Specification of Interventions and Selection of Control in Acupuncture Randomized Controlled Trials: A Cross-Sectional Study

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Research

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Abstract

Background: Specification of interventions and selection of control are two methodological determinants for a successful acupuncture trial. However, it is not fully understood about the current practice of these two determinants. We thus conduced a cross-sectional study to examine specification of interventions and selection of control among current acupuncture randomized controlled trials (RCTs).

Methods: We searched PubMed for acupuncture RCTs published in the core clinical journals and complementary and alternative medicine (CAM) journals from January 2010 to December 2019 (10 years), and included RCTs that assessed treatment effects of acupuncture versus any type of control. Teams of methods-trained investigators who had experiences in acupuncture trials independently screened reports for eligibility and collected data, using a prespecified standardized questionnaire. We used network meta-analyses to investigate whether treatment effect was differential in patients with chronic pain when using sham acupuncture as a control versus using waiting-list or no treatment.

Results: Of 319 eligible RCTs, most well specified style of acupuncture (86.8%), acupoint prescription (96.2%), type of needle stimulation (90.3%) and needle retention time (85.6%). However, other acupuncture details were less specified, including achievement of response sought (65.5%) and needle manipulation (50.5%), specification of number of needle insertions (21.9%), angle and direction of insertion (31.3%), patients posture (32.3%) and co-interventions (22.9%). Sham acupuncture (41.4%) was the most frequently used control, followed by waiting-list or no treatment (32.9%). There was no differential treatment effect when using sham acupuncture versus waiting-list/no treatment as a control (SMD = -0.15, 95% CI -0.91 to 0.62).

Conclusions: Over a decade of research practice, important gaps remained in the specification of acupuncture interventions, including specification of response sought, needle manipulation, and co-interventions. While sham acupuncture was largely used, waiting-list or no treatment may also be used as an appropriate control.

Background

As a complementary and alternative therapy, acupuncture has been widely accepted and used in 103 World Health Organization (WHO) member states [1-5]. Randomized controlled trials (RCTs) are the best evidence about the treatment effects of acupuncture. While an increasing number of acupuncture trials have been published in the past decades [6], their methodological rigors – thus the resulting evidence – are often challenged [7, 8]. Among the nominated concerns, specification of interventions and selection of control are the two major methodological issues that have profound impact on the validity and applicability of acupuncture trials [9, 10].

As a complex intervention, the effect of acupuncture is largely affected by design and implementation of interventions, and specification of interventions is a key determinant for a successful acupuncture trial [11-13]. However, these methodological details were not well attended in acupuncture trials. For

example, a survey published in 2009 found that only 10.5% of acupuncture trials in top medical journals fully specified acupuncture interventions [14]. Two subsequent surveys also showed incomplete specification of interventions in Korean acupuncture trials [15] and trials for migraine [16]. Up to now, it is not fully understood about how current acupuncture trials specify interventions, and the extent to which the methodological specifications of these trials are met with the established standards (e.g., revised STandards for Reporting Interventions in Clinical Trials of Acupuncture (STRICTA)) [17].

Due to the nature of complex intervention, a valid control in acupuncture trials should minimize placebo effect and nonspecific effect [18, 19], and the resulting effect would be attributable to the underlying true effect of acupuncture intervention [20]. In 1997, the NIH proposed to use sham or placebo acupuncture as a control to eliminate the placebo effect [1]. However, controversies continue as to the appropriate choice of control in acupuncture trials. For instance, there has a debate over the choice of appropriate sham acupuncture in trials on pain, as sham acupuncture (such as shallow needling) might have a certain therapeutic effect [20, 21].

A comprehensive and systematic survey of trials would enable effective identification of methodological limitations of current acupuncture trials and inform methodological improvement. Therefore, we conducted a cross-sectional study of acupuncture trials published in the last 10 years to investigate how acupuncture trials specify interventions and choose control. We also investigated whether there was a differential effect in trials using sham acupuncture versus waiting-list or no treatment.

Methods

Eligibility criteria

We included a study if it was an RCT, assessed the effects of acupuncture (i.e., manual or electrical needle stimulation) versus any type of control treatment, examined efficacy/effectiveness with or without safety outcomes, and was a main study report. We excluded trial protocols, pilot trials, or RCTs reported as a research letter.

Literature search

We searched PubMed to identify reports of acupuncture RCTs published in the core clinical journals as well as in complementary and alternative medicine (CAM) journals from January 2010 to December 2019 (10 years). The core clinical journals, previously known as the *Abridged Index Medicus*, were defined by the US National Library of Medicine, and included 118 journals published in English in 2020, covering all specialties of clinical medicine and public health sciences [22]. CAM journals were defined by the SCImago Journal & Country Rank (SJR) website, and comprised 55 journals indexed in Web of Science in 2019 [23]. We used MeSH and free texts terms related to acupuncture, RCT and journals to search for potentially eligible studies, and one experienced investigator (JL) developed the search strategy with reference to a previous related study [24] (Appendix 1).

Study process

Two paired methods-trained researchers, who had experiences in acupuncture trials, used pilot-tested, standardized forms, together with detailed written instructions to screen abstracts and full texts for eligibility, and to abstract data from eligible studies independently and in duplicate. Disagreements were resolved through discussion or, if needed, adjudication by a third researcher (JL or LL).

