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The Effectiveness of Acupuncture for Herpes Zoster: A Systematic Review and Meta-Analysis

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Herpes zoster (HZ) results from the reactivation of a varicella-zoster virus infection and is accompanied by moderate-to-severe pain in most patients. The most common treatment is medication; however, there are still limitations. Acupuncture reportedly has meaningful therapeutic effects and is a possible alternative option in HZ. However, no systematic reviews examining the use of acupuncture and electro-acupuncture (EA) alone have been published; in this study, we therefore aimed to systematically review those techniques. We searched for clinical trials of acupuncture and EA treatment for HZ up to October 2022. Trials that used acupuncture were included. Outcomes were visual analog scale (VAS) and effective rate. Secondary outcomes were time to pain relief, time to pain elimination, incrustation, decrustation, lastly incidence of post-herpetic neuralgia (PHN). In total, 22 randomized controlled trials were included in this research. Compared with conventional medication therapy, acupuncture was associated with a significant improvement in VAS, effective rate, and times to pain relief and elimination. Times to new blister cessation, incrustation, and decrustation (days) were significantly improved. Furthermore, the incidence rate of PHN was lower in acupuncture groups. The results suggest that acupuncture could be a reasonable treatment option for patients with HZ who suffer from pain and accompanying symptoms.

Keywords: Acupuncture; Electroacupuncture; Herpes zoster; Systematic review

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INTRODUCTION

Herpes zoster (HZ) is caused by reactivation of the varicella-zoster virus, which lies dormant in the dorsal root ganglion and is reactivated frequently. In a healthy host, memory cells can help to avoid reactivation. However, when host immunity is lowered by aging, stress, and/or the administration of external immunosuppressants, reactivation cannot be suppressed, and the virus replicates and infects the body [1]. With the aging population, the number of patients with HZ is increasing. According to health insurance statistics in Korea, the number of patients treated for HZ steadily increased during 2010–2021, to 725,000 from 48,000 [2]. Also, patients with HZ showed an increase in coronavirus disease 2019 infection during the pandemic period [3].

The symptoms of HZ include a whole-body reaction: headache, fever, etc. The most characteristic symptom is skin lesions along the affected dermatome, accompanied by temporary and persistent pain that result in sleep disorder, anxiety, and lower quality of everyday life [4]. The pain can manifest as a variety of sensations such as burning, poking, and stabbing. The skin rashes become blisters within 1–2 days and last 3–4 days. The blisters turn into pustules within one week and subsequently into ulcerations and crusting [5].

Treatment in Western medicine is mainly antiviral medications and supplemental therapies such as steroids and painkillers. When those approaches are not sufficient to relieve the symptoms, antidepressants, anticonvulsants, and opioids are prescribed [6]. However, these drugs have side effects such as nausea, vomiting, and liver or kidney failure because of restricted drug metabolism [7]. With conventional drug treatment, the incidence rate of post-herpetic neuralgia (PHN) is 6.5%, which is still high [8].

With the increase of patients with HZ and the limitations of conventional treatment, an approach to HZ with Korean medicine is considered necessary [9,10]. Acupuncture in particular is known to be safe and to have fewer side effects [11]. Several studies have revealed benefits of acupuncture in HZ, using various acupuncture methods: acupuncture, fire needling, pharmaco-acupuncture, moxibustion, bloodletting, electro-acupuncture (EA), etc. However, no systematic reviews have been published that include only acupuncture and EA, which doctors of Korean medicine use most frequently in treatment and which are covered by national insurance. In this study, we therefore aimed to systematically review and investigate the efficacy and safety of acupuncture and EA for HZ.

MATERIALS AND METHODS

1. Types of studies

This review included only randomized clinical trials. Case reports and protocols were excluded, as were non-randomized and observational studies. No language restrictions were imposed.

2. Type of participants

The subjects of this study were patients with HZ. Patients with HZ occurring concurrently with other diseases and patients suffering from PHN were excluded.

3. Types of interventions

We included only acupuncture and EA as interventions. To see the effect of acupuncture alone, we excluded acupuncture techniques such as thread-embedding acupuncture, fire acupuncture, acupotomy, acupressure, and pharmaco-acupuncture. Studies of moxibustion, cupping, and their combinations with acupuncture were also excluded. Included studies were those that used acupuncture and EA as the sole treatment or in combination with drugs.

4. Types of outcome measures

The primary outcomes were the effective rate and visual analog scale (VAS) for pain. Secondary outcomes were time to pain relief, pain elimination, incrustation time, decrustation time, and incidence of PHN.

5. Data sources and search methods

The databases searched for relevant studies were PubMed, EMBASE, Cochrane Library, China National Knowledge Infrastructure, Citation Information by NII, Korean Studies Information Service System, Korean Medical Database, ScienceON, and Oriental Medicine Advanced Searching Integrated System up to October 2022. Terms associated with the diagnosis (HZ) and treatment (acupuncture, EA) were used. In addition, the gray literature, reports, and dissertations were searched.

6. Data extraction and quality assessment

Two researchers (SKC and JHM) independently screened titles and abstracts in the search results to eliminate duplicate and unsuitable studies. They then read the full-text articles to determine eligibility for inclusion based on the predefined criteria. Disagreements were re-

solved through discussion, and the final decision was made by a third reviewer (EJK). Data on authors, publication years, interventions, outcome measures, results of studies, and adverse events (AEs) were then extracted from the included studies. The data were analyzed using the Review Manager software application (version 5.4.1; Copenhagen, Denmark; The Nordic Cochrane Center, The Cochrane Collaboration, 2020).

7. Statistical analysis

Mean differences (MD) and odds ratios (OR) with 95% confidence intervals (CI) were calculated to evaluate the effectiveness of acupuncture for HZ as described by the data. Statistical heterogeneity between studies was assessed using the chi-squared test and I-squared (I^2) statistic, as recommended in the Cochrane Handbook [12], with an I^2 statistic of 0–40% indicating substantial heterogeneity, 30–60% moderate heterogeneity, 50–90% substantial heterogeneity, and 75–100% significant heterogeneity. If the heterogeneity was >50%, a random ef-

