


Acupuncture for shoulder-hand syndrome after stroke

An overview of systematic reviews

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Abstract

Background: To provide evidence, this review evaluated the methodological quality, risk of bias, and reporting quality of SRs/MAs in the treatment of shoulder-hand syndrome after stroke with acupuncture.

Methods: Systematic reviews and Meta analyses (SRs/MAs) of acupuncture for shoulder and hand syndromes after stroke were retrieved from 6 databases from inception to May 1, 2022. Two reviewers independently screened the literature and extracted the data, then used Assessment of Multiple Systematic Reviews-2 (AMSTAR-2), Bias Risk in Systematic Review (ROBIS), and Preferred Report Item for Systematic review and Meta-analysis (PRISMA), Grading of Recommendations, Assessment, Development and Evaluation (GRADE) to assess methodological quality, risk of bias, quality of reporting, and quality of evidence.

Results: We included 7 SRs/MAs, of which all SRs/MAs had very low AMSTAR-2 assessment quality and one study had a very low assessment bias risk. According to the PRISMA checklist, Protocol and registration, Synthesis of results, Summary of evidence, Conclusions and Funding were the main reporting limitations. GRADE evaluation showed a total of 37 results, but no high-quality evidence results, 6 results (16.22%) of the evidence quality were moderate, and supported acupuncture combined with exercise rehabilitation and drug therapy was better than exercise joint drug rehabilitation and rehabilitation, we also found that the result of limitations were the main factors that influence the evidence of low quality, followed by imprecision, inconsistency, and publication bias.

Conclusions: Acupuncture is a relatively safe and effective adjuvant therapy for shoulder and hand syndromes after stroke. However, because of the low quality of SRs/MAs evidence supporting these findings, high-quality randomized controlled trials should be conducted, and the quality of relevant SRs should be improved to provide evidence for clinical application.

Abbreviations: ADL = activities of daily living, AMSTAR-2 = Assessment of Multiple Systematic Reviews-2, CNKI = Chinese National Knowledge Infrastructure, FMA = Fugl-Meyer motor function assessment, GRADE = Grading of Recommendations, Assessment, Development and Evaluation, PRISMA = Preferred Reporting Items for Systematic Reviews and Meta-Analyses, RCTs = randomized controlled trials, ROBIS = Risk of Bias in Systematic reviews, VAS = visual analogue scale, VIP = China Science and Technology Journal Database.

Keywords: acupuncture, overview, shoulder-hand syndrome, stroke, systematic reviews

1. Introduction

Poststroke shoulder hand syndrome (SHS) is one of the most common complications of stroke patients with hemiplegia,^[1] usually occurring 1–3 months after cerebrovascular disease, with an incidence of 12.15%–74.11%.^[2] The main clinical manifestations after stroke are edema of the affected side of the upper limb,

shoulder joint, finger pain, redness of the skin, rising skin temperature, limited joint activity, dislocation of the shoulder joint, and stiffness of the skin and muscle atrophy or spasm; to a large extent, it affects the functional recovery of the paralyzed upper limb and reduces the quality of life of the patient.^[3] Common clinical symptomatic treatments, including oppressive central winding alternating hot and cold immersion and microwave

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All data generated or analyzed during this study are included in this published article and its supplementary information files.

Ethical approval was not required as no primary data of individual patients were collected. The results of this overview will be published in peer-reviewed journals.

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treatment of nonsteroidal anti-inflammatory hormones to relieve symptoms are limited.^[4] Therefore, the number of patients with shoulder and hand syndrome who choose complementary and alternative therapy for treatment is gradually increasing.^[5] Acupuncture is an important part of complementary and alternative medicine and has unique advantages in the treatment of shoulder and hand syndrome, which can maintain the excitation and inhibition processes of the peripheral and central nerves, promote local blood circulation, and relieve symptoms of limb pain caused by ischemia and hypoxia.^[6] Evidence based on the treatment of SRs/MAs of poststroke shoulder and hand syndrome by acupuncture shows that acupuncture can improve clinical symptoms and quality of life, and the review aimed to assess methodological quality, bias risk, and reporting quality of SRs/MAs, and summarize the existing evidence on acupuncture for the treatment of shoulder and hand syndrome after stroke.

2. Methods

Our program, including review questions, eligibility criteria, search strategies, and quality assessment methods, is registered with PROSPERO (<http://www.crd.york.ac.uk/PROSPERO>, identifier CRD42022306416) before being outlined. We conducted an overview based on the methodological guidance of the overview of the systematic review.^[7–10]

2.1. Inclusion criteria

2.1.1. Research design. SRs/MAs of randomized controlled trials of acupuncture in the treatment of poststroke shoulder-hand syndrome were included.

