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REVIEW ARTICLE

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Acupuncture treatment of diabetic peripheral neuropathy: An overview of systematic reviews

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Abstract

What is known and objective: To evaluate the clinical efficacy of acupuncture through a review and analysis of systematic reviews of acupuncture for the treatment of diabetic peripheral neuropathy.

Methods: Systematic reviews of acupuncture treatment for diabetic peripheral neuropathy were collected by searching CNKI, VIP, Wanfang database, Chinese Biomedical Literature Database (CBM), PubMed, Web of Science and the Cochrane Library. The retrieval period was from the establishment of the database to February 14, 2020. After literature selection and extraction, included reports were evaluated in terms of the quality of the methodology and of the report using criteria from the AMSTAR2 scale and the PRISMA statement.

Results and discussion: Eighty eight reviews were retrieved. The inclusion criteria were a published systematic evaluation/meta-analysis/systematic review of acupuncture treatment for diabetic peripheral neuropathy, which included subjects meeting the diagnostic criteria for diabetic peripheral neuropathy, and which compared acupuncture treatment with non-acupuncture treatment. After the inclusion criteria had been applied, 18 reviews were finally included. According to the PRISMA statement, 3 reports were relatively complete, 12 reports had certain defects, 3 reports had considerable information missing, and 18 reports had extremely low methodological quality according to the AMSTAR2 scale. Current evidence shows that acupuncture improves diabetic peripheral neuropathy and increases nerve conduction velocity. However, the methodological quality of the reviews is generally extremely low, and most of the reviews had certain defects, showing that there is still much room for improvement in terms of the methodology and quality of the research reports.

What is new and conclusion: Acupuncture appears to have an effect on DPN, effectively improving nerve conduction and clinical symptoms. Although the methodological quality of the included studies was generally very low and defects were frequent, our study highlights areas where improvement in methodology is required. There is a need for further study of the pathogenesis of DPN, and for developing a unified

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standard for methods of acupuncture treatment, acupoint selection, and adverse reactions reporting. Traditional Chinese medical practices such as acupuncture should adopt an evidence-based approach to provide greater confidence in their use.

KEYWORDS
acupuncture, an overview of systematic reviews, diabetic peripheral neuropathy

1 | WHAT IS KNOWN AND OBJECTIVE

Diabetic peripheral neuropathy (DPN) is a neuropathy caused by metabolic and microvascular disease due to long-term hyperglycaemia, a common chronic complication of diabetes. The main clinical manifestations are symmetrical feelings of distal limbs, dyskinesia, motor and autonomic dysfunction, weakened muscles, numbness/reduced sensation of limb pain, and muscle atrophy. Prevalence of DPN ranges from 30% to 90% and increases depending on the duration of diabetes.[1] DPN affects both the quality of life and brings severe financial burden to patients. The annual treatment cost of diabetic patients is $ 6,632, and for diabetic patients with DPN, it is twice that.[2]

The pathogenesis of DPN is currently not fully understood. Theoretical studies have outlined several factors which are potentially related to DPN, including oxidative stress caused by free radical generation and defective antioxidant mechanisms, changes in blood vessels supplying peripheral nerves, metabolic and autoimmune diseases which cause glial cell activation, changes in sodium and calcium channel expression, as well as more recent reports of central pain mechanisms including an increase in thalamic blood vessels and an imbalance in the pathway of promotion/inhibition of decline.[3] Western medicine's approach to treatment of DPN mainly focuses on the pathogenesis and on symptomatic treatment. Many drugs are used for treatment, including a-lipoic acid and methyl cobalamin. However, most pharmaceutical treatments are still in the stages of clinical research and development, as they cause severe adverse reactions but non-significant clinical effects. There are still many research questions which have not been answered for this disease, providing an opportunity development and research.[4]

In recent years, evidence has shown that acupuncture treatment, which is low cost and produces few adverse reactions, is effective for treating DPN, and can improve various clinical symptoms.[5,6] Systematic reviews (SRs) are an important factor in clinical practice and decision-making,[7] and are one of the most important sources of evidence to guide clinical decision-making.[8] Low-quality SRs can be misleading to decision makers. Therefore, the SRs of existing acupuncture treatment of DPN have great significance when it comes to the evaluation of DPN, both at home and abroad. No studies have yet addressed the quality of SRs which cover acupuncture treatment of DPN.

In order to further evaluate the safety and effectiveness of DPN, this article will evaluate the clinical efficacy, report quality and methodological quality of related research in order to provide a reference for clinical decision-making, and to promote the popularization and application of acupuncture treatment of DPN.

2 | METHODS

2.1 | Inclusion and exclusion criteria

2.1.1 | Inclusion criteria

Type of study

A systematic assessment/meta-analysis/SR of acupuncture for DPN which has been published, regardless of the research area.

Research subjects

Subjects who meet the diagnostic criteria for DPN, regardless of gender, age, ethnicity, onset time and duration of disease.

Intervention

Treatment group: acupuncture treatment including electroacupuncture, acupoint bloodletting and acupoint injection alone or combined with other treatment methods. Control group: non-acupuncture treatment such as drugs or untreated control. The control group should be consistent with the baseline of the treatment group.