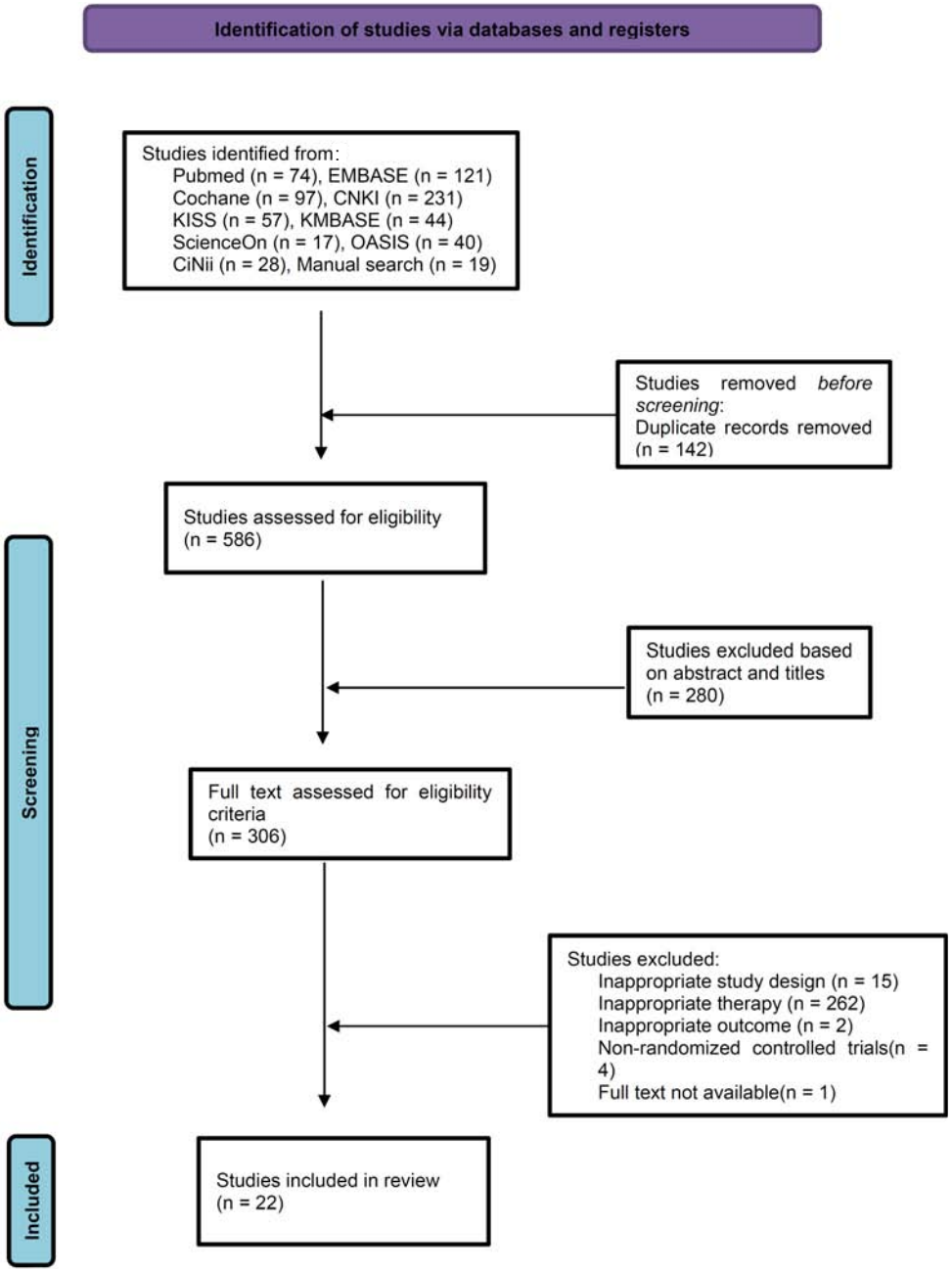


Fig. 1. Flowchart of the study selection process. CNKI, China National Knowledge Infrastructure; KISS, Korean Studies Information Service System; KMBASE, Korean Medical Database; OASIS, Oriental Medicine Advanced Searching Integrated System; CiNii, Citation Information by NII.

fects model was applied. If the outcome measurement unit differed between studies, the standardized MD (SMD) was applied [13]. Subgroup analysis was done for the acupuncture types; acupuncture and EA. Sensitivity analysis was performed when heterogeneity was high.

8. Quality of evidence

Two researchers evaluated the risk of bias in three categories using the seven domains of the Cochrane Collaboration "risk of bias" criteria: random sequence generation, allocation concealment, blinding of participants, blinding of outcome assessors, incomplete outcomes data, selective outcome reporting, and other biases [12]. If there was disagreement between the researchers, a third was involved. Funnel plots were also constructed to examine publication bias.

RESULTS

1. Study selection

Of 728 studies identified from the search, 142 duplicates were removed, and 586 studies were screened by title and abstract. Based on the predefined criteria, 280 studies were excluded, and the remaining 306 studies were assessed for eligibility by full-text review. Of the 22 eligible studies included in this review and meta-analysis, 7 were dissertations, and the other 15 were journal articles. Fig. 1 presents the study selection process.

2. Characteristics of included studies

Table 1 shows the studies' associated characteristics. All studies were reported in China except for two from Italy and Germany [14,15]. Studies were reported for the years 2004–2020. The total number of patients was 1,963, and their mean ages ranged from 42 to 66 years. Seven studies had more than one experimental group, treated using different methods. Three had two experimental groups eligible for this review [14,16,17], and four had only one eligible experimental group among their interventions, except cupping or various acupuncture treatments in the intervention [18-21]. The number of treatments ranged from 5 to 28. All studies included acupuncture treatment as an intervention, and 12 of the studies used EA [14,17-20,22-28]. Most studies used the Ashi and Jiaji points; frequently used distal acupoints were TE6 and SI3. Antiviral drugs, vitamins, and painkillers were used as Western medicine treatments. In six studies of add-on acupuncture treatment, Western medicine and acupuncture were used together as an intervention in the experimental group [14,16,19-21,29].

3. Risk of bias assessment

In 13 studies, the randomization principle was used to choose random numbers, which resulted in a low risk of bias in random sequence generation [14-17,19,24,25,27,28,30-32]. Allocation concealment was reported in only six studies [14-16,18,24,27]. In terms of blinding of participants, all studies had a high risk of bias. Considering the characteristics of acupuncture, a completely blind study cannot be guaranteed unless sham acupuncture is used, which would cost more. One study [14] used laser-acupuncture in the control groups, but that technique is not enough to measure against sham needles. In terms of detection bias, only two studies had a low risk of bias [16,24], mentioning that a third party collected the results; the others had no reports on it. Outcomes data were incomplete in three studies. Liu et al. (2013) [19] found that the total number of people differed for each outcome. Shi (2008) [22] missed reporting the VAS after treatment, and Zheng et al. (2011) [29] gave insufficient information on dropouts. Selection bias was mostly unclear because the protocol could not be found. Regarding other bias, no study ranked highly because there could be room for further bias; however, we found no information to evaluate it (Fig. 2).

4. Effects of interventions

We classified interventions as acupuncture alone and acupuncture with Western medicine. Subgroups were divided by acupuncture type: acupuncture and EA. The primary outcomes were the effective rate and VAS. Secondary outcomes were time to pain relief, pain elimination, incrustation time, decrustation time, and incidence of PHN.

5. Effective rate

Regarding effective rate, 12 studies compared acupuncture with Western medicine [16-18,21,24-26,28-30,33,34], and three studies compared acupuncture to Western medicine [20,31,35].

In treatment with acupuncture alone, six results showed a significant difference (OR 5.63; 95% CI 2.45–12.92; $p < 0.0001$; $I^2 = 0\%$). Treatment with EA showed a significant difference (OR 2.95; 95% CI 1.79–4.84; $p < 0.0001$; $I^2 = 5\%$). The overall pooled result showed a statistically significant difference (OR 3.54; 95% CI 2.32–5.40; $p < 0.00001$; $I^2 = 0\%$) (Fig. 3A).

In add-on acupuncture treatment (two studies), the results showed a significant difference (OR 4.26; 95% CI

Table 1. Characteristics of included studies

Study	Control group (M/F)	Control group age (y)	Experimental group (M/F)	Experimental group age (y)	Add-on treatment	Experimental group treatment (points)	Control group treatment	Number of treatments	Outcome measures	AEs (C/E)
Bian 2010 [24]	30 (12/18)	45.70 ± 15	32 (13/19)	45.62 ± 12.52		EA (Ashi, TE6, SI3, EX-B2)	Valacyclovir 0.3 g bid, Vit B1 10 mg tid	10	ER, VAS, RP, EP, CB, In, De, PHN	None
Chen 2012 [25]	31 (17/14)	49.61 ± 16.34	27 (16/11)	42.39 ± 17.06		EA (Ashi, EX-B2, SJ6, SI3)	Valacyclovir 0.3 g bid, Vit B1 10 mg tid	10	ER, CB, In, De	Unknown
Ding 2006 [26]	42 (22/20)	18–70	59 (34/25)	24–69		EA (Ashi)	Acyclovir 0.2 g tid, polymyocytes 2 mg (IV, 2/wk), prednisone 10 mg tid, indomethacin 50 mg bid	14–28	ER	Unknown
Huang 2012 [27]	34 (14/20)	45.97 ± 14.66	35 (14/21)	44.08 ± 16.24		EA (circumference needle, Ashi)	Valacyclovir 0.3 g bid, Vit B1 10 mg tid	10	PHN	Unknown
Li 2006 [33]	148 (77/71)	≥40	43 (24/19)	≥40		Acupuncture (Jiao's scalp acupuncture)	Vit B12 500 mg, anlagia (unknown), intramuscular inj. (unknown) qd	Unknown	ER	Unknown
Li et al. 2009 [28]	40 (19/21)	44.79 ± 9.43	20 (15/5)	46.36 ± 10.21		EA (Ashi, EX-B2, TE6, SI3)	Valacyclovir 0.3 g bid, Vit B1 10 mg tid	10	ER, VAS, In	Unknown
Li 2012 [30]	30 (14/16)	44.72 ± 12.88	30 (17/13)	45.25 ± 11.48		Acupuncture (Shu Zhua ci method; DU14, DU12, DU8, D66, DU2)	Acyclovir 0.3 g bid, Vit B1 10 mg tid	5	ER, VAS, RP, EP, CB, In, De, PHN	(5/0)
Li et al. 2012 [18]	98 (unknown/unknown)	43.76 ± 15.34	98 (unknown/unknown)	46.51 ± 15.30		EA (surrounding, EX-B2, TE6, SI3)	Valacyclovir 300 mg bid, Vit B1 10 mg tid	10	ER	Unknown
Liu et al. 2013 [19]	98 (unknown/unknown)	Unknown	98 (unknown/unknown)	Unknown		EA (circumference needle, Ashi, EX-B2)	Valacyclovir 0.3 g bid, Vit B1 10 mg tid	10	VAS, RP, EP, PHN	Unknown
Liu 2022 [35]	55 (30/25)	55.7 ± 4.11	55 (28/27)	54.24 ± 4.5	0	Acupuncture (Ashi and EX-B2)	Acyclovir 0.8 g tid, Vit B12 0.5 mg tid	14	ER, VAS, PHN	(3/1)
Mao et al. 2015 [20]	20 (12/8)	22–61	20 (9/11)	23–72	0	EA (Weici, LI11, TE3, GB34, LR3)	Ganciclovir 0.25 g inj., valacyclovir 0.3 g bid, methylcobalamin 0.5 mg tid	5	VAS	Unknown
Shi 2008 [22]	30 (10/20)	42.83 ± 16.80	30 (12/18)	44.91 ± 16.97		EA (Ashi, EX-B2, TE6, SI3)	Valacyclovir 0.3 g bid, Vit B1 10 mg tid	10	EP, CB, In, De, PHN	(7/1)