2.1.2. Research participants of the study. Participants in the study were patients diagnosed with poststroke shoulder and hand syndrome according to international or Chinese standards,^[11] regardless of age, race, and sex.

2.1.3. Intervention measures. The intervention measures were acupuncture (manual acupuncture, auricular acupuncture, electroacupuncture, warm acupuncture, filiform needle, fire needle, acupoint catgut embedding, and moxibustion) and acupuncture combined with other therapies, and the control group consisted of nonacupuncture and other treatments.

2.1.4. Outcome indicators. The main indicators were the effective rate, Fugl-Meyer motor function assessment (FMA), and visual analogue scale (VAS), and the secondary indicators were activities of daily living (ADL) and safety.

2.2. Exclusion criteria

Animal experiments, reviews, repeated publications, protocols for systematic reviews, conferences, articles for which the full text was not available, and narrative reviews were excluded.

2.3. Search methods and SRs collection

The SRs/MAs related to acupuncture in the treatment of post-stroke shoulder-hand syndrome in 6 electronic databases (PubMed, EMBase, Cochrane Library, CNKI, Wanfang, and VIP) were searched from the establishment of the database to May 1, 2022. The search terms were stroke, brain infarction, cerebrovascular accident, cerebral hemorrhage, Shoulder-Hand Syndrome, reflex sympathetic dystrophy, acupuncture, manual acupuncture, electroacupuncture, auricular acupuncture, warm acupuncture, filiform needle, fire needle, acupoint catgut embedding, systematic review, meta-analysis, and search strategy were presented in Supplementary Material 1, Supplemental Digital Content, <http://links.lww.com/MD/H954>. Literature retrieval

adopted a combination of theme words and free words, and conducted full-text retrieval through an appropriate combination. There were no language restrictions.

2.4. Study screening and data extraction

Two reviewers independently performed literature screening and retrieval, and adopted Endnote X20 to conduct literature induction and collation. Based on the eligibility criteria, literature titles and abstracts were first screened to exclude literature that did not meet the inclusion criteria. Then, the full text was obtained, and the full text was carefully read to find the literature that met the inclusion criteria. For controversial literature, inclusion of this article was determined by discussion by 2 persons or by a third reviewer with the assistance of cross-checking. The data extraction was also carried out independently by 2 reviewers. The extracted contents included: information, country, design, sample size, intervention, control, duration of treatment (days), outcomes, assessment of methodological quality and safe.

2.5. Evaluation method

Two reviewers independently evaluated the quality of the included systematic reviews and meta-analyses, and checked each other. In case of disputes, 2 reviewers would discuss and reach a consensus, or a third reviewer would assist in the decision.

2.5.1. Methodological quality assessment. The AMSTAR2 scale^[7] is a methodological quality evaluation tool consisting of 16 items, among which there are 7 key items: Items 2, 4, 7, 9, 11, 13, and 15. According to the conformity of the items in the included literature, each SR can be divided into 4 grades: “high,” “medium,” “low,” and “very low,” based on the methodological quality of the included literature.

2.5.2. Report quality assessment. The PRISMA statement evaluation tool^[8] is a 27-item checklist used to evaluate the reporting quality of articles. Each SR can be evaluated as “yes,” “partial yes,” or “no,” according to the item compliance of each article.

2.5.3. Bias risk analysis. The ROBIS tool^[9] is used to assess the bias risk of the included SRs/MAs, which can be divided into 3 stages: assessing the relevance of systematic review questions to the practical problems to be addressed by their users, SR eligibility criteria, screening, and analysis problems, the overall risk assessment of bias for SRs. Results are considered “low,” “unclear,” or “high.”

2.5.4. Evidence quality assessment. GRADE^[10] is used to systematically analyze the quality of evidence in the included studies, mainly by examining the risk of bias (limitation), Imprecision, inconsistency, indirectness, and publication bias of the studies, and the quality of SR evidence is divided into 4 grades: “high,” “medium,” “low,” or “very low.”

3. Results

3.1. Literature screening

A total of 371 articles were obtained by searching the database; 273 duplicated articles were excluded, 72 were excluded by reading titles and abstracts, and 7 articles were included for analysis by reading the full text, as shown in Figure 1.