Data collection

To assess implementation of interventions and selection of control among acupuncture RCTs, we developed a questionnaire to collect data from included trials. The original version was developed by three experienced authors (JL, LL and XS) with reference to revised STRICTA [17] and previous methodological studies [25-27]. Then our study group piloted the questionnaire, and convened to discuss the appropriateness and applicability of included items. After further revising the questionnaire, we conducted the second pilot and addressed discrepancies through group discussion. Based on the piloted questionnaire, we collected the following information from eligible trials:

1) ***General characteristics***: year of publication, journal type, hypothesis of the trial, type of design, international trial, center involved, country of trial conducted, sample size, length of follow-up, number of authors, methodologists involved, source of funding, study setting, participants recruitment, trial registered, protocol provided, exclusion of patients with acupuncture experience, and Traditional Chinese Medicine (TCM) diagnosis reported.

We judged that a trial involved a methodologist if any author declared an affiliation with a department of epidemiology, statistics, or evidence-based medicine, or if a methodologist was listed in the acknowledgement section.

2) ***Acupuncture rationale***:style of acupuncture specified, style of acupuncture, acupoint prescription, reasoning for acupuncture treatment, rationale for acupoint selection, and standards of acupoint positioning.

3) ***Acupuncture details:*** we collected details of needling, treatment regimen, other components of treatment, and practitioner background from eligible trials. Details of needling included needle stimulation, number of needle insertions per subject per session, names of points used, response sought, etc. Treatment regimen included total number of treatment sessions, actual number of treatment sessions specified, incomplete treatment sessions specified, frequency of treatment sessions, duration of treatment sessions, etc. Other components of treatment includeddetails of other interventions administered to the acupuncture group, and setting and context of treatment (i.e., instructions to practitioners, and information and explanations to patients). Practitioner background included description of participating acupuncturists (qualification or professional affiliation, years in acupuncture practice, other relevant experience).

4) ***Control selection and rationale:*** type of control, rationale for the control selection, precise description of the control, and details of sham acupuncture (e.g., sham acupoints, shallow needling, blunt needle device).

5) ***Main effect of pain outcome in trials of acupuncture for chronic pain:*** name of pain outcome, instrument used to measure the pain intensity, mean and standard deviation (SD) of changes form baseline in pain intensity, and number of patients included for analyses in each treatment group. If mean and SD of changes form baseline of pain intensity were not available, we collected mean and SD at baseline and last follow up.

One pain outcome was selected in each trial of acupuncture for chronic pain. If the primary outcome of a trial was pain intensity, we selected it as the primary pain outcome for our analyses; Otherwise, we selected the first reported pain intensity outcome from secondary outcomes for our analyses. If a trial did not clearly specify the primary or secondary outcomes, we selected one outcome according to our previously published strategy [27, 28].

Statistical analysis

We conducted descriptive analyses of study characteristics, rationale and details of acupuncture interventions and control selection of included trials. For all descriptive analyses, we used frequencies (and percentages) for dichotomous variables, and mean (and SD) or median (and range) for continuous variables. We used Chi-Square test or Fisher's exact test to compare characteristics, interventions implementation, and control selection of trials published in core clinical journals and CAM journals for dichotomous variables, and t-test for continuous variables when the distribution was normal or Mann Whitney U test otherwise. We used R software (version 3.6.3) for data analysis, and a P value of 0.05 or less than 0.05 were considered statistically significant.

As most included trial assessing the effects of acupuncture for chronic pain, we conducted network meta-analyses to investigate whether there was a differential effect between sham acupuncture and waiting-list/no treatment groups in patients with chronic pain. We also conducted two separate analyses by type of sham acupuncture (i.e., non-penetrating vs. penetrating) to explore whether non-penetrating or penetrating sham acupuncture had differential effect. The primary outcome was changes form baseline of pain intensity measured by scales such as 10-cm Visual Analog Scale (VAS), and an 11-cm point numeric rating scale (NRS). For trials that did not report changes form baseline in pain intensity, we calculated the mean change from baseline and imputed its SD according to approaches described in Cochrane handbook[29]**.** We conducted frequentist pairwise, indirect and network meta-analyses using a random-effects model by inverse variance method, with standardized mean difference (SMD) and corresponding 95% confidence intervals. We used node splitting method to check for consistency of direct and indirect evidence in our network.

Results

Our search yielded 1850 potentially relevant reports. After screening full text reports 319 RCTs proved eligible, including 51 trials published in core clinical journals and 268 trials in CAM journals (Figure 1).

Table 1 summarized the general characteristics of included trials. Among these 319 trials, the median sample size was 72 (range 10 to 1075), and the median follow-up was 8 weeks (range 0 to 104). Only four were international trials, and 72 (22.6%) were multi-center trials. About half of trials were conducted in China (n=170, 53.3%); 39 (12.2%) trials explicitly excluded patients with any acupuncture experience. Only 26 (39.5%) clearly specified trial registration, and 27 (8.5%) provided study protocols. Compared with trials published in CAM journals, those in core clinical journals included more patients (median 116 vs. 66, P□0.001), had a longer follow up (median 16 vs. 8 weeks, P=0.001). Those trials were also more likely to perform trial registration (76.5% vs. 32.5%, P□0.001) and provide protocol (31.4% vs. 4.1%, P□0.001).

3.1 Specification of acupuncture interventions

Table 2 described the specification of acupuncture rationale. Of these 319 trials, 277 (86.8%) specified style of acupuncture, among which the most used style was TCM acupuncture (85.9%); n=294 (92.2%) provided the reasoning for acupuncture; 307 (96.2%) provided acupoint prescription, among which 71.3% used standardized prescriptions and the rest were either partially or fully individualized prescriptions; 215 (67.4%) stated the rationale for acupoint selection, among which 80.0% was based on TCM theory or evolution of patient symptoms. All included trials specified acupoint positioning standards.