2.1.2 | Exclusion criteria

(1) Duplicated publications, (2) literature not in Chinese/English language, (3) literature comparing two acupuncture methods, (4) literature with incomplete data.

2.2 | Literature retrieval strategies

Systematic reviews addressing acupuncture treatment of DPN were collected from CNKI, VIP, Wanfang Database, Chinese Biomedical Literature Database (CBM), PubMed, Web of Science, and the Cochrane Library databases. Time limits were set from

TABLE 1 PubMed search strategy

#1 Search ((((acupuncture) OR electroacupunture) OR scalp acupuncture) OR warm acupuncture) OR auricular acupuncture
#2 Search (((((diabetes peripheral neuropathy) OR diabetic neuropathy) OR diabetic peripheral nerve disease) OR diabetic peripheral nerve lesion) OR diabetic peripheral neuropathies) OR diabetic peripheral neuropathy
#3 Search (((((systematic assessment) OR system evaluation) OR systematic evaluation) OR systematic review) OR systematical review) OR meta-analysis
#4 #1AND#2AND#3

the construction of the library to 14 February 2020. The keywords were acupuncture, electroacupuncture, scalp acupuncture, warm acupuncture, auricular acupuncture, diabetic peripheral neuropathy, systematic assessment, meta-analysis and systematic review. As an example, PubMed is shown in Table 1.

2.3 | Literature screening and data extraction

The SRs returned from the searches were imported into Endnote and duplicates were removed. The title and abstract were read again for screening, and irrelevant studies that did not meet the inclusion/exclusion criteria were excluded. Data were extracted from the included literature. The data extracted included: author, country, patient age, study type, study size, sample size, treatment group, control group, method evaluation tools, outcome indicators and main conclusions.

2.4 | Evaluation method

This study used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) scale and A MeaSurement Tool to Assess systematic Reviews 2 (AMSTAR2) scale to evaluate the quality of reports and methodology.

2.4.1 | Report quality evaluation tool: PRISMA statement

The PRISMA statement includes 27 items covering 7 aspects. Each item is scored according to the report's degree of compliance. Each item scores 1 point if it meets the requirements or 0 points if 'unreported', for a total of 27 points. Reports with scores of 21–27 are considered relatively to be complete, 15–21 are considered to be defective, and when scores are 15 or lower, the level of information missing is considered relatively serious.[9]

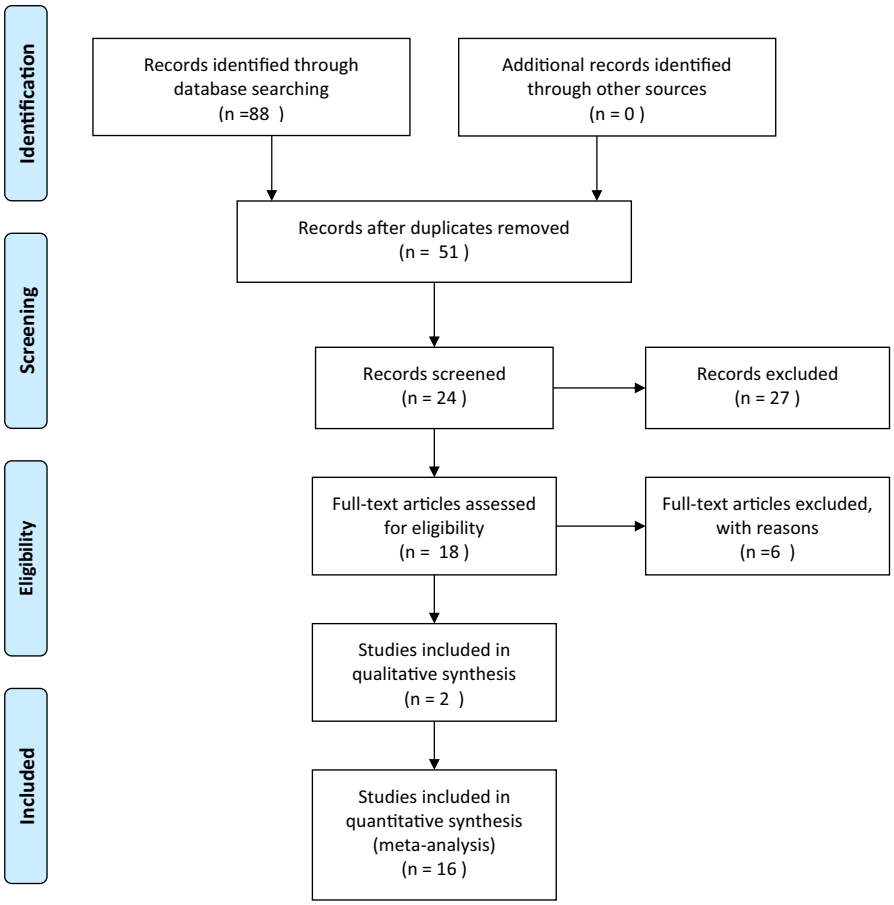

FIGURE 1 Literature selection process [Colour figure can be viewed at wileyonlinelibrary.com]