3.2. Study characteristics

Seven articles^[12–18] were included and published from 2013 to 2019, including 5 in Chinese^[14–18] and 2 in English.^[12,13] These

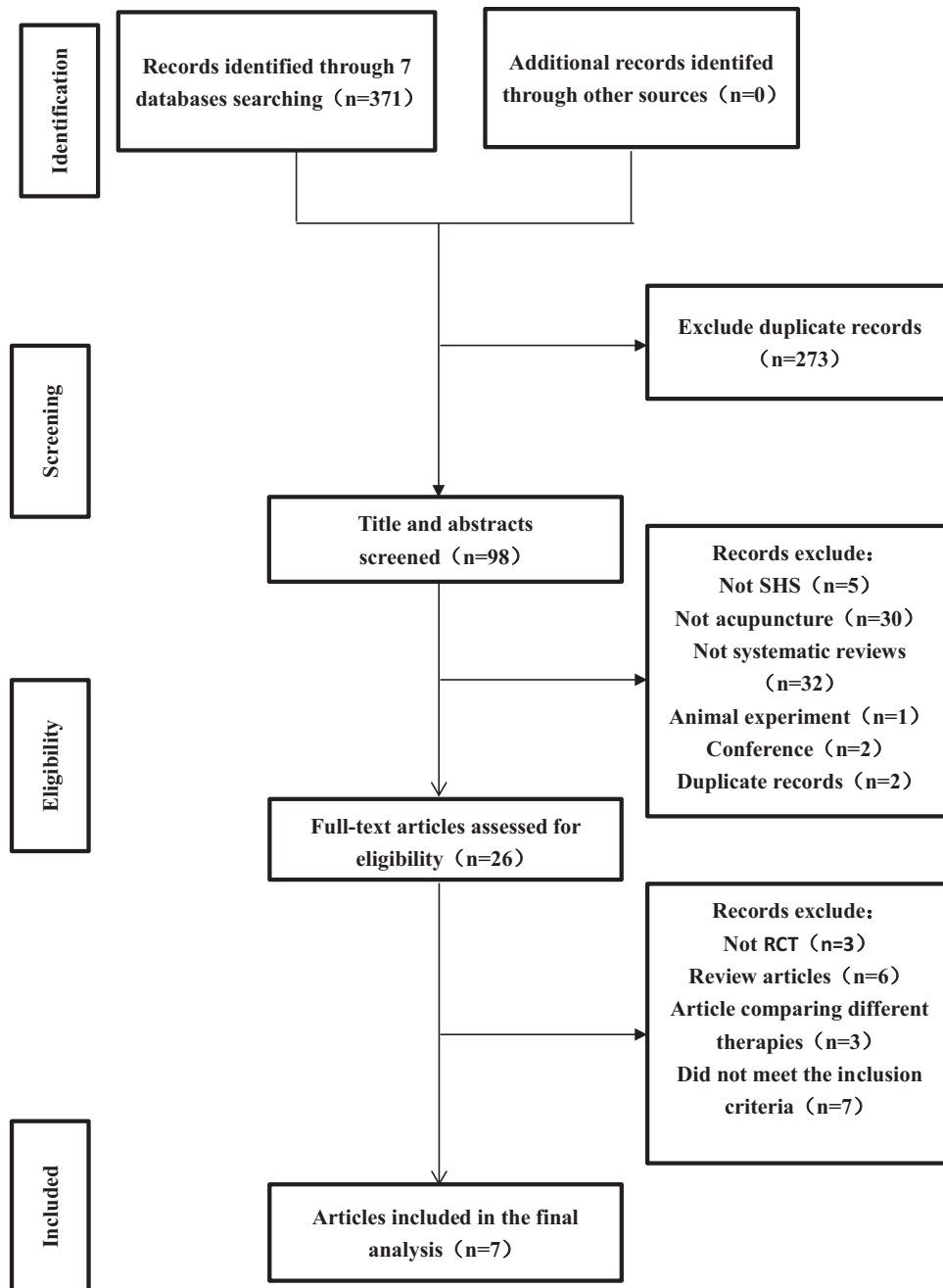


Figure 1. Flow diagram of selection process of studies.

articles included 3–38 randomized controlled trials with sample sizes of 252–3184 people. The intervention measures in the 7 studies were acupuncture and moxibustion, and the combination of acupuncture and moxibustion with other therapies. The control group mainly received exercise therapy, rehabilitation training, conventional therapy, drugs, local blocking therapy, traditional Chinese medicine fumigation, or a combination of these therapies. Six studies^[12–16,18] reported the duration of the intervention measures, which ranged from 7 to 60 days. Cochrane was the methodological quality evaluation tool used for 5 articles,^[12,13,15,17,18] Jadad was the methodological quality evaluation tool used for one article,^[16] and the above 2 methodological quality evaluation tools were used for one article.^[14] Six articles performed meta-analysis,^[12,13,15–18] and one article^[14] did not meet the requirements of meta-analysis owing to the difference in number and trials, therefore, only qualitative analysis was conducted. Four SRs^[12,13,15,17] completed subgroup analysis,

and 1^[12] conducted sensitivity analysis. Four articles,^[12,16–18] which reported the safety of acupuncture and moxibustion. The specific information is shown in Table 1.