Table 3a described the details of needling. Most trials specified the type of needle stimulation (n=288, 90.3%), names of points (n=297, 93.1%) and needle type (e.g., diameter, length) (n=266, 83.4%). Nearly two-thirds of trials (n=209, 65.5%) stated response sought, among which 82.8% was *de qi* sensation. More than half mentioned depth of insertion (n=195, 61.1%) and needle manipulation (n=161, 50.5%). 273 trials (85.6%) reported needle retention time, with a median of 30 minutes. However, only 70 trials (21.9%) specified number of needle insertions, and 100 trials (31.3%) described angle and direction of insertion.

Table 3b summarized the treatment regimen. Most trials (n=270, 84.6%) specified the total number, frequency (n=246, 77.1%) and duration (n=260, 81.5%) of treatment sessions. However, less than a third of trials mentioned patients posture (n=103, 32.3%), disinfection (n=90, 28.2%), and actual number of treatment sessions participants received (n=42, 13.2%).

Table 3c reported co-interventions and contextual information. Most trials (n=232, 72.7%) specified setting and context of treatments (i.e., instructions to practitioners, and information and explanations to patients), and more than half of trials (n=183, 57.4%) mentioned details of participating acupuncturists. Only 73 trials (22.9%) stated the details of co-interventions.

Compared with trials published in CAM journals, more trials published in core clinical journals provided reasoning for acupuncture treatment (100% vs. 90.7%, P=0.02), had a longer duration of treatment sessions (median 8 vs. 4 weeks, P=0.003), and were more likely to specify needle stimulation (98.0% vs.

88.8%, P=0.04), needle manipulation (64.7% vs. 48.1%, P=0.03), response sought (82.4% vs. 62.3%, P=0.006), and details of participating acupuncturists (76.5% vs. 53.7%, P=0.003). No difference was found in specifying rationale for acupoint selection (78.4% vs. 65.3%, P=0.067) (Tables 2 and 3).

Selection and specification of control

Among those 319 trials, 222 (69.6%) included one control group, and 97 (30.4%) included multiple control groups among which 14 used both sham acupuncture and waiting-list/no treatment controls. In general, sham acupuncture (41.4%) was the most frequently used control, followed by waiting-list/no treatment (32.9%). 142 trials (44.5%) specified the rationale for the choice of control and justified the choice (Table 4). No difference in the specification of control was found between core clinical journals versus CMA journals.

Among the 132 trials with sham acupuncture control, 130 (98.5%) described the specific type of sham acupuncture, of which 74 (56.9%) were invasive (penetrating the skin) and 56 (43.1%) were non-invasive (non-penetrating). Sham points (n=70, 53.8%) were the most frequently used type of sham acupuncture, followed by non-penetrating sham needle (n=44, 33.8%) and shallow needling (n=43, 33.1%) (Figure 2). Details about sham manual and electrical acupuncture were shown in Appendix 2 and Appendix 3.

Choice of sham acupuncture versus waiting-list/no treatment as a control

We included 28 randomized controlled trials that used either sham acupuncture or waiting-list/no treatment as a control to assess the effects of acupuncture for chronic pain, involving a total of 2,431 patients. Network meta-analysis showed no differential effect between sham acupuncture and waiting-list/no treatment groups in patients with chronic pain (SMD = -0.15, 95% CI -0.91 to 0.62), while there were statistical differences between acupuncture vs. sham acupuncture (SMD=1.46, 95%CI 0.92 to 2.06), as well as acupuncture vs. waiting-list/no treatment (SMD=1.34, 95%CI 0.80 to 1.89) (Figure 3). No differential effects were found in non-penetrating sham acupuncture (SMD=0.2, 95% CI -064 to 1.04) and penetrating sham acupuncture (SMD=-0.60, 95% CI 1.64 to 0.43) compared to waiting-list/no treatment (Appendix 4 and Appendix 5).

Discussion

Main findings and interpretations

In this systematic survey of acupuncture trials, we found that most trials clearly specified style of acupuncture, acupoint prescription, type of needle stimulation, needle retention time, frequency and duration of treatment sessions. However, other acupuncture details were less specified, including achievement of response sought and needle manipulation, specification of number of needle insertions, angle and direction of insertion, and co-interventions, which should be given more emphasis. We also found that, only 24.8% trials involved methodologists, and 39.5% clearly specified trial registration, which also highlighted important areas for improved planning and conduct of acupuncture trials.

Most included acupuncture trials used TCM acupuncture, and nearly half of included trials were conducted in foreign countries, which indicated that acupuncture is gradually accepted in other countries recently. We also found that 71.3% acupuncture trials used standardized acupoint prescription, and only 18.2% used partially individualized acupoint prescription (i.e., fixed acupoint combined with acupoint selected by syndrome differentiation), which might not fully reflect the feature of TCM interventions (i.e., treatment based on syndrome differentiation), and thus other epidemiological design such as pragmatic randomized controlled trials can be used to increase consideration of TCM features [30, 31].

Moreover, we found that trials published in core clinical journals were superior to trials published in CAM journals in terms of certain acupuncture details (such as needle manipulation, response sought, and participating acupuncturists), suggesting that editors in CAM journals should consider requiring acupuncture trials authors to adhere to the STRICTA checklist regarding the reporting of acupuncture interventions.