(Continued on next page)

Table 1. Continued

Study	Control group (M/F)	Control group age (y)	Experimental group (M/F)	Experimental group age (y)	Add-on treatment	Experimental group treatment (points)	Control group treatment	Number of treatments	Outcome measures	AEs (C/E)
Song 2009 [23]	30 (15/15)	43.47 ± 13.57	30 (16/14)	42.23 ± 14.98		EA (Ashi, EX-B2, TE6, SI30)	Valacyclovir 0.3 g bid, Vit B1 10 mg tid	10	VAS, RP, EP, CB, In, De, PHN	(4/0)
Su 2017 [16]	32 (16/16)	42.50 ± 12.13	31 (18/13)	41.77 ± 12.08		Acupuncture (Gansu Zheng method, cold-reducing, Ashi, TE6, SI3, LR3, GV14, GB34, SP9, SP10, LR2, EX-B2)	Valacyclovir 0.3 g bid, methylcobalamin 0.5 mg tid	14	VAS, RP, EP, CB, In, De, PHN	(6/1)
	32 (16/16)	42.50 ± 12.13	30 (17/13)	42.97 ± 10.52		Acupuncture (Gansu Zheng method, twisting acupuncture, Ashi, TE6, SI3, LR3, GV14, GB34, SP9, SP10, LR2, EX-B2)	Valacyclovir 0.3 g bid, methylcobalamin 0.5 mg tid	14	VAS, RP, EP, CB, In, De, PHN	(6/1)
Sun et al. 2015 [17]	30 (15/15)	43 ± 12	30 (14/16)	43 ± 12		EA (Xie method, Ashi [in depth, 33 mm], EX-B2, BL60, GB43, LR2)	Valacyclovir 0.3 g bid, Vit B1 10 mg tid	10	ER, VAS, CB, In, De, PHN	None
	30 (15/15)	43 ± 12	30 (13/17)	42 ± 10		EA (Xie method, Ashi [16 mm], EX-B2, BL60, GB43, LR2)	Valacyclovir 0.3 g bid, Vit B1 10 mg tid	10	ER, VAS, CB, In, De, PHN	None
Thoma 2012 [14]	16/6	53.5 ± 16.7	16/6	57.6 ± 17.6		EA (GB34, BI40, Ashi, EX-B2)	Gabapentin 300 mg tid	12	VAS	Unknown
Ursini et al. 2011 [15]	32 (12/20)	65.5 ± 12.8	34 (10/24)	67.1 ± 12.8	0	Acupuncture (CV12, CV4, LI11, LI4, ST44, SP10, LR2, PC6, Ashi)	Pregabalin bid, levobupivacaine (inj).)	8	PHN	Unknown
Zhang et al. 2009 [21]	25 (11/14)	20–60	25 (12/13)	19–67		Acupuncture (EX-B2, Ashi, TE6, SI3)	Valacyclovir 0.3 g bid, Vit B1 10 mg tid, Vit B12 0.25 mg tid	10	ER, VAS, RP, EP	Unknown
Zheng et al. 2011 [29]	30 (unknown/ unknown)	Unknown	30 (unknown/ unknown)	Unknown		Acupuncture (Jie-geng treatment, acupuncture syndrome differentiation)	Acyclovir 0.4 g tid, Vit B1 20 mg tid	5	ER	Unknown
Zhou 2018 [34]	25 (15/10)	51.8 ± 8.4	25 (13/12)	51.2 ± 8.6		Acupuncture (circumference needle, EX-B2, Ashi)	Acyclovir 200 mg × 5, Vit B12 0.5 mg tid	10	ER, VAS	Unknown
Zhou et al. 2020 [31]	64 (28/36)	62.47 ± 5.63	64 (27/37)	63.52 ± 5.95	0	Acupuncture (surrounding acupuncture method with thumbtack needle)	Famciclovir 0.25 g tid, Vit B12 0.5 mg tid, gabapentin 0.3 g tid, tetrandrine 40 mg tid	14	ER, VAS, RP, CB, In, PHN	Unknown
Zhu 2019 [32]	37 (12/25)	Unknown	43 (24/19)	Unknown	0	Acupuncture (press needle surround acupuncture, Ashi)	Valacyclovir 0.3 g bid, Vit B12 0.5 g tid	15	VAS, CB, In, De, PHN	None

M, males; F, females; AEs, adverse events; C/E, control group/experimental group; EA, electro-acupuncture; bid, two times daily; Vit, vitamin; tid, three times daily; ER, effective rate; VAS, visual analog scale for pain; RP, time to pain relief; EP, time to pain elimination; CB, time to new blister cessation; In, time to incrustation; De, time to decrustation; PHN, incidence of post-herpetic neuralgia; IV, intravenous; qd, four times daily.

Fig. 2. Risk of bias summary and risk of bias graph: review authors' judgments about each risk of bias item for each included study presented as percentages across all included studies.

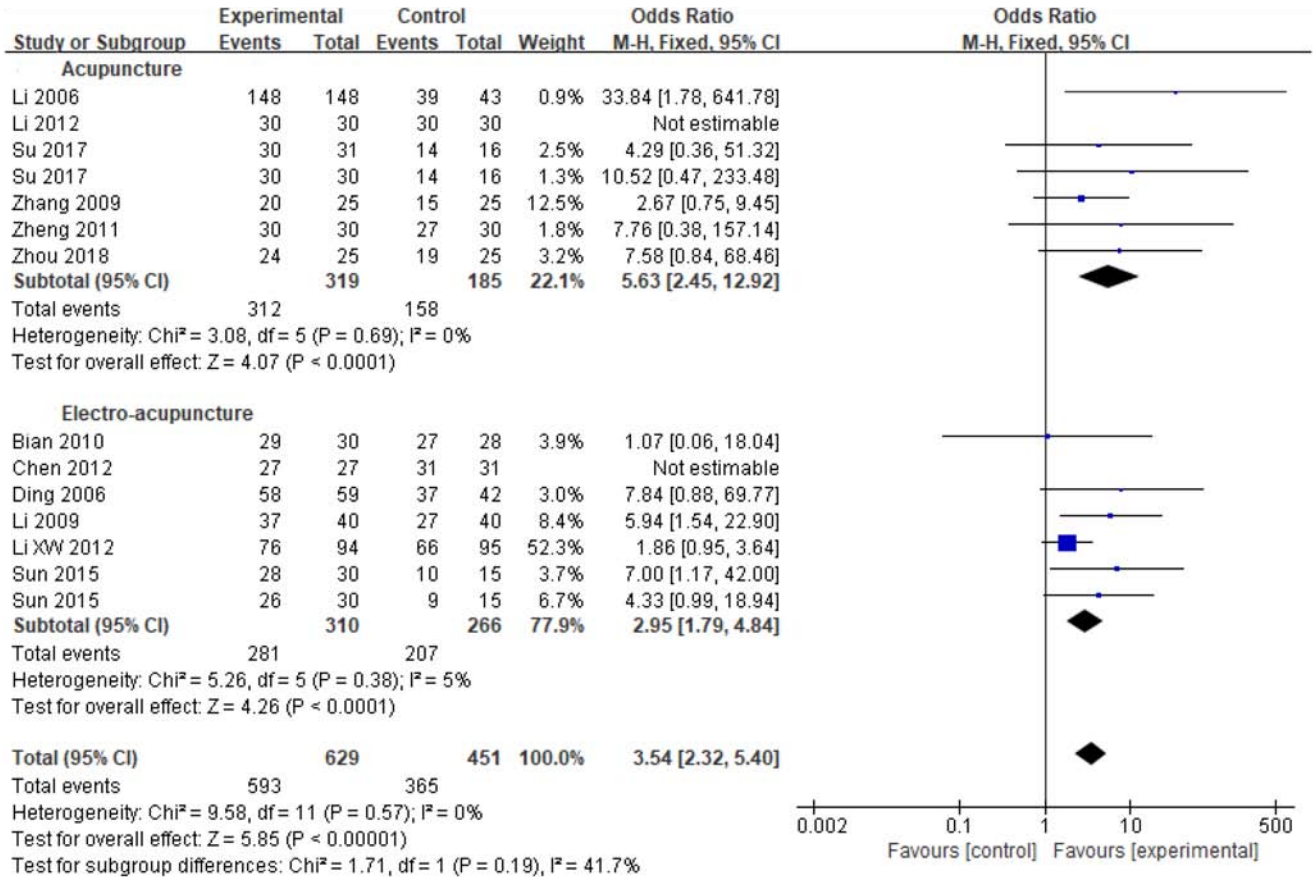
1.35–13.38; p = 0.01; I^2 = 0%). Only one result with EA showed no significant difference (OR 11.18; 95% CI 0.56–222.98; p = 0.11). The overall pooled result showed a statistically significant difference (OR 4.98; 95% CI 1.72–14.38; p = 0.003; I^2 = 0%) (Fig. 3B).