3.3. Methodological quality assessment results

According to the evaluation criteria of AMSTAR-2, the methodological quality of the included articles was evaluated, All the articles found that more than one key item and several nonkey items did not meet the requirements, indicating that the methodological quality was extremely low. Key items 2,7 and nonkey items 3, 10, and 16 all had obvious methodological defects, and the articles with the most content of the report items meet 9 items; the articles with the least content of the report items meet 6 items. The evaluation results of methodological quality are shown in Table 2.

Table 1
Characteristics of included SRs/MAs of randomized controlled trials.

Information	Country	Design	Sample size	Intervention	Control	Duration of treatment (d)	Outcomes	Assessment of methodological quality	Safety	Subgroup analysis	Sensitivity analysis	Meta-analysis
Qiao, 2015	China	RCT	23 (1657)	①+⑥, ①+⑥	⑤, ⑥	7–60	Effective rate, FMA, VAS	Jadad	Y	N	N	Y
Xu, 2013	China	RCT	21 (1515)	①, ①+⑥, ②+⑥, ③+⑥, ④+⑥	⑥	14–56	FMA, VAS, ADL	Cochrane	Y	N	N	Y
Su, 2019	China	RCT	11 (998)	④+⑥	⑥	NR	Total effective rate, Effective rate, Marked effective rate, FMA, VAS	Cochrane	Y	Y	N	Y
Peng, 2017	China	RCT	20 (1918)	①+⑥	⑥	14–30	FMA, VAS, ADL	Cochrane	NR	Y	N	Y
Liu, 2019	China	RCT	38 (3184)	①+⑥	⑥	14–56	FMA, VAS, ADL, ROM	Cochrane	Y	Y	Y	Y
Lu, 2009	China	RCT	3 (252)	①+⑥, ②+⑥	⑥, ⑩	28–40	Shoulder pain, range of motion, Hand edema, Effective rate	Cochrane, Jadad	NR	N	N	N
Liu, 2015	China	RCT	7 (399)	①, ①+⑦, ⑧	⑥, ⑥+⑦, ⑩	14–28	Effective rate, FMA, VAS, ADL	Cochrane	NR	Y	N	Y

① Acupuncture; ② Electropuncture; ③ Auricular acupuncture; ④ Warm acupuncture; ⑤ Kinesitherapy; ⑥ Rehabilitation training; ⑦ Conventional treatment; ⑧ Drug; ⑩ Treatment of local block; ⑩ Traditional Chinese medicine fumigation; Y = Yes, N = No, NR = No Report, RCT = randomized controlled trials, VAS = visual analogue scale, FMA = Fugl-Meyer Assessment Upper Extremity Scale, ADL = Activities of daily living Scale, ROM = range of motion.

Table 2
Results of AMSTAR 2 assessment.

Author, year	Items																Quality of the review
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Qiao J, 2015	Y																Very low
Xu Y et al, 2013	Y																Very low
Su MY, 2019	Y																Very low
Peng L et al, 2017	Y																Very low
Liu SN et al, 2019	Y																Very low
Lu YM et al, 2009	Y																Very low
Liu K et al, 2015	Y																Very low

Red:Yes;Yellow:Partially Yes;Green:No

3.4. Report quality assessment results

According to the PRISMA evaluation criteria, the report quality of the included articles was evaluated, and the scores of the 7 articles were 12–22.5 points, including one article^[17] with a score below 15, 5 articles^[13–16,18] with scores of 15–21, and 1 article^[12] with a score above 21. If the completeness of each item in the PRISMA report declaration was less than 50%, it indicated that the item information was missing. As can be seen from Table 3, Item 5:Protocol and Registration, Item 14:Synthesis of Results, Item 24:Summary of evidence, Item 26: Summary of Evidence, Item 27:Funding, 5 items had missing

report information, and the other 22 items had good report information integrity. Table 3 presents the PRISMA checklist.

3.5. Bias risk assessment of included studies

In the first phase (Assessing relevance) and Domain 1 (study eligibility criteria) of second phase, all SRs/MAs were rated at a low risk of bias; In Domain 2 (Identification and Selection of Studies), 3 SRs/Mas^[13–15] had a low bias risk; 5 SRs/MAs^[12,13,15,16,18] had a low bias risk in Domain 3, and 2 articles^[14,17] had a unclear bias risk. In Domains 4 (synthesis and findings). Two articles^[13,15] had

a low risk of bias, In phase 3, 4 SRs/MAs^[12-14,17] had a low bias risk. The evaluation results of the ROBIS are shown in Table 4.