TABLE 2 Table 1 basic characteristics of the included literature

Included study	Country	Age	Study type	Number of documents	Therapy group
Sun 2019[23]	China		System assessment	2/140	Basic Therapy +Bloodletting
Zhu 2019[13]	China	Unlimited	System assessment	7/580	Basic acupuncture combined with acupuncture
Yang 2014[18]	China		System assessment	16/1141	Acupuncture treatment (including milli-needle and electroacupuncture)
He 2019[17]	China	Unlimited	Meta-analysis, trial sequential analysis	16/1208	Acupuncture(including fire acupuncture and bleeding, electro acupuncture +cupping with acupuncture) +control group
Ma 2019[19]	China	50 ~ 65 years old	Meta-analysis	10/700	Acupuncture, electric acupuncture, warm acupuncture, electronic moxibustion, Chinese medicine fumigation +acupuncture, low frequency pulse of acupuncture
Guo 2014[22]	China	Unlimited	Meta-analysis	5/347	TCM acupuncture, TCM acupuncture +conventional drug treatment
Xv 2016[16]	China	Unlimited	Meta-analysis	7/546	Acupuncture combined with hypoglycemic and nutritional nerves conventionaltreatment

Control group	Methodology evaluation tools	Outcomes	Main conclusion
Basic treatment +Western medicine (methylcobalamin tablets, Micobo)	Jadad quality score	Clinical efficacy	The clinical efficacy of DPN combined with spinal bloodletting on the basis of conventional treatment is better than that of conventional treatment alone, which can better improve the quality of life and prognosis of patients.
Basic treatment	RCT bias risk assessment method	Total effective rate for improvement of clinical symptoms and signs, Nerve conduction velocity (sensory and motor nerves)	Compared with basic therapy, acupuncture combined with basic therapy has a good effect in improving clinical effectiveness and peripheral nerve conduction velocity.
Western medicine treatment (unlimited drug types)	Jadad scale	Total effective rate, peripheral nerve conduction velocity, plasma NO content	Acupuncture is effective in treating diabetic peripheral neuropathy. It improves peripheral nerve conduction velocity, increases plasma NO content, promotes local blood circulation, and improves nerve conduction.
Basic treatment,basic treatment+mecobalamin point injection, basic treatment+mecobalamin tablets orally, basic treatment +mecobalamin intramuscular injection, basic treatment +oral Chinese medicine,basic treatment +oral vitamin and injection, basic treatment +epas Oral, basic treatment+Mudangranules	Improved Jadad scale, Cochrane5.1.0 biasriskassessment tool	Clinical efficacy, signs, symptom score, nerve conduction velocity, Toronto clinical neuropathy score (TCSS)	Acupuncture has a good effect on diabetic peripheral neuropathy, which has a greater advantage than conventional western medicine
Oral Micobo, intramuscular Micobo, oral mecobalamin, oral Neurotrophic drugs, oral+intramuscular vitamin B1, B12	Jadad rating scale	Tibial nerve symptom improvement total effective rate, nerve measurement of conduction velocity (SNCV, MNCV), improvement of clinical symptoms, biochemical indicators	Acupuncture improves tibial nerve conduction velocity in DPN, which has certain advantages over conventional western medicine
Conventional medication		Completely cured: Related symptoms disappear, Fasting blood glucose reaches normal levels; Improve: Relevant symptoms and laboratory tests have improved; Unhealed: No change in symptoms and laboratory tests	Acupuncture treatment is significantly more effective than conventional medications
All are hypoglycemic, nutritional andother drugs Conventional treatment		Motor nerve conduction velocity sensory nerve conduction velocity	Acupuncture can broadly and significantly increase the speed of movement of limbs and sensory nerves in DPN patients, there by improving peripheral nerve function and alleviating persistent pain, numbness and sensory disturbances in the limbs.

(Continues)

TABLE 2 (Continued)

Included study	Country	Age	Study type	Number of documents	Therapy group
Liu 2014[14]	China	Unlimited	System assessment	7/437	Acupuncture, acupuncture, electro acupuncture, warm acupuncture
liu 2016[11]	China	Unlimited	Meta-analysis	10/685	Acupuncture, warm acupuncture, electro acupuncture, combined use of acupuncture, plum acupuncture, chest ankle acupuncture
Li 2015[12]	China	Unlimited	System assessment	18/1158	The treatment group used acupuncture(acupuncture, warm acupuncture,and acupuncture combined with moxibustion). Same group
Cao 2011[15]	China	Unlimited	Meta-analysis	10/696	Basic treatment +electroacupuncture + ear pressure, basic treatment +acupuncture +acupoint injection, acupuncture, basic treatment +a cupuncture,acupuncture+acupo int injection,acupuncture, basic treatment +electroacupuncture, basic treatment+acupuncture
Zhong 2019[20]	China	Unlimited	Meta-analysis	7/528	Electronic moxibustion, acupuncture, electricacupuncture+electronic moxibustion,acupuncture +hyperbaric oxygen, electricacupuncture
Ma 2018[21]	China		Efficacy evaluation, meta-analysis	24/2277	Combination of acupuncture and medicine on the basis of the control group
Jane Nash 2018[24]	Australia	≥18	Systematic review	(Ranged from 7 to 90)	Chinese medicine acupuncture, body acupuncture, ankle acupuncture