6. VAS

The 15 studies that evaluated VAS as the outcome calculated the SMD, because two versions of the VAS were used: 0–10 and 0–100. Nine studies evaluated acupuncture alone [16,17,19,21,23,24,28,30,34], and six evaluated acupuncture added to Western medicine [14,15,20,31,32,35].

In treatment with acupuncture alone, four results with acupuncture showed a significant difference (SMD 0.82; 95% CI 0.39–1.25; p = 0.0002; I^2 = 61%). The six results with EA treatment showed a significant difference in the pooled result (SMD 0.71; 95% CI 0.39–1.03; p < 0.0001; I^2 = 60%). The overall pooled result showed a statistically significant difference (OR 0.76; 95% CI 0.51–1.00; p <

(A)



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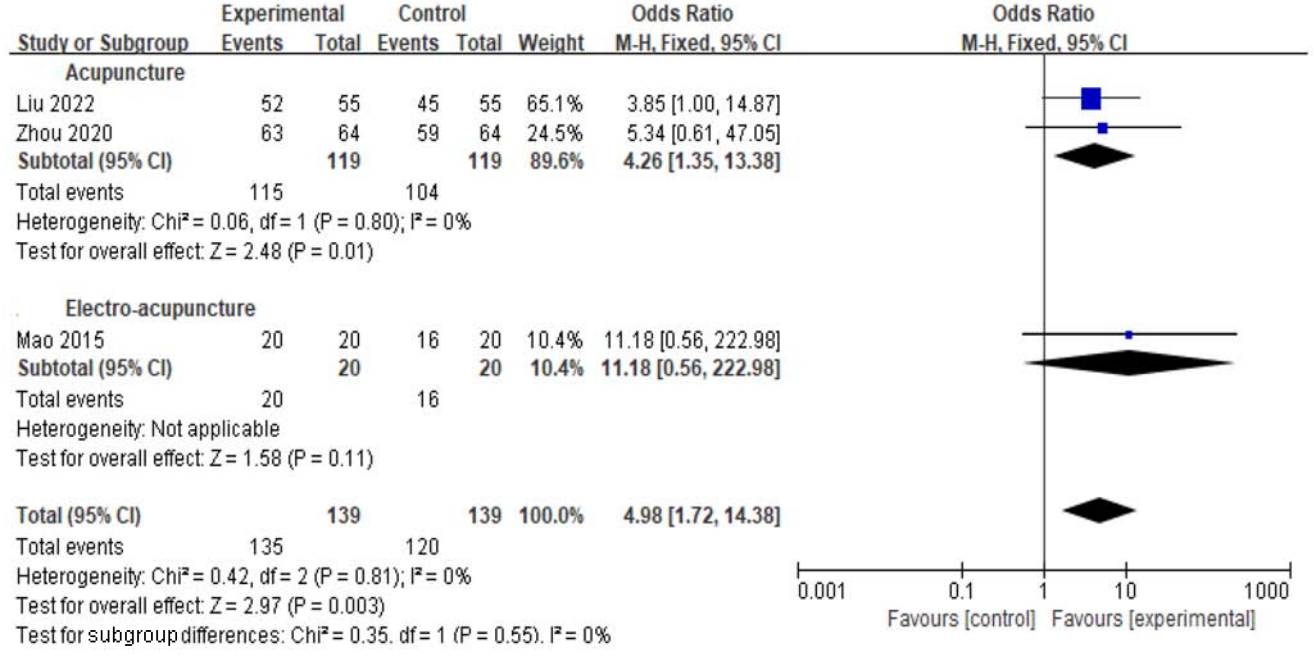


Fig. 3. Treatment effective rate. (A) Comparison of acupuncture treatment alone and Western medicine treatment. (B) Comparison of add-on acupuncture treatment (acupuncture + Western medicine) and Western medicine treatment. M-H, Mantel–Haenszel; CI, confidence interval.

0.00001; I^2 = 58%) (Fig. 4A).

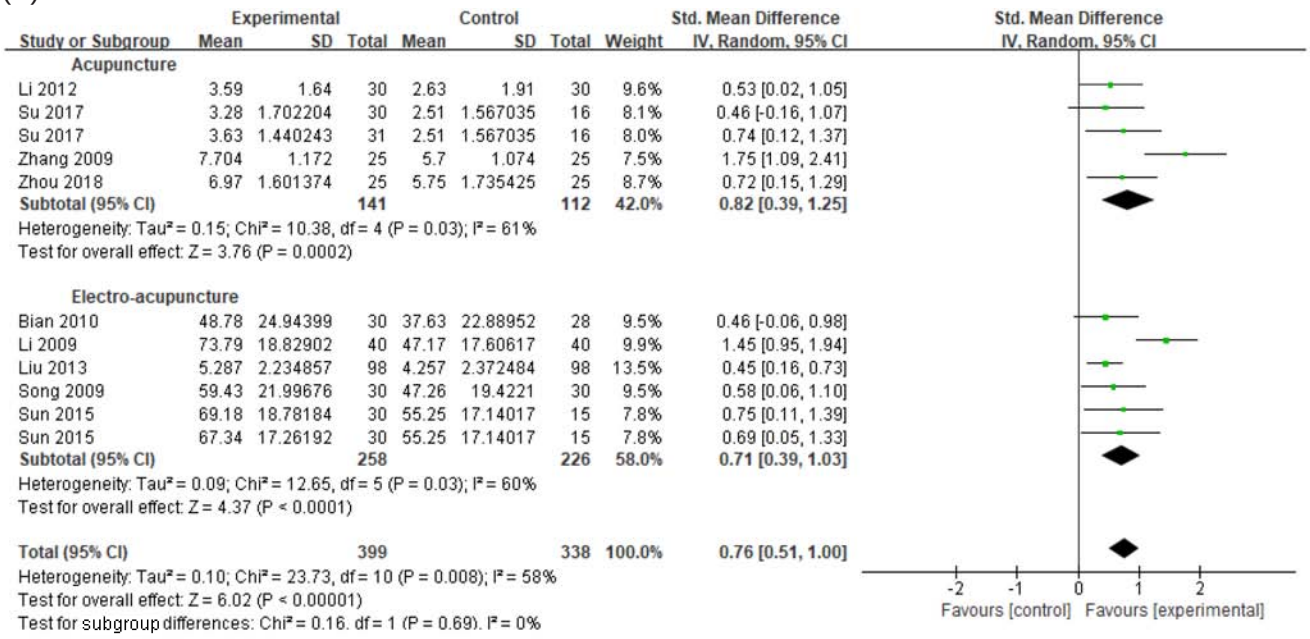
In add-on acupuncture treatment, four studies with acupuncture showed a significant difference (SMD 0.81; 95% CI 0.47–1.14; p < 0.00001; I^2 = 59%). Two results with EA showed no significant difference (SMD −0.46; 95% CI −0.99 to 0.06; p = 0.08). The overall pooled result showed no statistically significant difference (SMD 0.46; 95% CI −0.01 to 0.94; p = 0.06; I^2 = 81%) (Fig. 4B).

7. Time to pain relief

Six studies recorded the time (days) to pain relief as an outcome [16,19,21,23,24,30].

In treatment with acupuncture alone, four results with acupuncture showed a significant difference (MD −3.53; 95% CI −4.69 to −2.36; p < 0.00001; I^2 = 72%). Three results with EA treatment showed a significant difference in the pooled result (MD −2.62; 95% CI −4.25 to

(A)