In addition, our findings showed no differential effect between sham acupuncture and waiting-list/no treatment for chronic pain, which was consistent with findings from one previous study, including 202 placebo controlled trials with 16566 patients and showing no clinical effects of placebo interventions [32]. However, criticism of acupuncture sham control has existed for decades because sham acupuncture is not physiologically inert [33]. There were several kinds of sham acupuncture procedures, thus the effects of different sham acupuncture (e.g., non-penetrating vs. penetrating sham acupuncture) may differ [34]. Unfortunately, our study did not find significant differences due to limited number of included studies and lack of direct evidence. While a recent network meta-analysis [35], including eight trials, showed that shallow needling (one kind of penetrating sham acupuncture) was more effective than non-penetrating sham needle (SMD -7.27, 95%CI-9.11 to -5.43). Therefore, future studies identifying more studies will be necessary to definitively establish or refute possible differences in the effect of sham acupuncture versus waiting-list/no treatment, as well as differences in the effect of different sham acupuncture.

Suggestions for conducting acupuncture trials

As acupuncture is a complex intervention, acupuncture trials require more involvement of methodologists. Acupuncture trials authors should consider to adhere to the STRICTA checklist to carefully plan and report acupuncture rationale and details, such as response sought, needle manipulation, angle and direction of insertion, and co-interventions.

As we did not find differential effect between sham acupuncture and waiting-list/no treatment for chronic pain, and a previous RCT also showed that a non-penetrating sham needle could successfully blind participants and might be a credible sham control [36], acupuncture trialists should chose an appropriate control according to aims of a study, e.g, a waiting-list/no treatment control selected for aim of controlling the effect of disease natural progression (i.e, natural history, regression to mean), and a non-penetrating sham acupuncture (i.e., non-penetrating sham needle) control selected for aim of eliminating

the non-specific effects of needling, which is particularly for studying of pain-related symptoms/disorders [2].

Strengths and limitations

Our study has several strengths. We used rigorous methods for searching, selecting, and collecting data from eligible trials. Further, our survey included 319 trials from 2010 to 2019 (10 yeas) with a large sample size and relatively good representative. Thirdly, we examined methodological safeguards of acupuncture interventions and control selection reported by acupuncture trials published in core clinical journals and CAM journals systematically.

Our study also has limitations. Firstly, our survey is based on reporting. Authors of acupuncture trials might have pursued rigorous approaches for specification of interventions and selection of control, but they are not explicitly reported in the full text, which may influence our judgment. Secondly, we included a relatively small number of trials to assess the effect sham acupuncture, and although we used standardized mean differences to combine pain intensity data from different chronic pain diseases, heterogeneity between studies may remain due to different chronic pain mechanisms and clinical settings, which may compromise findings from our study.

Conclusions

Over a decade of research practice, important gaps remained in the specification of acupuncture interventions, including achievement of response sought and needle manipulation, specification of number of needle insertions, angle and direction of insertion and co-interventions. We did not find differential effect between sham acupuncture and waiting-list/no treatment for chronic pain. While sham acupuncture was largely used, waiting list or no treatment may also be used as an appropriate control.

Declarations

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Authors' contributions

XS conceived the study. XS acquired the funding. JL, LL and XS had full access to all of the data in the study, and take responsibility for the integrity of the data and the accuracy of the data analysis. JL, ZL, KD, YL, and YM conducted the literature searches and extracted the data. JL, LL and XS conducted the analysis and interpreted the data. LL, JL and XS drafted the manuscript. XS, LL, JWB, BM, XZ, XL, and KZ critically revised the manuscript. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interests.

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Availability of data and materials

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

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Tables

Table 1 General characteristics of included trials

Characteristics	Total (n=319, %)	Core clinical journals (n=51, %)	CAM journals (n=268, %)	P value
Study hypothesis				0.001*
Equivalence	5 (1.5)	3 (5.9)	2 (0.7)	
Superiority	52 (16.3)	17 (33.3)	35 (13.1)	
Non-inferiority	4 (1.3)	2 (3.9)	2 (0.7)	
Not specified	258 (80.9)	29 (56.9)	229 (85.4)	
Type of design				0.264*
Parallel	308 (96.5)	50 (98)	258 (96.3)	
Cross-over	8 (2.5)	0 (0)	8 (3.0)	
Factorial	3 (0.9)	1 (2.0)	2 (0.7)	
International trial	4 (1.3)	2 (3.9)	2 (0.7)	0.122*
Center involved				
Single center	198 (62.1)	26 (51.0)	172 (64.2)	
Multicenter	72 (22.6)	24 (47.0)	48 (17.9)	
Not specified	49 (15.4)	1 (2.0)	48 (17.9)	
Country of trial conducted				0.242
China	170 (53.3)	31 (60.8)	139 (51.9)	
Other countries	149 (46.7)	20 (39.2)	129 (48.1)	
Sample size#	72 (10-1075)	116 (35-1075)	66 (10-640)	0.001#
Length of follow-up#	8 (0-104)	16 (0-104)	8(0-96)	0.001
≤8 weeks	142 (44.5)	14 (27.5)	128 (47.8)	

> 8 weeks	129 (40.4)	33 (64.7)	96 (35.8)	
Not specified	48 (15.1)	4 (7.8)	44 (16.4)	
Number of authors[#]	6 (1-35)	8 (3-35)	6 (1-23)	0.001[#]
Methodologists involved	79 (24.8)	21 (41.2)	58 (21.6)	0.003
Source of funding				0.002[*]
Non-profit funding	204 (63.9)	42 (82.4)	162 (60.4)	
For profit funding	4 (1.3)	0 (0)	4 (1.5)	
No funding	16 (5.0)	4 (7.8)	12 (4.5)	
Not reported	95 (29.7)	5 (9.8)	90 (33.6)	
Study setting				0.002[*]
Hospital	229 (71.8)	45 (88.2)	184 (68.7)	
Community/primary care/private clinic	32 (10.0)	4 (7.9)	28 (10.4)	
Others	15 (4.7)	2 (3.9)	13 (4.9)	
Not specified	43 (13.5)	0	43 (16.0)	
Patient recruitment[&] **(n=88)**				0.751[*]
Poster/brochures	36 (40.9)	10 (47.6)	26 (38.8)	
Social media	43 (48.9)	14 (66.7)	29 (43.3)	
Text messaging/ mailing/telephone	14 (15.9)	4 (19)	10 (14.9)	
Presentation by researcher	7 (8)	2 (9.5)	5 (7.5)	
Doctor recommended	31 (35.2)	6 (28.6)	25 (37.3)	
Other	4 (4.5)	0 (0)	4 (6)	