Control group	Methodology evaluation tools	Outcomes	Main conclusion
Drug therapy (methylcobalamin, sugar capsules, insulin, Gehuazhi), intramuscular injection of vitamin B1, vitamin B12	PEDro scale Cochrane bias risk assessment GRADE evidence quality assessment	Efficient EMG	Compared with medicine, acupuncture has a good effect in terms of efficiency and improvement of clinical symptoms
Micobo, Nimodipine Tablets +VitaminB1,MicoboInjection VitaminB6Injection,VitaminB1+VitaminB12Injection, Nutritional Neuropharmaceuticals, Conventional Hypoglycemic Agents, Micobo Acupoint Injection, Mecobalamin	Methodological quality evaluation cochrane 5.1.0 Risk assessment of bias	Motor nerve conduction velocity (MNCV) Sensory nerve conduction velocity (SNCV)	Acupuncture treatment of peripheral neuropathy in type 2 diabetic patients improves peroneal nerves in both MNCV and SNCV, and it is superior to the control group without adverse reactions and high safety
Medication or blank control	Cochrane Collaboration bias tool methodological bias risk assessment GRAD Eprofiler version 3.6 evidence quality assessment	Clinical efficacy: total effectiveness, peripheral nerve(including sensory and motor nerve) conduction speed, adverse reactions	Acupuncture treatment(common acupuncture treatment, warm acupuncture or acupuncture combined with moxibustion) was significantly better than the drug control group. Not only can improve the clinical effectiveness, but also significantly improve the peripheral nerve(including median nerve, common peroneal motor and sensory nerve)conduction velocity. No obvious adverse reactions
Basic treatment +mecobalamin, micobalamin, basic treatment +micobalamin, vitamin B1, B6, B12, basic treatment, basic treatment +nimoton + vitamin B1, B12	Jadad quality score	Total effective rate of improvement of symptoms and signs, improvement of motor nerve conduction velocity, improvement of sensory nerve conduction velocity	The current acupuncture treatment is not uniform, the diagnostic criteria and the curative effect criteria Criteria, follow-up time, etc. are inconsistent, and the control groups in each study are different. At the same time, the existing data do notsuggestserious adversereactionsandadverseevents, and there is no assessment of recurrence or quality of life. Insufficient evidence
Oral+intramuscular vitamin injection, intramuscular vitamin injection, oral MICOPRO tablets	Jadad quality score	Total effective rate for improvement of symptoms and signs, improvement of ulnarnerve motor nerve conduction velocity, sensory nerve conduction velocity	Acupuncture can improve ulnar nerve conduction velocity, affirming acupuncture Clinical effect of moxibustion on DPN
Conventional basic treatment	Jadad quality score	Total effective rate, cure rate, apparent efficiency, effective rate, inefficient	Compared with conventional basic treatment, the combination of acupuncture and medicine can significantly improve the total effective rate, cure rate, and significant efficiency of DPN patients, and reduce inefficiency.
Vitamin B, Japanese acupuncture, fake acupuncture, VitaminB12, Japanese Matsumoto Kiko acupuncture, Parksham device	Cochrane bias risk assessment tool NICMA N scale STRICTA project List of integrated reporting standards (CON SORT)	Symptomatic pain	Acupuncture improves symptoms and provides beneficial effects

(Continues)

TABLE 2 (Continued)

Included study	Country	Age	Study type	Number of documents	Therapy group
Alexandra Dimitrova 2017[27]	USA	>18	Systematic review, meta-analysis	4/322	Electroacupuncture, Acupuncture, Electroacupuncture +, Acupuncture+Xuelian Injection,Acupuncture +Vitamin B12
Wang 2018[26]	China		Systematic review	14/1071	Zusanli acupoint injection (the drug isunlimited and the same as the control group)
Suzanne Amato Nesbit 2018[25]	USA		Systematic review	1/45	
Chen 2013[28]	China		Systematic review	25/1649	Artificial acupuncture

2.4.2 | Methodological quality evaluation tool: AMSTAR2 scale

The AMSTAR2 scale contains a total of 16 entries. Each entry is answered either 'yes' or 'no', and some entries can be answered as 'partial yes'. Entries 2, 4, 7, 9, 11, 13, 15 are key entries. If no items are defective or there is only one non-key item which is defective, the methodological quality is high, and the SR conclusion is judged to be accurate and comprehensive. If there is more than one non-key item defect, but there are no key item defects, the methodological quality is judged to be medium. These results indicate that the conclusions of the SR are considered accurate. If a key item is defective, with or without non-critical item defects, the methodological quality is low, and the conclusions of the SR may not be accurate and comprehensive. If there is more than one key item defect, accompanied or not accompanied by non-critical item defects, the methodological quality is extremely low, and the conclusions of the SR are considered inaccurate and incomplete.[10]

After unified training, the two researchers independently conducted quality evaluation and cross-checked the results of the evaluation. If there were objections, they were resolved through discussion or consultation with a third researcher.