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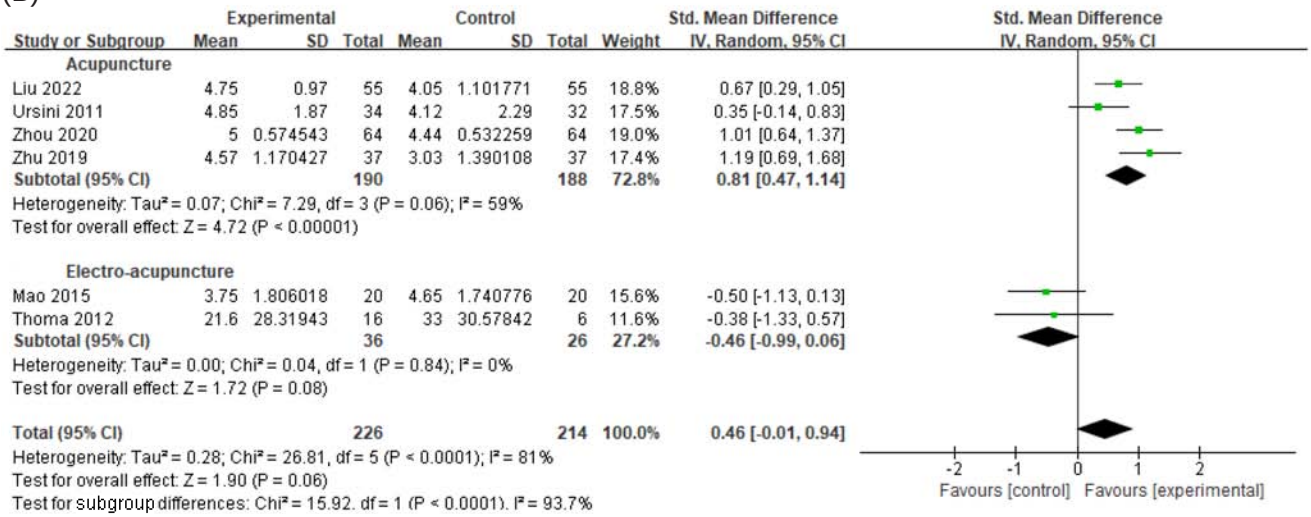


Fig. 4. Treatment visual analog scale for pain. (A) Comparison of acupuncture treatment alone and Western medicine treatment. (B) Comparison of add-on acupuncture treatment (acupuncture + Western medicine) and Western medicine treatment. SD, standard deviation; IV, weighted mean difference; CI, confidence interval.

−0.98; p = 0.002; I^2 = 58%). The overall pooled result showed a statistically significant difference (MD −3.20; 95% CI −4.11 to −2.29; p < 0.00001; I^2 = 65%) (Fig. 5A).

In add-on acupuncture treatment, only one study with acupuncture showed a significant difference (MD −1.56; 95% CI −1.90 to −1.22; p < 0.00001) (Fig. 5B).

8. Time to pain elimination

Seven studies with acupuncture treatment alone measured pain elimination as the outcome [16,19,21-24,30]. Three studies with four results for acupuncture showed a significant difference (MD −7.59; 95% CI −10.95 to −4.23; p < 0.00001; I^2 = 93%). Four studies of EA showed a significant difference (MD −9.75; 95% CI −15.55 to −3.95; p = 0.001; I^2 = 89%). The pooled result showed a significant difference (MD −8.47; 95% CI −11.23 to −5.71; p < 0.00001; I^2 = 91%) (Appendix 1).

9. Time to new blister cessation

Nine studies recorded the time (days) to new blister cessation as an outcome [16,17,22-25,30].

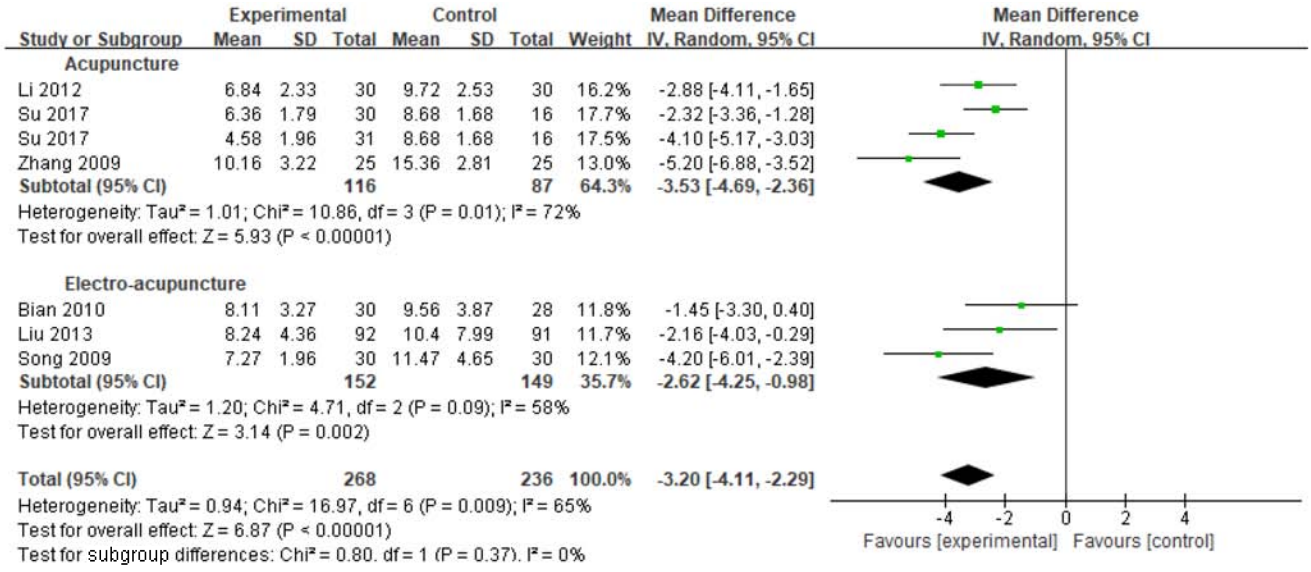
In treatment with acupuncture alone, three results with acupuncture showed no significant difference (MD −0.69; 95% CI −1.45 to 0.07; p = 0.07; I^2 = 55%). Results with EA showed a significant difference (MD −0.97; 95% CI −1.88 to −0.07; p = 0.04; I^2 = 77%). The overall pooled result showed a statistically significant difference (MD −0.86; 95% CI −1.47 to −0.26; p = 0.005; I^2 = 71%) (Fig. 6A).

In add-on acupuncture treatment, two studies with acupuncture showed a significant difference (MD −0.61; 95% CI −1.17 to −0.05; p = 0.03; I^2 = 86%) (Fig. 6B).

10. Time to incrustation

Nine studies recorded the time (days) to incrustation

(A)



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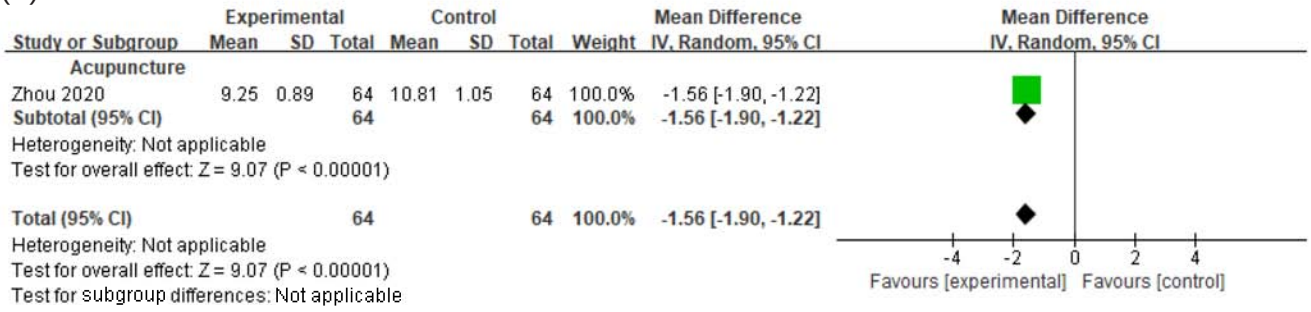


Fig. 5. Treatment time to pain relief (days). (A) Comparison of acupuncture treatment alone and Western medicine treatment. (B) Comparison of add-on acupuncture treatment (acupuncture + Western medicine) and Western medicine treatment. SD, standard deviation; IV, weighted mean difference; CI, confidence interval.