Trial registered	126 (39.5)	39 (76.5)	87 (32.5)	0.001
Protocol provided	27 (8.5)	16 (31.4)	11 (4.1)	0.001*
Excluded patients with acupuncture experience				0.001
Yes, excluded patients with any acupuncture experience	39 (12.2)	10 (19.6)	29 (10.8)	
Yes, excluded patients with acupuncture experience in a defined duration	45 (14.1)	14 (27.5)	31 (11.6)	
No/not specified	235 (73.7)	27 (52.9)	208 (77.6)	
TCM diagnosis reported	29 (9.1)	2 (3.9)	27 (10.1)	0.194*

*Fisher's exact test; others are Pearson's chi-squared test. # Values are median (range) and P value are from Mann-Whitney U test. & Twenty-eight trials used two approaches, eight trials used three approaches and one trial used four approaches to recruit participants.

Table 2 Acupuncture rationale of included trials

Characteristics	Total (n=319, %)	Core clinical journals (n=51, %)	CAM journals (n=268, %)	P value
Style of acupuncture specified	277 (86.8)	48 (94.1)	229 (85.4)	0.093
Style of acupuncture (n=277)[#]				
TCM acupuncture	238 (85.9)	38 (79.2)	200 (87.3)	
Japanese acupuncture	2 (0.7)	0 (0)	2 (0.9)	
Korean acupuncture	8 (2.9)	0 (0)	8 (3.5)	
Western medicine acupuncture	32 (11.6)	22 (45.8)	10 (4.4)	
Reasoning for acupuncture provided	294 (92.2)	51 (100.0)	243 (90.7)	0.02*
Reasoning for acupuncture (n=294)[&]				
Historical context	33 (11.2)	6 (11.8)	27 (11.1)	
Literature sources	282 (95.9)	47 (92.2)	235 (96.7)	
Consensus methods	22 (7.5)	11 (21.6)	11 (4.5)	
Other	11 (3.7)	4 (7.8)	7 (2.9)	
Acupoint prescription provided	307 (96.2)	50 (98)	257 (95.9)	0.699*
Acupoint prescription (n=307)				
Standardized acupoint prescription	219 (71.3)	32 (64)	187 (72.8)	
Partially individualized prescription	56 (18.2)	8 (16)	48 (18.7)	
Fully individualized prescription	32 (10.5)	10 (20)	22 (8.7)	
Rationale for acupoint selection provided	215 (67.4)	40 (78.4)	175 (65.3)	0.067
Rationale for acupoint selection (n=215)[$]				
Literature reports/ meta-analysis	53	10 (25)	43 (24.6)	

	(24.7)			
Clinical experience/expert consensus	24 (11.2)	8 (20)	16 (9.1)	
TCM theory/evolution of patient symptoms	172 (80.0)	31 (77.5)	141 (80.6)	
Modern medicine theory	13 (6.0)	2 (5.0)	11 (6.3)	
Standards of acupoint positioning				0.028*
Chinese standard (i.e. GB 12346-90)	275 (86.2)	38 (74.5)	237 (88.4)	
WHO standard acupuncture locations	12 (3.8)	3 (5.9)	9 (3.4)	
Myofascial trigger points	32 (10)	10 (19.6)	22 (8.2)	

*Fisher's exact test; others are Pearson's chi-squared test. # Three trials used two styles of acupuncture. &Forty-four trials used two reasons for acupuncture treatment, and five trials used three reasons for acupuncture treatment. $Forty-four trials specified two rationales for acupoint selection, and five trials specified three rationales for acupoint selection.

Table 3 Acupuncture details of included trials

Characteristics	Total (n=319, %)	Core clinical journals (n=51, %)	CAM journals (n=268, %)	P value
Table 3a: Details of needling				
Needle stimulation specified	288 (90.3)	50 (98.0)	238 (88.8)	0.04*
Needle stimulation (n=288)				0.23
Manual needle stimulation	174 (60.4)	30 (60)	144 (60.5)	
Electrical needle stimulation	48 (16.7)	5 (10)	43 (18.1)	
Both Manual and electrical needle stimulation	66 (22.9)	15 (30)	51 (21.4)	
Number of needle insertions specified	70 (21.9)	12 (23.5)	58 (21.6)	0.765
Names of points used provided	297 (93.1)	47 (92.2)	250 (93.3)	0.764*
Needle unilateral/bilateral mentioned	177 (55.5)	31 (60.8)	146 (54.5)	0.406
Depth of insertion specified	195 (61.1)	33 (64.7)	162 (60.4)	0.567
Angle and direction of insertion described	100 (31.3)	15 (29.4)	85 (31.7)	0.745
Response sought stated	209 (65.5)	42 (82.4)	167 (62.3)	0.006
Response sought (n=209)				0.044*
de qi sensation	173 (82.8)	32 (76.2)	140 (83.8)	
Muscle twitch/contraction response	15 (7.2)	7 (16.7)	8 (4.8)	
Other	21 (10)	3 (7.1)	18 (10.8)	
Needle manipulation specified	161 (50.5)	33 (64.7)	129 (48.1)	0.03
Needle manipulation (n=161)[&]				0.007*
Lifting and thrusting	55 (34.2)	9 (27.3)	46 (35.7)	
Twisting and rotating	104 (64.6)	16 (48.5)	88 (68.2)	