3.6. Evidence quality of included SRs/MAs

The details of the evidence quality of the 7 SRs/MAs included in the analysis are shown in Table 5. Among them, 6 results were rated as medium quality, 12 as low quality, 19 as very low quality, and none as high quality, all of which had serious limitations, which were also the main factors affecting the low quality of evidence. Secondary factors affecting the quality of evidence included imprecision, inconsistency, and publication bias.

3.7. Curative effect

3.7.1. Effective rate. Four articles^[12,15-17] reported the effective rate of acupuncture combined with other therapies

in the treatment of shoulder and hand syndrome after stroke, among which 3 articles^[14,16,17] showed that the effective rate of acupuncture combined with exercise and rehabilitation therapy was superior to that of exercise and rehabilitation therapy. One article^[15] described that the effective rate of acupuncture combined with drugs in the treatment of shoulder and hand syndrome after stroke was better than that of rehabilitation combined drugs, and there was no significant difference between acupuncture and rehabilitation.

3.7.2. FMA score. The FMA score of acupuncture in the treatment of shoulder and hand syndrome after stroke was studied in 7 articles, among which 5 articles^[12,13,16-18] showed that acupuncture combined with exercise and rehabilitation was superior to exercise and rehabilitation, and the FMA score of one article^[14] showed no difference between acupuncture combined with drugs in the treatment of shoulder-hand syndrome after stroke compared with rehabilitation. The FMA score of another

Table 3
Results of ROBIS assessment.

References	Phase 1		Phase 2				Phase 3
	Assessing relevance	Domain 1: study eligibility criteria	Domain 2: identification and selection of studies	Domain 3: data collection and study appraisal	Domain 4: synthesis and findings	Risk of bias in the review	
Qiao et al. ^[16]	Low	Low	High	Low	High	High	
Xu et al. ^[13]	Low	Low	High	Low	High	High	
Su ^[17]	Low	Low	High	Unclear	High	Low	
Peng et al. ^[13]	Low	Low	Low	Low	Low	Low	
Liu et al. ^[12]	Low	Low	High	Low	High	Low	
Lu et al. ^[14]	Low	Low	Low	Unclear	High	Low	
Liu et al. ^[15]	Low	Low	Low	Low	Unclear	High	

Table 4
Results of the PRISMA checklist.

Section/topic	Items	Qiao J,							Number of Y and PY (%)
		2015	Xu et al. ^[13]	Su ^[17]	Peng et al. ^[13]	Liu et al. ^[12]	Lu et al. ^[14]	Liu et al. ^[15]	
Title	1. Title	N	Y	Y	Y	Y	Y	Y	6 (85.71%)
Abstract	2. Structured summary	PY	PY	PY	PY	PY	PY	PY	7 (100%)
Introduction	3. Rationale	Y	Y	Y	Y	Y	Y	Y	7 (100%)
	4. Objectives	Y	Y	Y	Y	Y	Y	Y	7 (100%)
Methods	5. Protocol and registration	N	N	N	N	Y	N	N	1 (14.29%)
	6. Eligibility criteria	PY	Y	Y	Y	PY	PY	PY	7 (100%)
	7. Information sources	N	Y	PY	N	Y	Y	Y	5 (71.43%)
	8. Search	Y	Y	N	Y	Y	Y	N	5 (71.43%)
	9. Study selection	Y	Y	PY	Y	PY	Y	Y	7 (100%)
	10. Data collection process	PY	PY	PY	PY	PY	PY	PY	7 (100%)
	11. Data items	Y	Y	N	Y	Y	PY	Y	6 (85.71%)
	12. Risk of bias in individual studies	Y	Y	Y	Y	Y	Y	Y	7 (100%)
	13. Summary measures	Y	Y	PY	PY	PY	PY	PY	7 (100%)
	14. Synthesis of results	Y	Y	N	N	Y	N	N	3 (42.86%)
Results	15. Risk of bias across studies	Y	Y	Y	Y	Y	Y	Y	7 (100%)
	16. Additional analyses	PY	PY	N	Y	PY	Y	Y	6 (85.71%)
	17. Study selection	N	Y	N	N	Y	Y	Y	4 (57.14%)
	18. Study characteristics	Y	Y	N	N	Y	Y	Y	5 (71.43%)
	19. Risk of bias within studies	Y	Y	Y	Y	Y	PY	Y	7 (100%)
	20. Results of individual studies	Y	N	PY	PY	PY	Y	PY	6 (85.71%)
	21. Synthesis of results	Y	Y	N	N	Y	Y	N	4 (57.14%)
	22. Risk of bias across studies	Y	Y	Y	Y	Y	N	Y	6 (85.71%)
Discussion	23. Additional analyses	Y	Y	Y	Y	Y	Y	Y	7 (100%)
	24. Summary of evidence	N	N	N	N	Y	N	N	1 (14.29%)
	25. Limitations	N	PY	N	PY	PY	PY	N	4 (57.14%)
	26. Conclusions	N	N	N	Y	PY	N	N	2 (28.57%)
Funding	27. Funding	N	N	N	N	Y	N	N	1 (14.29%)
PRISMA score		17	20	12	16.5	22.5	16.5	16	