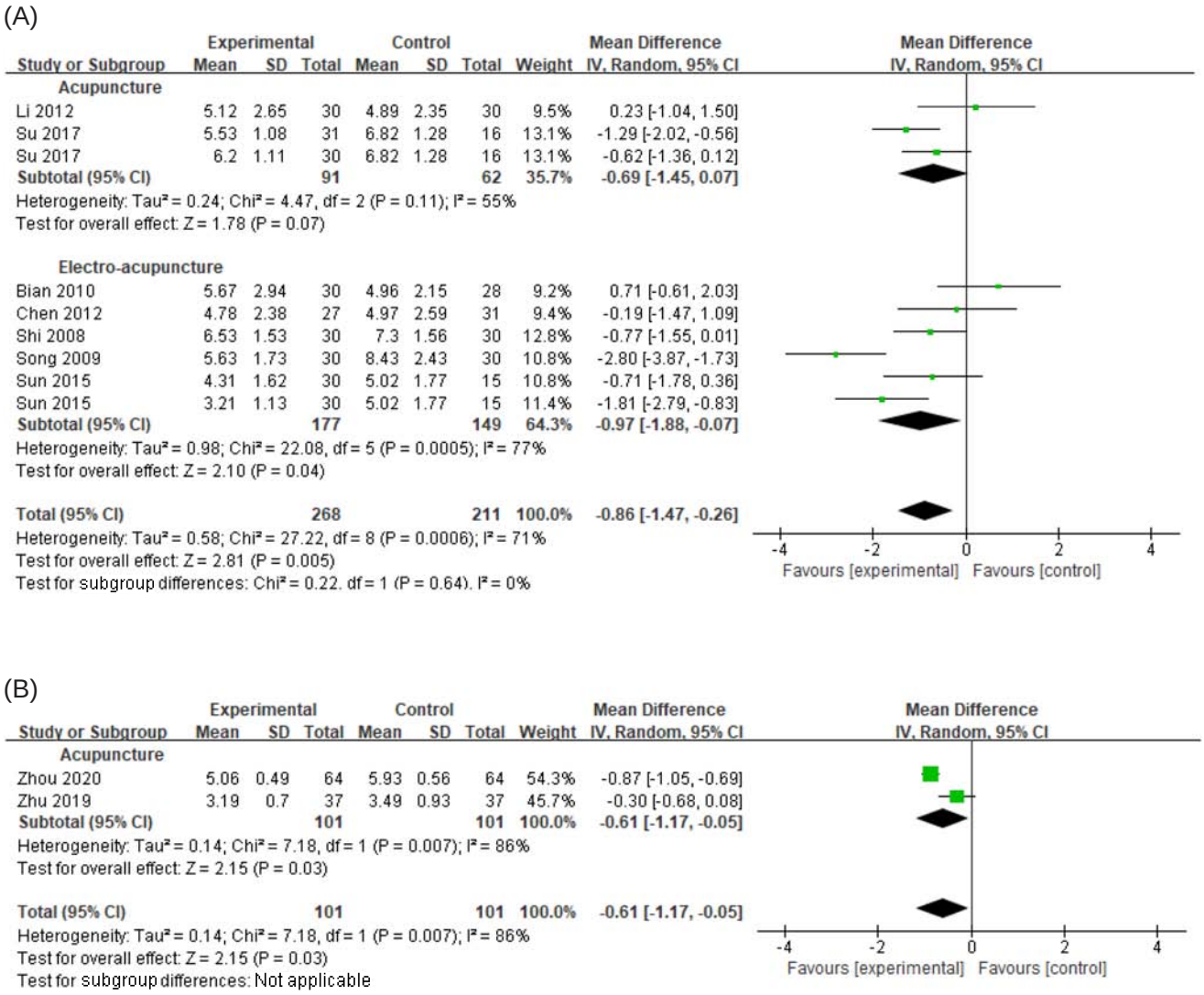


Fig. 6. Treatment time to new blister cessation (days). (A) Comparison of acupuncture treatment alone and Western medicine treatment. (B) Comparison of add-on acupuncture treatment (acupuncture + Western medicine) and Western medicine treatment. SD, standard deviation; IV, weighted mean difference; CI, confidence interval.

as an outcome [16,17,22-24,28,30].

In treatment with acupuncture alone, three results with acupuncture showed a significant difference (MD −2.68; 95% CI −3.31 to −2.04; $p < 0.00001$; $I^2 = 0\%$). Six results with EA showed a significant difference (MD −2.39; 95% CI −3.64 to −1.15; $p = 0.0002$; $I^2 = 85\%$). The overall pooled result showed a statistically significant difference (MD −2.50; 95% CI −3.32 to −1.67; $p < 0.00001$; $I^2 = 79\%$) (Fig. 7A).

In add-on acupuncture treatment, two studies with acupuncture showed a significant difference (MD −3.24; 95% CI −4.57 to −1.91; $p < 0.00001$; $I^2 = 95\%$) (Fig. 7B).

11. Time to decrustation

Eight studies recorded the time (days) to decrustation as an outcome [16,17,22-25,30].

In treatment with acupuncture alone, three results with acupuncture showed a significant difference (MD −3.83; 95% CI −5.67 to −2.00; $p < 0.0001$; $I^2 = 66\%$). For EA treatment, the pooled result showed a significant difference (MD −4.15; 95% CI −7.26 to −1.04; $p = 0.009$; $I^2 = 85\%$). The overall pooled result showed a statistically significant difference (MD −3.96; 95% CI −5.79 to −2.13; $p < 0.0001$; $I^2 = 83\%$) (Fig. 8A).

In add-on acupuncture treatment, only one result with acupuncture showed a significant difference (MD −3.16; 95% CI −3.61 to −2.71; $p < 0.00001$) (Fig. 8B).

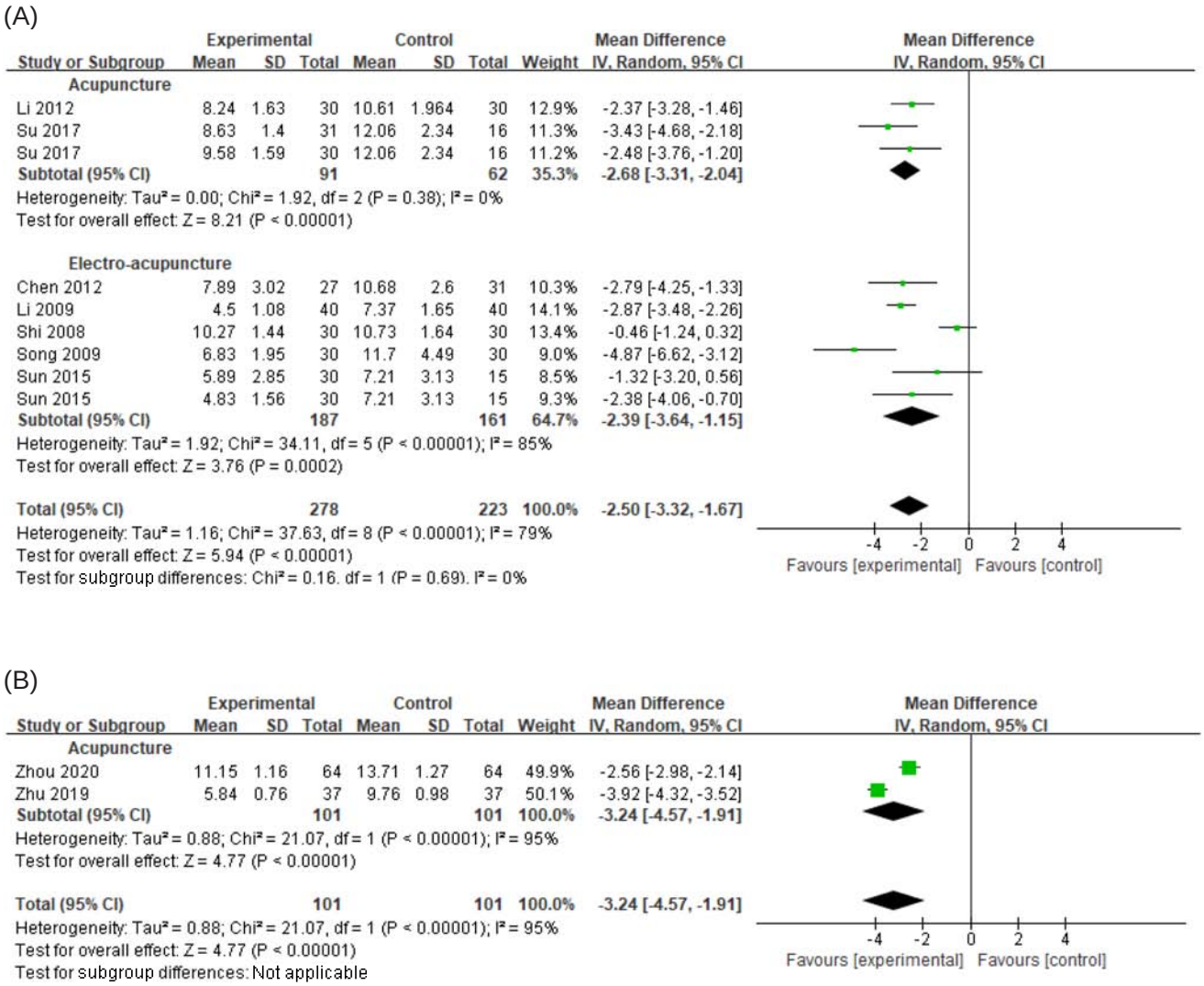


Fig. 7. Treatment time to incrustation (days). (A) Comparison of acupuncture treatment alone and Western medicine treatment. (B) Comparison of add-on acupuncture treatment (acupuncture + Western medicine) and Western medicine treatment. SD, standard deviation; IV, weighted mean difference; CI, confidence interval.

12. Incidence of PHN

The PHN incidence rate was reported in 14 studies [15-17,19,22-24,27,30-32,35].

In treatment with acupuncture alone, three results with acupuncture showed a significant difference (OR 0.40; 95% CI 0.18–0.89; p = 0.03; I^2 = 0%). In EA, the pooled result showed a significant difference (OR 0.15; 95% CI 0.08–0.27; p < 0.00001; I^2 = 0%). The overall pooled result showed a statistically significant difference (OR 0.20; 95% CI 0.13–0.32; p < 0.00001; I^2 = 0%) (Fig. 9A).