3 | RESULTS

3.1 | Literature search results

A total of 88 articles were retrieved using the search strategy, and after 37 duplicate articles were excluded, 51 remained. After reading the topic abstract, a total of 27 articles were excluded, including 11 non-SRs, 1 non-DPN-related study and 2 non-acupuncture-related studies. There were 13 articles which were excluded as they were irrelevant, at which point 24 articles remained. After reading the full text, 6 articles were excluded as they did not meet the inclusion/exclusion criteria, and 18 articles were finally included in the SR.[11–28] The literature screening process is shown in Figure 1.

3.2 | Basic characteristics of the included literature

Among the 18 included articles,[11–28] 13 were in Chinese[11–23] and 5 were in English,[24–28] of which, 3 were from overseas.[24,25,27] Articles were published from 2011 to 2019, with most (5) published in 2019. The number of studies included in each SR was mostly between 7 and 16. The interventions for the treatment group included bloodletting, acupuncture, electroacupuncture, acupoint injection, acupuncture +drug therapy and others. The intervention measures for the control group included basic therapy and drug therapy. Except for two studies which drew no definite conclusions,[15,25] all studies concluded that acupuncture had a significant effect on DPN. Details are shown in Table 2.

3.3 | Report quality evaluation results

The PRISMA statement score of the included literature ranged from 10 to 22, including 3 which were relatively completed, 12 with certain defects, and 3 with serious information missing. The results of the two evaluators were highly consistent (r = 0.888). Details are shown in Table 3.

3.4 | Methodological quality evaluation results

At least two key entries of each article did not meet acceptable standards and their methodological quality was extremely low. The

Control group	Methodology evaluation tools	Outcomes	Main conclusion
Intramuscular injection or intravenous injection of inositol, mecobalamin, vitamin B12 and other drugs	Scientific quality scale for complementary and alternative medicine surveys	Hemorheology, neurological examination, improvement of symptoms, NCV (MNCV), clinical signs score, symptoms score, improvement scale, neurological examination score	Acupuncture is effective for DPN
Intramuscular injection or blank control	Cochrane risk of bias (ROB) tool independent evaluation method	Adverse reactions, NCV, TCSS	Zusanli acupoint injection can reduce pain score in patients with DPN And improve NCV
	Cochrane risk of bias (ROB) tool independent evaluation method	Pain, quality of life	No conclusion
False acupuncture, blank control, other non-acupuncture treatments	CONSORT Statement, STRICTA 2010	Improved symptoms, nerve conduction speed, adverse reactions	Artificial acupuncture has a certain effect on DPN

results of the two evaluators were highly consistent (r = 0.744). Details are shown in Table 4.

3.5 | Main outcome indicators

Most studies currently use clinical efficacy and nerve conduction velocity as the outcome indicators to verify the effectiveness of acupuncture treatment of DPN. We therefore selected 5 main outcome indicators. These are detailed in the subsections below.

3.5.1 | Clinical effectiveness/total effectiveness

Of the 18 articles included, 112 randomized controlled trials (RCTs) used the total clinical efficacy rate as the outcome indicator, including a grand total of 8,378 people. Across studies, interventions were divided into 5 types: acupuncture (6 studies), needling (5 studies), bloodletting on acupuncture points (1 study), warm acupuncture (1 study) and electroacupuncture +acupuncture cupping (1 study). The control measures were divided into 2 types: positive controls (9 studies) and inert controls (5 studies). There were no items with heterogeneity ≥75%, 2 items with heterogeneity <75% and 12 items with heterogeneity <50%. Overall, the studies showed that acupuncture was effective in treating DPN across 13 items, with no difference in 1 item, and no items with invalid results.

3.5.2 | Median nerve sensory conduction velocity

Of the 18 articles included, 31 RCTs used the sensory conduction velocity of the median nerve as the outcome indicator, including a grand total of 2,142 subjects. The interventions were divided into 3 types: acupuncture (4 studies), needling (4 studies) and acupoint injection (1 study). The control measures were divided into 2 types: positive controls (4 studies), and inert controls (5 studies). There was 1 item with heterogeneity ≥75%, 3 items with heterogeneity <75%, and 2 items with heterogeneity <50%. Overall, the studies showed that acupuncture was effective for treating DPN across 9 items, with no items in which there were differences in results or ineffective results.

3.5.3 | Median nerve motor conduction velocity

Of the 18 articles included, 34 RCTs used the motor conduction velocity of the median nerve as the outcome indicator, including a grand total of 2,355 subjects. The interventions were divided into 3 types: acupuncture (5 studies), needling (4 studies) and acupoint injection (1 study). The control measures were divided into 2 types: positive controls (5 studies) and inert controls (5 studies). There were 3 items with heterogeneity ≥75%, 1 item with heterogeneity <75% and 3 items with heterogeneity <50%. Overall, the studies showed that acupuncture is effective for treating DPN across 10 items, with no items in which there were differences in results or ineffective results.

