	Huang *et al.* (2018)[7]	Wei *et al.* (2020)[8]	Wang *et al.* (2021)[9]	Zhang *et al.* (2021)[10]	Zhang *et al.* (2021)[11]	Jiang *et al.* (2023)[12]	Zhong *et al.* (2023)[13]
	21. Synthesis of results	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
	22. Risk of bias across studies	Y	Y	Y	N	N	Y	N	Y	Y	Y	Y	Y	Y
Discussion	23. Additional analyses	N	Y	N	Y	N	N	Y	Y	Y	N	Y	Y	Y
Other information	24. Summary of evidence	N	N	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y
	25. Limitations	N	Y	N	N	Y	N	N	Y	N	Y	Y	Y	Y
	26. Conclusions	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y
	27. Funding	N	N	N	N	N	Y	N	N	N	N	Y	N	Y

Abbreviations: N: No; PRISMA: Preferred Reporting Items for Acupuncture Systematic Reviews; PY: Partial yes; Y: yes.

References

1. Li XH, Chen JQ, Hu YN, *et al*. Meta-analysis of Acupuncture combined with Chinese medicine versus western medicine for post-stroke depression. *Shaanxi J Tradit Chin Med*. 2012;33(9):1263-1267.

2. Zhang W, Sun JH, Gao Y, *et al*. System review on treating post-stroke depression with acupuncture. *World J Acupunct Moxibustion*. 2014;24(2):52-59.

   doi: 10.1016/S1003-5257(14)60026-X

3. Niu L. *Systematic Review of Electroacupuncture for Post-Stroke Depression*. *Chengdu Univ Tradit Chin Med* [Master's thesis]; 2014.

4. Zhang J, Chen J, Chen J, *et al*. Early filiform needle acupuncture for poststroke depression: a meta-analysis of 17 randomized controlled clinical trials. *Neural Regen Res*. 2014;9(7):773-784.

   doi: 10.4103/1673-5374.131590

5. Zhang YY, Liu ZS. *Systematic review and meta-analysis of electroacupuncture for post-stroke depression*. Beijing Univ Chin Med [Master's thesis]; 2017.

6. Li XB, Wang J, Xu AD, *et al*. Clinical effects and safety of electroacupuncture for the treatment of post-stroke depression: A systematic review and meta-analysis of randomised controlled trials. *Acupunct Med*. 2018;36(5):284-293.

   doi: 10.1136/acupmed-2016-011300

7. Huang YJ, Li LX, Zhou YL, *et al.* Meta-analysis of Acupuncture and Electroacupuncture for Post-stroke Depression. *Mod Hosp.* 2018;18(1):120-124.

8. Wei JF, Lan L, Wu P. *Systematic Review of Acupuncture for Post-stroke Depression*. . *Chengdu Univ Tradit Chin Med* [Master's thesis]; 2020.

9. Wang X, Cai W, Wang Y, Huang S, Zhang Q, Wang F. Is electroacupuncture an effective and safe treatment for poststroke depression? An updated systematic review and meta-analysis. *Biomed Res Int*. 2021;2021:8661162.

   doi: 10.1155/2021/8661162

10. Zhang L, Chen B, Yao Q, *et al*. Comparison between acupuncture and antidepressant therapy for the treatment of poststroke depression: Systematic review and meta-analysis. *Medicine* (*Baltimore*). 2021;100(22):e25950.

    doi: 10.1097/md.0000000000025950

11. Zhang K, Cui G, Gao Y, Shen W. Does acupuncture combined with antidepressants have a better therapeutic effect on post-stroke depression? A systematic review and meta-analysis. *Acupunct Med*. 2021;39(5):432-440.

    doi: 10.1177/0964528420967675

12. Jiang W, Jiang X, Yu T, Gao Y, Sun Y. Efficacy and safety of scalp acupuncture for poststroke depression: A meta-

analysis and systematic review. *Medicine* (*Baltimore*). 2023;102(31):e34561.

doi: 10.1097/md.0000000000034561

13. Zhong D, Cheng H, Pan Z, *et al*. Efficacy of scalp acupuncture combined with conventional therapy in the intervention of post-stroke depression: A systematic review and meta-analysis. *Complement Ther Med*. 2023;77:10295.

doi: 1016/j.ctim.2023.102975