Y = yes; PY = partially yes; N = no.

Table 5
Results of evidence quality.

Reviews	Intervention	Outcomes (number of studies)	Synthesis of results	Limitations	Inconsistency	Indirectness	Imprecision	Publication bias	Quality of evidence
Qiao J,2015	Acupuncture + kinesitherapy vs kinewsitherapy	Effective rate (18)	OR = 5.46, 95% CI (3.71, 8.03), $I^2 = 0\%$, $P < .00001$	-1	0	0	-1	0	Low
		FMA (17)	OR = 8.69, 95% CI (6.78, 10.60), $I^2 = 88\%$, $P < .00001$	-1	-1	0	-1	0	Very low
		VAS (14)	OR = -1.62, 95% CI (-2.10, -1.15), $I^2 = 90\%$, $P < .00001$	-1	-1	0	0	0	Low
Xu Y et al,2013	Acupuncture + rehabilitation training vs rehabilitation training Duration = 3 weeks	FMA (2)	WMD = 12.53, 95% CI (4.56, 20.49), $I^2 = 68\%$, $P = .002$	-1	-1	0	-1	0	Very low
		Duration = 4 weeks	FMA (6)	WMD = 7.25, 95% CI (3.38, 11.12), $I^2 = 35\%$, $P = .0002$	-1	0	0	-1	0
	Duration = 5 weeks	FMA (2)	WMD = 7.06, 95% CI (5.66, 8.47), $I^2 = 0\%$, $P < .00001$	-1	0	0	-1	0	Very low
	Duration = 6 weeks	FMA (1)	WMD = 13.86, 95% CI (11.17, 16.55), $P < .00001$	-1	-1	0	-1	0	Very low
	Duration = 8 weeks	FMA (1)	WMD = 15.28, 95% CI (13.81, 16.75), $P < .00001$	-1	-1	0	-1	0	Very low
	Acupuncture + rehabilitation training vs rehabilitation training Duration = 2 weeks	VAS (1)	WMD = -1.40, 95%CI (-1.71, -1), $I^2 = 0\%$, $P < .00001$	-1	0	0	0	0	Moderate
		Duration = 5 weeks	VAS (2)	WMD = -1.88, 95%CI (-3.08, 0.68), $I^2 = 38\%$, $P = .002$	-1	0	0	0	0
	Duration = 8 weeks	VAS (1)	WMD = -1.78, 95%CI (-2.47, -1.09), $P < .00001$	-1	-1	0	0	0	Low
	Acupuncture + Rehabilitation training vs Rehabilitation training Duration = 3 weeks	ADL (1)	WMD = 9.33, 95%CI (1.14, 17.52), $P = .03$	-1	-1	0	-1	-1	Very low
		Duration = 5 weeks	ADL (2)	WMD = 15.17, 95%CI (12.00, 18.3), $I^2 = 0\%$, $P < .00001$	-1	0	0	-1	-1
Duration = 8 weeks	ADL (1)	WMD = 18.49, 95%CI (15.15, 21.83), $P < .00001$	-1	-1	0	-1	-1	Very low	
Su MY,2019	Warm acupuncture + Rehabilitation training vs Rehabilitation training	Total effective rate (10)	OR = 3.86, 95%CI (2.58, 5.79), $I^2 = 0\%$, $P < .00001$	-1	0	0	0	-1	Low
		Effective rate (9)	OR = 1.42, 95%CI (0.79, 2.55), $I^2 = 66\%$, $P = .24$	-1	-1	0	-1	-1	Very low
		Marked effective rate (9)	OR = 2.15, 95%CI (1.20, 3.83), $I^2 = 53\%$, $P = .03$	-1	-1	0	0	0	Low
		FMA(9)	OR = 8.28, 95%CI (-0.57, 17.12), $I^2 = 100\%$, $P < .00001$	-1	-1	0	-1	-1	Very low
		VAS (7)	OR = -1.23, 95%CI (-1.80, -0.66), $I^2 = 87\%$, $P < .00001$	-1	-1	0	-1	0	Very low
Peng L et al,2017	Acupuncture + Rehabilitation training vs Rehabilitation training	VAS (9)	MD = 1.49, 95% CI (1.15, 1.82), $I^2 = 71\%$, $P < .00001$	-1	-1	0	0	0	Low