3.5.4 | Common peroneal nerve sensory conduction velocity

Of the 18 articles included, 32 RCTs used the sensory nerve conduction velocity of the common peroneal nerve as the outcome indicator, including a grand total of 2,241 subjects. The interventions were divided into 5 types: acupuncture (5 studies), needling (3 studies), acupoint injection (1 study), electroacupuncture (1 study) and special acupuncture (1 study). The control measures were divided into 2 types: positive controls (9 studies) and inert controls (2 studies). There

TABLE 3 Evaluation results of PRISMA statement

Included studies	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11
Sun 2019	1	0.5	1	0.5	0	0.5	1	1	0	1	1
Zhu 2019	1	0.5	1	0.5	0	1	1	1	1	1	0
Yang 2014	1	0.5 5	1	0.5	0	0.5	1	1	1	1	1
He 2019	1	0.5	1	0.5	0	0.5	1	1	1	1	1
Ma 2019	1	0.5	1	0.5	0	0.5	1	1	1	1	1
Guo 2014	1	0.5	1	0.5	0	0.5	1	1	0	0	0
Xv 2016	1	0.5	1	0.5	0	0.5	1	1	0	0	0
Liu 2014	1	0.5	1	0	0	0.5	1	1	1	1	1
liu 2016	1	0.5 55	1	0.5	0	0.5	1	1	1	1	1
Li 2014	1	0.5	1	0	0	0.5	1	1	1	0	0
Cao 2011	1	0.5	1	0.5	0	0.5	1	1	0	0	0
Zhong 2019	1	0.5	1	0.5	0	0.5	1	1	1	1	1
Ma 2018	1	0.5	1	0	0	0.5	1	0	1	1	0
Jane Nash 2018	1	0.5	1	0.5	0	0.5	1	1	0	1	1
Alexandra Dimitrova 2017	1	0.5	1	0.5	0	0.5	1	1	1	0	0
Wang 2018	1	0.5	1	0.5	0	0.5	1	1	1	1	1
Suzanne Amato Nesbit 2018	1	0.5	1	0.5	0	0	1	0	1	1	0
Chen 2013	1	0.5	1	0.5	1	0.5	1	1	1	1	1

Item 12	Item 13	Item 14	Item 15	Item 16	Item 17	Item 18	Item 19	Item 20	Item 21	Item 22	Item 23	Item 24	Item 25	Item 26	Item 27	Total score
0	1	1	0	0	0	1	0	1	1	0	0	1	1	1	0.5	16
0.5	1	1	0	1	1	1	1	1	1	0	1	1	1	1	0.5	21
0	1	1	1	0	0.5	0	0	1	1	1	0	0.5	1	1	0	17.5
0.5	1	1	1	1	0.5	1	0	1	1	1	0	0	1	0.5	0.5	20
0	1	1	1	0	1	1	0	1	1	1	0	1	1	1	0.5	20
0	1	1	0	0	0.5	0	0	0	1	1	0	0	0	0	0	10
0	1	1	0	0	1	1	0	1	1	0	0	0	1	1	0.5	14
1	1	1	1	1	0.5	1	1	1	1	1	0	1	1	1	0.5	22
0.5	1	1	0	1	0.5	1	1	1	1	1	1	1	1	1	0.5	22
0.5	1	1	0	1	1	1	1	1	1	1	0	1	1	1	0.5	19
0	1	1	1	1	0.5	1	0	1	1	1	0	1	1	1	0	17
0	1	1	0	0	0.5	1	0	1	1	1	0	0	1	1	0.5	17.5
0	1	0	0	0	0.5	1	0	1	1	0	0	1	1	1	0	13.5
0.5	0	0	0	1	1	1	1	0	0	0	0	1	1	0.5	0.5	15
0	0	1	0	0	1	1	0	1	1	0	0	0.5	1	1	1	15
0.5	1	0	0	0	1	1	1	1	1	1	0	0	1	1	1	19
0.5	1	0	0	0	1	1	0	1	1	0	0	1	1	1	1	19.5
0.5	1	1	1	1	1	0	0	1	0	1	1	0	1	1	0.5	20.5

Note: Item 1 title; item 2 structured abstract; item 3 theoretical basis; item 4 introduction purpose; item 5 scheme and registration; item 6 inclusion criteria; item 7 information source; item 8 retrieval; item 9 research selection; item 10 data extraction; Item 11 data item; item 12 single study bias; item 13 effect index; item 14 synthetic results method; item 15 inter-study bias method; item 16 supplementary analysis method; item 17 research screening; item 18 study characteristics; Risks; item 20 individual research results; item 21 synthetic results; item 22 inter-study bias results; item 23 supplementary analysis results; item 24 evidence summary; item 25 limitations; item 26 conclusions; item 27 funding.