Reinforcing and reducing	24 (14.9)	2 (6.1)	22 (17.1)	
Other	34 (21.1)	14 (42.4)	20 (15.5)	
Needle retention time specified	273 (85.6)	43 (84.3)	230 (85.8)	0.779
Needle retention time (min)#	30 (5-90)	30 (5-90)	30 (5-60)	0.274#
≤15min	9 (3.3)	4 (9.3)	5 (2.2)	
15-30min	245 (89.7)	37 (86)	208 (90.4)	
≥30min	19 (7)	2 (4.7)	17 (7.4)	
Needle type (e.g., diameter, length) specified	266 (83.4)	44 (86.3)	222 (82.8)	0.545
Details of electrical stimulation (n=114)$				0.664*
Electrical equipment	91 (79.8)	15 (75)	76 (80.9)	
Electric current	52 (45.6)	12 (60)	40 (42.6)	
Frequency settings	95 (83.3)	19 (95)	76 (80.9)	
Other	4 (3.5)	1 (5)	3 (3.2)	
Table 3b: Treatment regimen				
Total number of treatment sessions specified	270 (84.6)	44 (86.3)	226 (84.3)	0.724
Total number of treatment sessions# (n=270)	10 (1-125)	12 (1-125)	8.5 (1-72)	0.126
1-5 sessions	93 (34.4)	14 (31.8)	79 (35)	
6-10 sessions	64 (23.7)	4 (9.1)	60 (26.5)	
11-15 sessions	35 (13)	9 (20.5)	26 (11.5)	
16-20 sessions	33 (12.2)	9 (20.5)	24 (10.6)	
21-25 sessions	16 (5.9)	3 (6.8)	13 (5.8)	
>25 sessions	29	5 (11.4)	24 (10.6)	

	(10.7)			
Number of treatment sessions mentioned	42 (13.2)	13 (25.5)	29 (10.4)	0.005
Incomplete treatment sessions mentioned (n=42)	18 (42.9)	9 (69.2)	9 (31.0)	0.021
Frequency of treatment sessions specified				0.317*
Yes	246 (77.1)	42 (82.4)	204 (76.1)	
No	23 (7.2)	1 (2)	22 (8.2)	
NA	50 (15.7)	8 (15.7)	42 (15.7)	
Frequency of treatment (sessions/week, n=246) #	3 (1-14)	3 (1-14)	3 (1-10)	0.826
1	37 (15)	7 (16.7)	30 (14.7)	
2	54 (22)	9 (21.4)	45 (22.1)	
3	70 (28.5)	9 (21.4)	61 (29.9)	
>3	67 (27.2)	1 (5.3)	3 (22.0)	
NA	18 (7.3)	4 (9.5)	14 (6.9)	
Duration of treatment specified	260 (81.5)	43 (84.3)	217 (81)	0.573
Duration of treatment (weeks, n=260)#	6 (0-25	8 (0-25)	4 (0-24)	0.003
4	73 (28.1)	9 (20.9)	64 (29.5)	0.099*
4-8	141 (54.2)	23 (53.5)	118 (54.4)	
9-12	30 (11.5)	7 (16.3)	23 (10.6)	
>12	9 (3.5)	4 (9.3)	5 (2.3)	
NA	7 (2.7)	0 (0)	7 (3.2)	
Patients posture specified	103 (32.3)	16 (31.4)	87 (32.5)	0.879
Disinfection specified	90 (28.2)	16 (31.4)	74 (27.6)	0.584

Tble 3c: Other components of treatment and practitioner background				
Details of other interventions specified	73 (22.9)	17 (33.3)	56 (20.9)	0.053
Details of other interventions[§]				1.0*
TCM treatment (e.g., moxibustion, cupping)	6 (8.2)	1 (5.9)	5 (8.9)	
Exercises	22 (30.1)	5 (29.4)	17 (30.4)	
Standard treatment or usual care	55 (75.3)	14 (82.4)	41 (73.2)	
Setting and context of treatment specified	232 (72.7)	34 (66.7)	198 (73.9)	0.296
Details of participating acupuncturists specified	183 (57.4)	39 (76.5)	144 (53.7)	0.003
Description of participating acupuncturists[^]				0.664
Qualification or professional affiliation	112 (61.2)	26 (66.7)	86 (59.7)	
Years in acupuncture practice	110 (60.1)	27 (69.2)	83 (57.6)	
Other relevant experience	54 (29.5)	16 (41)	38 (26.4)	

Abbreviations: NA, not applicable; TCM: traditional Chinese medicine. [*]Fisher's exact test; others are Pearson's chi-squared test. [#] Values are median (range) and P value are from Mann-Whitney U test. [&] Fifty-one trials used two methods of needle manipulation, and eight trials used three methods of needle manipulation. [$] Fifty trials reported two details of electrical stimulation, and thirty-nine trials reported three details of electrical stimulation. [§] Ten trials reported two kinds of other interventions administered to the acupuncture group. [^] Sixty-seven trials described two details of participating acupuncturists, and thirteen trials described three details of participating acupuncturists.