(Continued)

Table 5
(Continued)

Reviews	Intervention	Outcomes (number of studies)	Synthesis of results	Limitations	Inconsistency	Indirectness	Imprecision	Publication bias	Quality of evidence
Liu,2019	Acupuncture + Rehabilitation training vs Rehabilitation training	FMA (38)	MD = 8.42, 95% CI (6.74, 10.10), $I^2 = 94\%, P < .00001$	-1	-1	0	-1	0	Very low
		ADL (6)	SMD = 1.31, 95% CI (0.57, 2.05), $I^2 = 95\%, P < .00001$	-1	-1	0	-1	0	Very low
		FMA (29)	MD = 8.01, 95% CI (6.69, 9.33), $I^2 = 78\%, P < .00001$	-1	0	0	0	0	Moderate
		VAS (25)	MD = 1.59, 95% CI (1.86, 1.32), $I^2 = 87\%, P < .00001$	-1	0	0	0	0	Moderate
		ADL (11)	MD = 9.99, 95% CI (5.91, 14.06), $I^2 = 86\%, P < .00001$	-1	0	0	0	0	Moderate
		ROM (3)	MD = 11.9, 95%CI (9.44, 14.45), $I^2 = 0\%, P = .001$	-1	0	0	0	0	Moderate
		Effective rate (9)	OR = 1.42, 95%CI (0.79, 2.55), $I^2 = 66\%, P = .24$	-1	-1	0	-1	-1	Very low
		Marked effective rate (9)	OR = 2.15, 95%CI (1.20, 3.83), $I^2 = 53\%, P = .03$	-1	-1	0	0	0	Low
		FM (9)	MD = 8.28, 95% CI (-0.57, 17.12), $I^2 = 100\%, P = .07$	-1	-1	0	-1	-1	Very low
		VAS(7)	MD = -1.23, 95% CI (-1.80, -0.66), $I^2 = 97\%, P < .0001$	-1	-1	0	-1	0	Very low
Liu,2015	Acupuncture vs Rehabilitation training	Effective rate (4)	RR = 1.11, 95%CI (0.96, 1.29), $I^2 = 0\%, P = .35$	-1	0	0	-1	0	Low
		FMA(4)	MD = -0.78, 95%CI (-4.58, 3.01), $I^2 = 0\%, P = .69$	-1	0	0	-1	0	Low
		ADL(4)	MD = 3.76, 95%CI (-4.94, 12.46), $I^2 = 61\%, P = .40$	-1	-1	0	-1	-1	Very low
	Acupuncture + drug vs Rehabilitation training + drug	Effective rate (2)	RR = 1.27, 95%CI (1.02, 1.59), $I^2 = 0\%, P = .04$	-1	0	0	-1	0	Low
		VAS(2)	MD = -2.13, 95%CI (-3.63, -0.62), $I^2 = 60\%, P = .006$	-1	-1	0	0	-1	Very low
		FMA(2)	MD = 4.72,95%CI (-9.20, 18.65), $I^2 = 74\%, P = .51$	-1	-1	0	-1	-1	Very low

ADL = activities of daily living scale, FMA = Fugl-Meyer assessment upper extremity scale, MD = mean difference, OR = odds ratio, RR = relative risk, SMD = standard mean difference, VAS = visual analog scale, WMD = weighted mean difference.

literature^[15] showed that acupuncture, acupuncture combined with drugs and rehabilitation, rehabilitation combined with drugs had no obvious advantage.

3.7.3. VAS score. The VAS score for acupuncture in the treatment of shoulder and hand syndromes after stroke was studied in 7 articles, and the combination of acupuncture and exercise, rehabilitation and drugs in the treatment of shoulder and hand syndromes after stroke was significantly better than that of exercise, rehabilitation, and rehabilitation combined with drug therapy.

3.7.4. ADL score. Four articles^[12,13,15,18] studied the ADL score of acupuncture in the treatment of shoulder and hand syndromes after stroke, and the ADL score of one article^[15] showed that there was no significant difference between acupuncture and rehabilitation in the treatment of shoulder and hand syndromes after stroke.