TABLE 4 Evaluation results of AMSTAR2 scale

Included studies	Item 1	Item 2*	Item 3	Item 4*	Item 5	Item 6	Item 7*	Item 8	Item 9*	Item 10	Item 11*	Item 12	Item 13*	Item 14	Item 15*	Item 16
Sun 2019	Y	N	N	PY	N	Y	N	N	N	N	N	N	N	Y	N	N
Zhu 2019	Y	N	N	PY	Y	Y	N	PY	Y	N	N	N	N	N	N	N
Yang 2014	Y	N	N	PY	Y	Y	N	PY	N	N	N	N	Y	N	Y	N
He 2019	Y	N	N	PY	Y	Y	N	N	Y	N	N	N	N	N	N	N
Ma 2019	Y	N	N	PY	Y	Y	N	N	N	N	N	N	N	Y	N	N
Guo 2014	Y	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N
Xv 2016	Y	N	N	PY	N	N	N	N	N	N	N	N	N	N	N	N
Liu 2014	Y	N	N	PY	Y	Y	N	N	Y	N	N	N	Y	N	N	N
liu 2016	N	N	N	PY	Y	Y	N	N	Y	N	N	Y	Y	Y	N	N
Li 2014	Y	N	N	PY	Y	Y	N	PY	Y	N	N	N	Y	N	N	N
Cao 2011	Y	N	N	PY	N	N	N	N	N	N	N	N	Y	N	Y	N
Zhong 2019	Y	N	N	PY	Y	Y	N	N	N	N	N	N	N	Y	N	N
Ma 2018	N	N	N	N	Y	Y	N	N	N	N	N	N	Y	N	N	N
Jane Nash 2018	Y	N	N	PY	N	Y	N	PY	Y	N	NO META	NO META	N	N	NO META	Y
Alexandra Dimitrova 2017	Y	N	N	PY	Y	Y	N	N	N	N	N	N	N	Y	N	Y
Wang 2018	Y	N	N	PY	Y	Y	N	N	Y	N	NO META	NO META	N	N	NO META	Y

(Continues)

TABLE 4 (Continued)

Included studies	Item 1	Item 2*	Item 3	Item 4*	Item 5	Item 6	Item 7*	Item 8	Item 9*	Item 10	Item 11*	Item 12	Item 13*	Item 14	Item 15*	Item 16
SuzanneAmato Nesbit 2018	N	N	N	N	Y	Y	N	N	Y	N	NO META	NO META	N	N	NO META	Y
Chen 2013	Y	Y	N	PY	Y	Y	N	N	Y	N	N	N	Y	N	Y	N

*Key item; Y: Yes; N: No; PY: Partially yes; Item 1: do the study questions and inclusion criteria include PICO? Item 2: Are there pre-published plans? Is there a clear bias between research and programmes? Item 3: Did the author explain the type of study design included? Item 4: Are comprehensive literature retrieval strategies used? Item 5: Were repeated studies screened? Item 6: Do you perform repeated data extraction? Item 7:Do you provide a list of excluded documents and explain why? Item 8: Are the included studies described in detail? Item 9: Were reasonable tools used to assess the risk of bias for each included study? Item 10: Are the funding sources included in the study reported? Item 11: If a meta-analysis is performed, are the results statistically combined using appropriate methods? Item 12: If a meta-analysis is performed, is the impact of bias risk explained in the results? Item 13: If a meta-analysis was performed, is the discussion explaining the effect of the risk of bias? Item 14: Is there a reasonable explanation for heterogeneity in the discussion? Item 15: If quantitative analysis is performed, are publication biases sufficiently investigated and their possible impacts discussed? Item 16: Are there any potential sources of conflicts of interest reported?

was 1 item with heterogeneity ≥75%, 2 items with heterogeneity <75% and 5 items with heterogeneity <50%. Overall, studies showed that acupuncture was effective for treating DPN across 11 items, with no items in which there were differences in results or ineffective results.

3.5.5 | Common peroneal nerve motor conduction velocity

Of the 18 articles included, 36 RCTs used the motor nerve conduction velocity of the common peroneal nerve as the outcome indicator, including a grand total of 2,338 subjects. The interventions were divided into 6 types: acupuncture (4 studies), acupuncture (4 studies), acupoint injection (1 study), electroacupuncture (1 study), special acupuncture (1 study) and warm acupuncture (1 study). There were 2 control measures: positive controls (10 studies) and inert controls (2 studies). There was 1 item with heterogeneity ≥75%, 2 items with heterogeneity <75% and 4 items with heterogeneity <50%. Overall, the studies showed that acupuncture is effective for treating DPN across 12 items, with no items in which there were differences in results or ineffective results.

4 | DISCUSSION

Systematic reviews constitute the highest quality in the hierarchy of evidence and are being used with increasing frequency as a reference for evidence-based decision-making.[29] As the quantity of research in to acupuncture increases, systematic evaluation of its efficacy is becoming increasingly more important for clinical decision-making. However, low quality of the methodologies and flaws in the reports affect the validity of conclusions. This study is the first to evaluate the literature using a systematic evaluation method in order to report the quality of acupuncture treatment for DPN, with the goal of providing useful suggestions for future researchers. The results of this study indicate that the methodological quality of the included literature is extremely low, and most of the literature reports have certain deficiencies. These deficiencies affect the conclusions of SRs and serve as an indicator that we need to improve the quality of SRs in future research.