In add-on acupuncture treatment, four results with acupuncture showed a significant difference (OR 0.42; 95% CI 0.25–0.69; p = 0.0007; I^2 = 35%) (Fig. 9B).

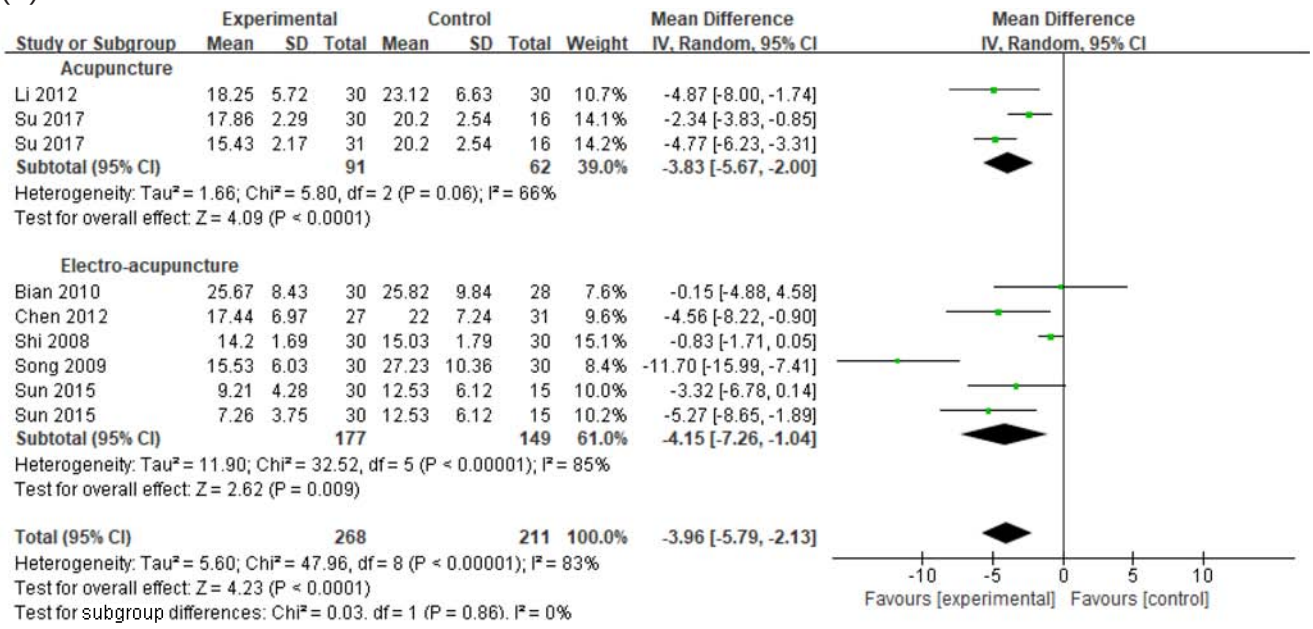
13. Adverse events (safety)

Eight studies reported information on safety [16,17,22-24,30,32,35].

In treatment with acupuncture alone, three results with acupuncture showed a significant difference (OR 0.15; 95% CI 0.05–0.52; p = 0.003; I^2 = 0%). EA treatment showed a significant difference in the pooled result (OR 0.11; 95% CI 0.02–0.61; p = 0.01; I^2 = 0%). The overall pooled result showed a statistically significant difference (OR 0.14; 95% CI 0.05–0.37; p < 0.0001; I^2 = 0%) (Fig. 10).

In add-on acupuncture treatment, only one study (Zhu 2019 [32]) with acupuncture showed no adverse events.

(A)



(B)

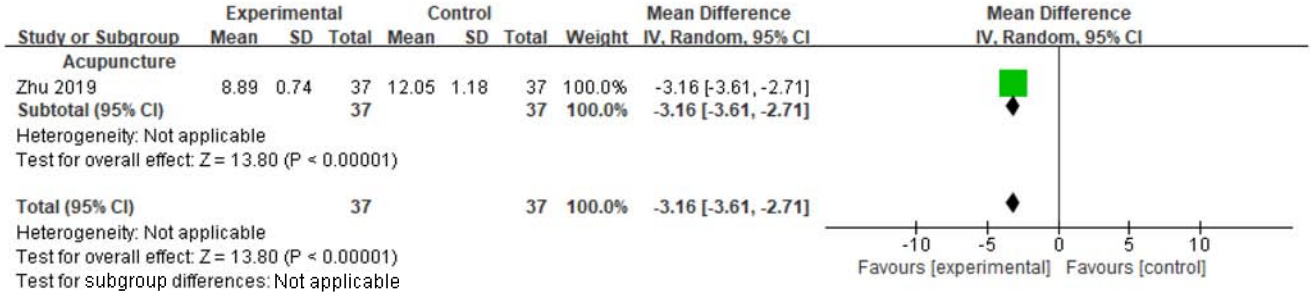


Fig. 8. Treatment time to decrustation (days). (A) Comparison of acupuncture treatment alone and Western medicine treatment. (B) Comparison of add-on acupuncture treatment (acupuncture + Western medicine) and Western medicine treatment. SD, standard deviation; IV, mean weighted difference; CI, confidence interval.

14. Heterogeneity of results

When results showed significant heterogeneity, we performed a sensitivity analysis based on the interventions and number of treatments. In the VAS for acupuncture alone, a too-large initial value (Li et al. 2009 [28]) or variation outside the average (Zhang et al. 2009 [21], Liu et al. 2013 [19]) affected the heterogeneity (Table 2).

15. Publication bias

The funnel plot for the total effective rate of acupuncture alone in the treatment of HZ showed asymmetry, and the Egger regression p value was 0.0149, which suggest the presence of publication bias in the literature included in this meta-analysis. After applying the trim-and-fill method, the results were corrected from OR 3.54, 95% CI 2.32 to 5.40, $p < 0.00001$, to OR 2.74, 95% CI 1.82 to 4.14, $p < 0.0001$, which showed a decrease in effectiveness.

The funnel plot for the total VAS with acupuncture alone in the treatment of HZ showed no obvious asymmetry, and the Egger regression p-value was 0.1826, suggesting a lack of any obvious publication bias in the literature included in this meta-analysis. The results for other outcomes also showed no obvious publication bias.

The results of the systematic review are reliable.