Table 4 Selection and specification of control

Characteristics	Total (N=319, %)	Core Clinical journals (n=51, %)	CAM journals (n=268, %)	P value
Number of control group				0.62
1	222 (69.6)	34 (66.7)	188 (70.1)	
≥2	97 (30.4)	17 (33.3)	80 (29.9)	
Both sham acupuncture and waiting-list/blank control	14 (4.4)	6 (11.8)	8 (3.0)	
Type of control*				0.15#
Sham acupuncture	132 (41.4)	31 (60.8)	101 (37.7)	
Waiting-list/no treatment	105 (32.9)	17 (33.3)	88 (32.8)	
Acupuncture	66 (20.7)	9 (17.7)	57 (21.3)	
Standard care/usual care	35 (11.0)	6 (11.8)	29 (10.8)	
Other TCM treatment (e.g. moxibustion, cupping)	17 (5.3)	1 (2.0)	16 (6.0)	
Active medication	47 (14.7)	3 (5.9)	44 (16.4)	
Surgery	2 (0.6)	0 (0)	2 (0.8)	
Behavioral intervention	17 (5.3)	4 (7.8)	13 (4.9)	
Rationale for control selection specified	142 (44.5)	18 (35.3)	124 (46.3)	0.148
Precise description of the control	282 (88.4)	48 (94.1)	234 (87.3)	0.164

* 97 trials included multiple control groups.

Fisher's exact test; others are Pearson's chi-squared test.