It is crucial that the methodology and report quality are recorded thoroughly in SRs. The literature included in this study had different degrees of deficiency in the information presented. Registering SRs can reduce this issue for SRs covering the same topic, and improves transparency and credibility when updating.[30] It is also crucial that the plan or registration information is reported completely. However, currently, most documents do not report this. Also, caution should be exercised when using results from literature which has conflicts of interest. If interest is not taken into account when interpreting reports, results may appear exaggerated compared with the reality.[30] This can be avoided if reviewers report the sources of funds in the future in order to reduce bias.[31] The documents included in the

current study did not provide preliminary plans, did not search the trial registration website and related grey literature, did not provide lists of documents excluded in the screening process, did not provide complete descriptions of the included studies and did not declare whether there were conflicts of interest. These problems may lead to omissions in screening, incomplete inclusion of the research, increased risk of bias in the research, publication bias and heterogeneity, which are all factors which heavily impact the research results. One particular problem with the included literature was that it did not explain the sources of heterogeneity or discuss its impact on the results, which affects the rigour of SRs as a basis for diagnosis and treatment.[32] Due to the lack of SRs of related studies prior to evaluation, and of methodological quality of SRs apparent in current study, there is insufficient evidence to explain the efficacy of acupuncture treatment. In the future, more efforts are needed to improve the quality of SRs which cover acupuncture treatment for DPN.

Although the PRISMA statement has a wide scope of applications and its use has greatly improved the quality of clinical research reports, it does not accurately capture every problem.[33] The AMSTAR2 scale, which was revised by AMSTAR in 2017, is designed to assess methodological quality.[10] The new version is more rigorous and comprehensive. However, half of the literature included in the current study was published before 2017, and the quality of the methodology of the studies is low. In the future, researchers should follow the new evaluation criteria.

Acupuncture is increasing in popularity across the world. In recent years, a large number of studies have shown that acupuncture certainly has some effect on DPN.[34,35] The clinical efficacy and nerve conduction velocity data assessed in the current study show improvements in these measures for DPN with acupuncture treatment. However, among the included studies, two demonstrated that the evidence was insufficient to support the validity of the results. The literature included in this study lacked acupuncture treatment programs, and the follow-up time was inconsistent. There were no reported issues relating to recurrence or quality of life, and most studies did not report whether there were serious adverse reactions or adverse events. Thus, it is still not clear whether adverse reactions actually occurred. Subsequent questions and doubts will reduce the credibility of conclusions. It is recommended that future clinically controlled trials based on traditional Chinese medicine theory are carefully designed to prove the effectiveness of acupuncture for the treatment of DPN.

Various methodological tools and reporting guidelines are currently available.[36] AMSTAR2 is considered to have high reliability and practicality, and can be used to evaluate SRs of intervention trials including both RCTs and non-RCTs.[37] PRISMA stated that it will revise and summarize based on QUOROM to further help authors improve the writing and reporting of SRs/meta-analyses. We are aware of 16 projects utilizing AMSTAR 2 and 27 projects utilizing PRISMA, some of which are complementary to each other. PRISMA emphasizes the structure of SRs, while AMSTAR 2 is more specific to the details of the original research studies included in SRs. For example, item 27 in the PRISMA statement emphasizes the source of funding and other support for SRs, while AMSTAR 2 emphasizes the source of funding in the original study. Both quality indicators consider potential conflicts of interest, but only AMSTAR 2 specifically clarifies whether there is a conflict of interest. Therefore, we believe that the combined use of the two can be used for a comprehensive assessment of the quality of SRs.

We used a rigorous method to conduct research, but this study still has certain limitations: (1) limitations in the search strategy may have result in studies being missed or publication bias; (2) this study assigns each item of the PRISMA statement a value of '1', but the weight of each item in the evaluation may not be equal, which could cause potential bias; (3) due to differences in acupoint selection, manipulation and treatment frequency, there may have been clinical heterogeneity which affected the accuracy of the results; (4) the intervention measures included in the study were complex, which may affect clinical application; (5) some subjectivity may remain in the evaluation process despite the establishment of objective criteria based on relevant literature evaluation; (6) the results of the study have provided a reference for the clinical application of acupuncture therapy for DPN, but the credibility of the evidence needs to be considered, and reference should be taken with caution.

5 | WHAT IS NEW AND CONCLUSION

Acupuncture appears to have an effect on DPN, effectively improving nerve conduction and clinical symptoms. Although the methodological quality of the included studies was generally very low and defects were frequent, our study highlights areas where improvement in methodology is required. There is a need for further study of the pathogenesis of DPN, and for developing a unified standard for methods of acupuncture treatment, acupoint selection and adverse reactions reporting. Traditional Chinese medical practices such as acupuncture should adopt an evidence-based approach to provide greater confidence in their use.

CONFLICT OF INTEREST

All authors report that they have no conflicts of interests.

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