3.7.5. Safety. Four articles^[12,16-18] reported the safety or adverse reactions of acupuncture in the treatment of shoulder and hand syndromes after stroke and all showed that acupuncture combined with other therapies was safe. However, safety was only mentioned, without a specific analysis.

4. Discussion

Our review included 7 SRs and meta-analyses published between 2009 and 2019, of which 6^[12,13,16–18] were published in the last 10 years, indicating that the efficacy of acupuncture in the treatment of shoulder-hand syndrome after stroke has received increasing attention. This study included 7 SRs/MAs, involving 123 randomized controlled trials (RCTs) with 9923 participants, which provided evidence for the efficacy of acupuncture in the treatment of poststroke shoulder-hand syndrome. However, evaluation by AMSTAR-2 found that the methodological quality of these studies was very low, and the low-quality research literature hindered us from making a clear judgment on the efficacy of acupuncture in the treatment of post-stroke shoulder-hand syndrome. The shortcomings of these studies mainly include: the systematic reviews did not attach importance to the formulation of the study protocol, which may lead to a larger adjustment of the research process than expected, affecting the rigor of the systematic reviews; the included studies did not explain the reasons for including RCT, which affected the overall methodological quality of the systematic reviews; SRs did not provide a list of excluded literatures and explain the reasons for exclusion, so there may be omissions in research screening, which makes the included studies incomplete; all the included studies failed to make reasonable analysis and report on relevant interest conflicts, especially whether they were supported by funds and whether the implemented funds affected the formulation of the systematic reviews, resulting in certain interest conflicts in the systematic reviews.

In the ROBIS tool, improper research selection and data synthesis methods were used as the main factors, leading to a high risk of bias. An inadequate explanation of the risk of bias in the discussion was the secondary factor, which may have affected the reliability of the current evidence. Based on the PRISMA checklist, we found that Protocol and registration, Synthesis of results, Summary of evidence, Conclusions, and Funding were not well reported, all of which may have affected the clarity and transparency of how the SRs were conducted.

Moderate-quality evidence supported the potential therapeutic advantage of acupuncture combined with rehabilitation in patients with poststroke shoulder-hand syndrome. Based on the results of the GRADE evaluation in this review, most of the evidence was of low or very low quality, and some of the evidence was of medium quality. In moderate-quality evidence, acupuncture combined with rehabilitation was superior to rehabilitation alone when the outcome measures were the FMA score, VAS score, ADL score, and ROM. Clinically, based on the extent to which acupuncture and moxibustion combined with other therapies can improve upper limb motor function pain and daily living ability, acupuncture and moxibustion are effective adjuvant therapies for SHS in terms of safety. Acupuncture therapy has been proven to be safe, but there are few studies that include and analyze its safety.

The main factor leading to the deterioration of evidence quality in the included articles was the limitations of the study. Most of the original RCTs did not explicitly describe randomization, allocation concealment, and blind method, resulting in a potential risk of bias, which may have affected the strength of the demonstration of SRs/MAs included in the literature. Most of the included literature did not explore a priori hypotheses that might explain the sources of heterogeneity, or did, but the findings had a great deal of inconsistency.

Based on the above conclusions, the future of randomized controlled trials should be through the strict test design, rational evaluation, and critical analysis to solve the problem of methodology. Researchers should follow the basic guidelines for reporting clinical trials. This review shows that large heterogeneity among articles caused by small sample size and small number of included articles leads to greater publication bias. Therefore, high-quality studies with larger sample sizes are needed to

confirm our results. In addition, future studies should be conducted in the East and West.

5. Strengths and limitations

This study serves as a review of acupuncture therapy for SHS, and may provide evidence for clinical practice based on the current results. The apparent limitations of the included SRs/MAs and RCTs were illustrated by systematic reviews using AMSTAR-2, PRISMA, ROBIS, and GRADE, which may help guide future high-quality studies. However, it also had limitations because the evaluation of quality was subject to a certain degree, and there might be differences in the subjective evaluation of the reviewers, which ultimately affects the research results. Because the quality of the included literature was generally low, the reliability of the research results was reduced.

6. Conclusion

As a single or adjunctive therapy, acupuncture has potential benefits and is safe as a single adjuvant therapy for the clinical treatment of SHS. However, the current low quality methodology limits SRs/MAs, and more high-quality studies are required to confirm this conclusion. Therefore, more details should be obtained in the future to continuously improve randomized controlled trials of acupuncture for the treatment of shoulder-hand syndrome after stroke, improve the methodological and reporting quality of SRs, and provide strong evidence for clinical application.

Author contributions

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