Figures

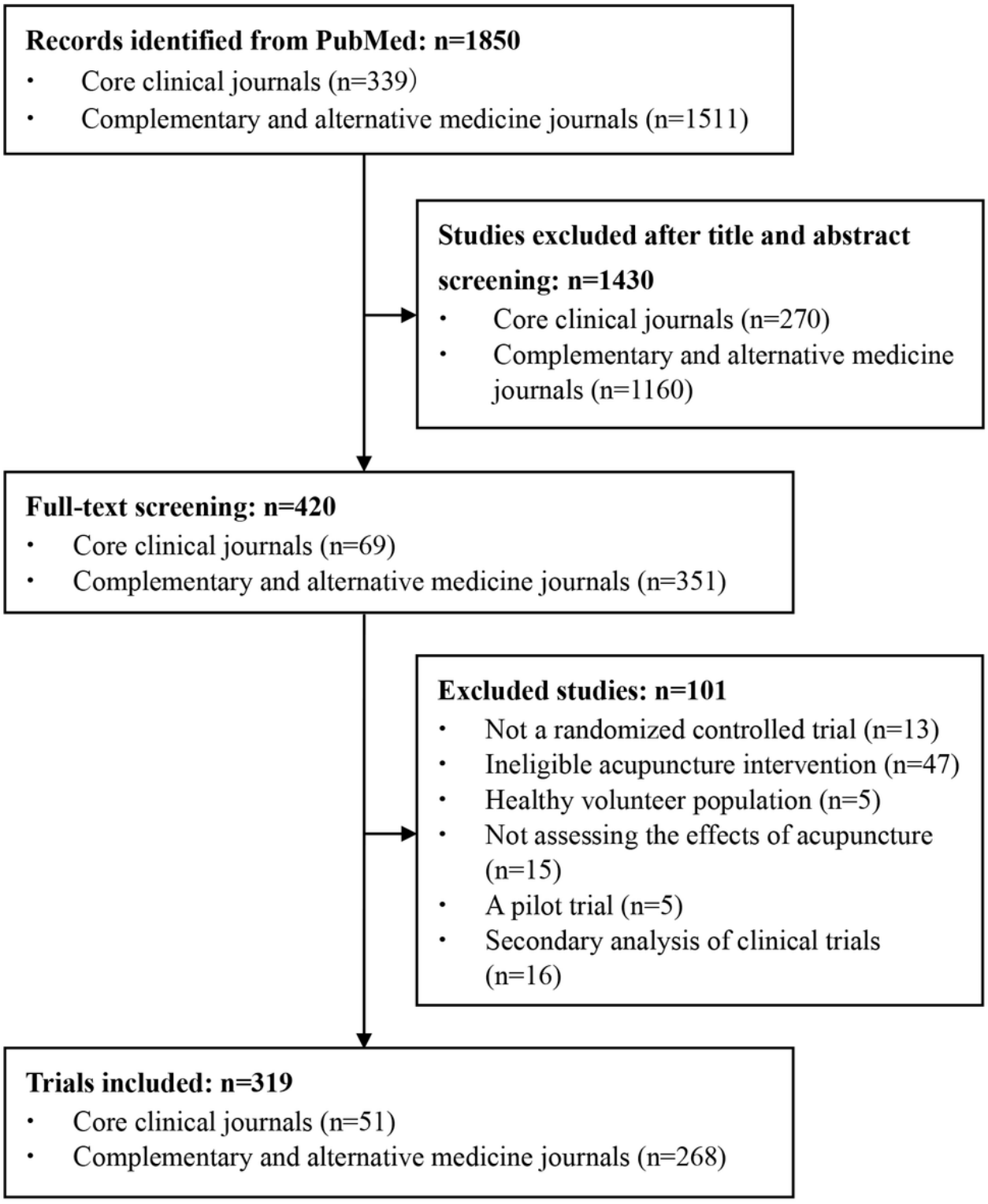

Figure 1

Flow chart of study selection

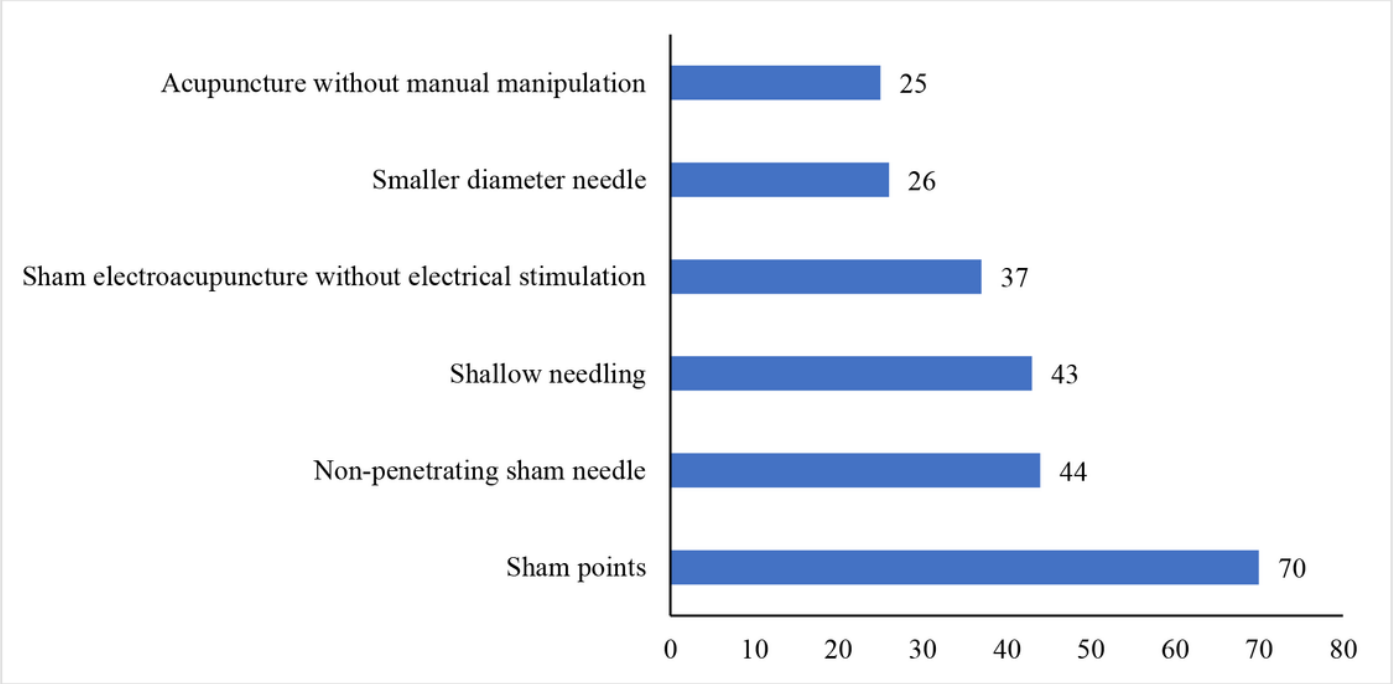

Figure 2

Sham acupuncture used in included trials

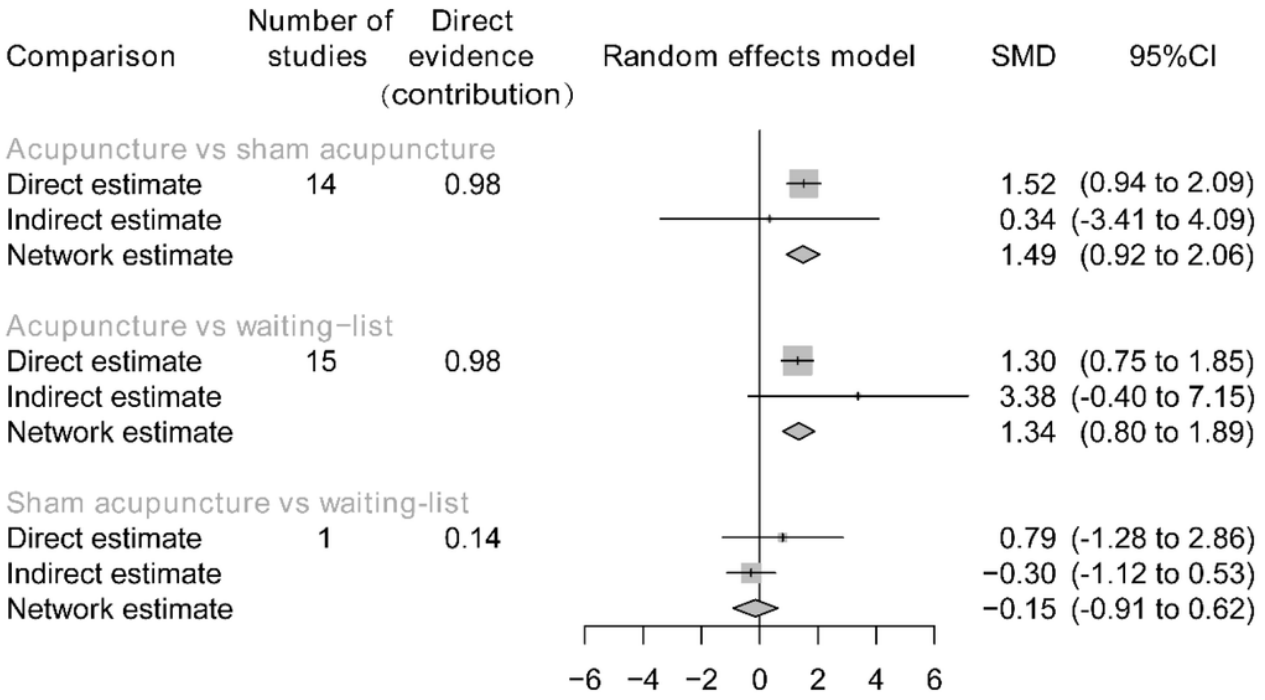

Figure 3

Network meta-analysis results of acupuncture, sham acupuncture and waiting-list/no treatment for chronic pain

Supplementary Files

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- Appendix15.docx