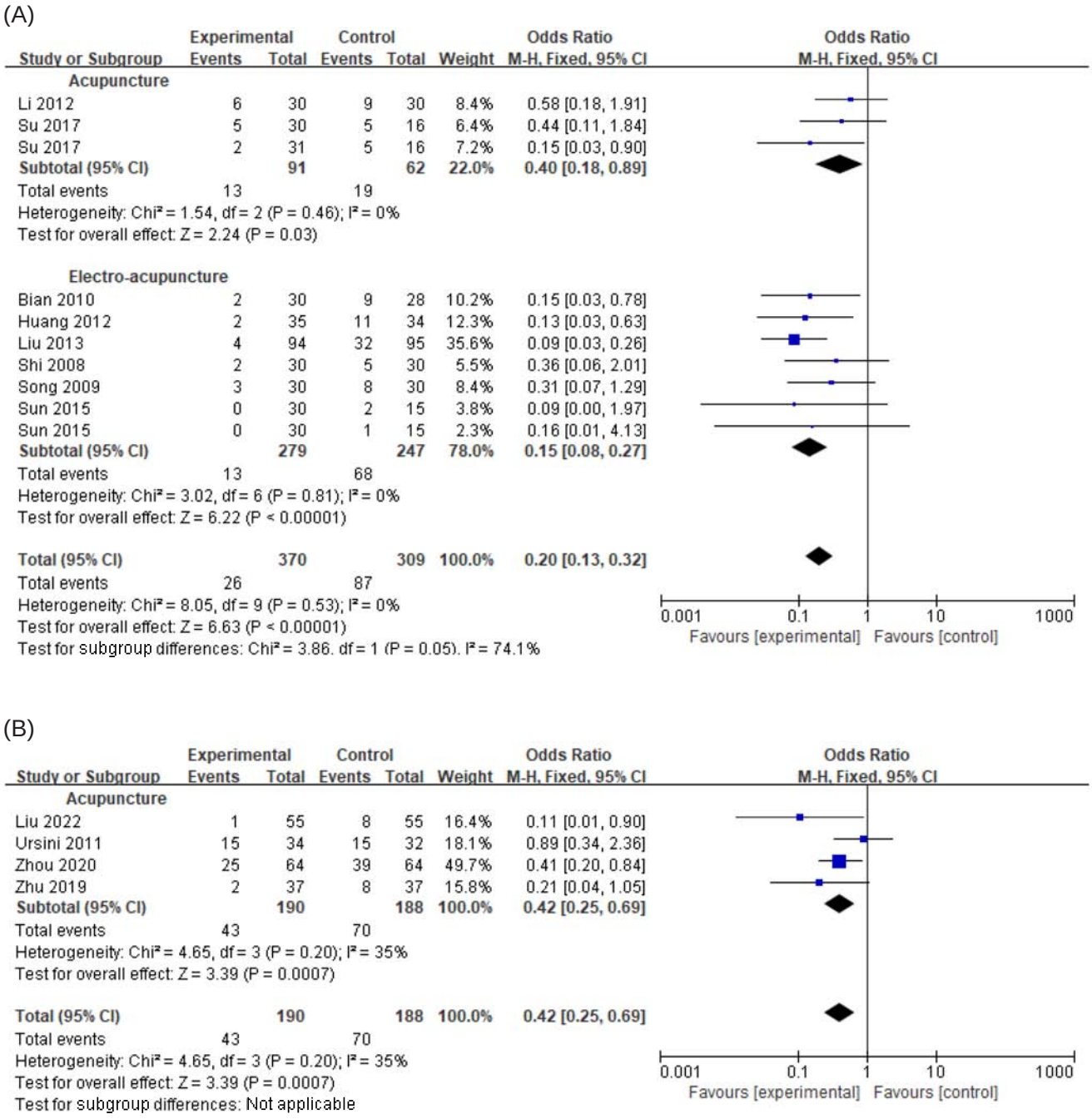


Fig. 9. Incidence of post-herpetic neuralgia. (A) Comparison of acupuncture treatment alone and Western medicine treatment. (B) Comparison of add-on acupuncture treatment (acupuncture + Western medicine) and Western medicine treatment. M–H, Mantel–Haenszel; CI, confidence interval.

DISCUSSION

Virus dormant in the human ganglion reemerges when immunity is weakened due to age, stress, and use of pharmaceuticals. This causes nerve damage and evokes severe pain together with skin lesions consisting of rash, blisters, and crustation. Western medicine treats this condition with antiviral and analgesic medications. Antiviral medication relieves pain and shortens the acute phase by depressing virus replication. The number of patients experiencing PHN even after treatment and the side effects of medications suggest a need for alternative or accompaniment treatments. This study attempted to reveal the efficacy and safety of acupuncture in the

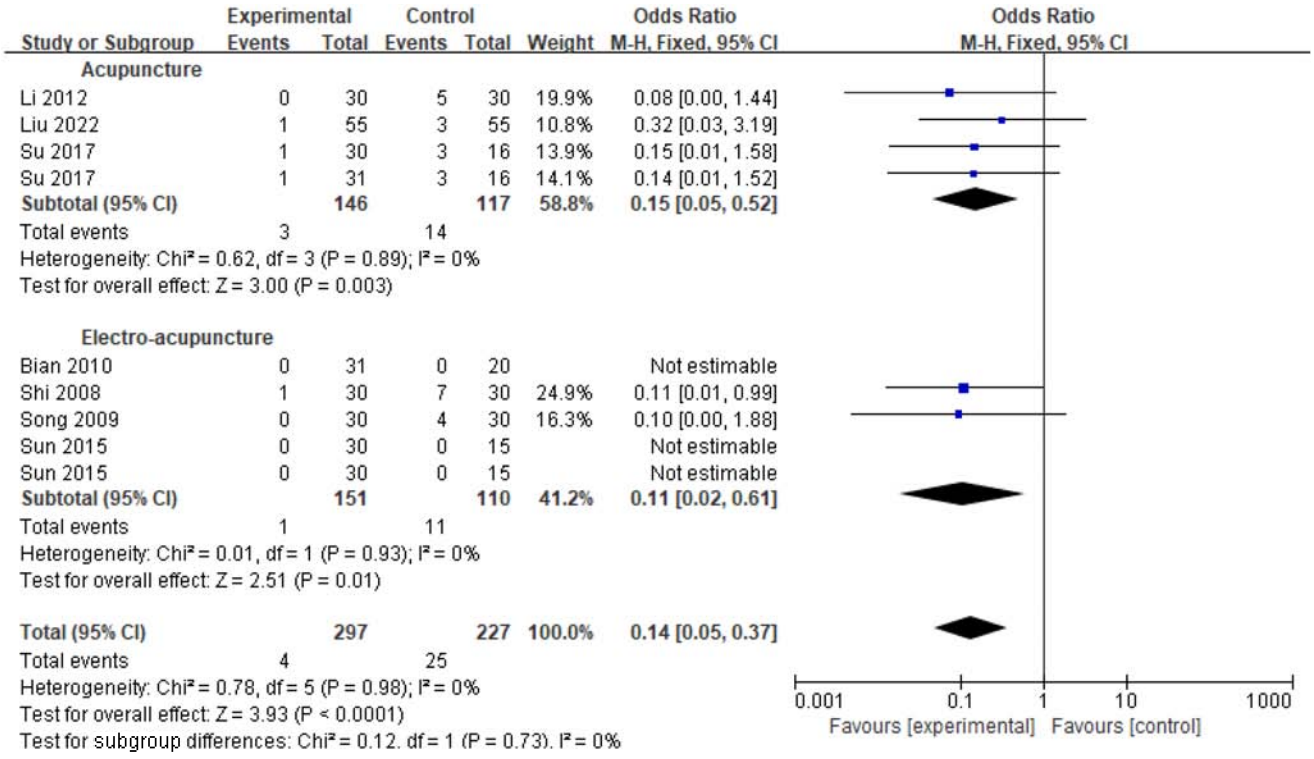


Fig. 10. Incidence of adverse events. M–H, Mantel–Haenszel; CI, confidence interval.

Table 2. Sensitivity analysis of visual analog scale for pain in treatment with acupuncture alone

Study	SMD	95% CI	I^2 (%)	*p*-value
Li 2012 [30]	0.78	0.51–1.05	61	<0.0001
Su 2017 [16]	0.78	0.52–1.05	61	<0.0001
Su 2017 [16]	0.76	0.50–1.03	62	<0.0001
Zhang et al. 2009 [21]	0.67	0.47–0.87	32	<0.0001
Zhou et al. 2020 [31]	0.76	0.50–1.03	62	<0.0001
Bian 2010 [24]	0.79	0.52–1.06	60	<0.0001
Li et al. 2009 [28]	0.66	0.45–0.87	36	<0.0001
Liu et al. 2013 [19]	0.81	0.54–1.07	54	<0.0001
Song 2009 [23]	0.78	0.51–1.05	62	<0.0001
Sun et al. 2015 [17]	0.76	0.49–1.03	62	<0.0001
Sun et al. 2015 [17]	0.76	0.50–1.03	62	<0.0001

SMD, standardized mean difference; CI, confidence interval.

acute phase of HZ.

Our meta-analysis on the effective rate, VAS, time to pain reduction, time to skin symptoms reduction, and incidence of PHN from 22 studies showed that acupuncture has advantages in all categories. Additionally, the risk of adverse effects is lower with acupuncture alone than with either Western medicine alone or Western medicine combined with acupuncture. Regarding heterogeneity, we performed a sensitivity analysis for the primary outcome (VAS) and found that cases with a high initial value or a value difference outside the average created heterogeneity. In secondary outcomes, considering that the results showing high heterogeneity were time-related items, the heterogeneity was thought to be influenced by the patients' stage at the time of study enrollment. Predicting the exact stage of a patient is difficult, and studies stated only that the patient's condition with the virus at the time of enrollment was 0–7. Furthermore, considering that HZ is a disease with changing symptoms, it might be a cause of the heterogeneity related to time categories.

Taken together, these results suggest that acupuncture could be a reasonable treatment for patients with HZ. Acupuncture is known to be safe because it rarely has adverse effects. Both acupuncture and EA can be used for treatment. Either technique can be used mainly by stimulating the area around the affected area or by selecting a meridian such as Governor Vessel, Bladder, or Extra point B2, which is the spinal segmental approach. Acupuncture can be applied for people who cannot take medicine for some reason or who are already using a medication. Considering that people develop HZ due to weakened immunity, old age, and complications of exist-

ing diseases, this external treatment can be considered effective. It not only reduces the duration of illness, but also the occurrence of PHN.

However, this study has some limitations. First, no uniformity in the protocols of the included studies was evident. The method of acupuncture treatment, number of treatments, sex ratio, and age criteria will all affect the results depending on the study. Second, the included studies were conducted mostly in China, which results in a lack of regional diversity. Third, although causes for the heterogeneity in the included studies have been hypothesized, the risk of heterogeneity remains. Fourth, no study satisfied the criteria of blinding participants and personnel, which affects the results. Lastly, we analyzed acupuncture and EA at the same time, which could have resulted in methodologic error and increased heterogeneity. However, the included studies were insufficient to be compared separately. So, related studies must be carried out in future, and a more detailed analysis is needed.

Several systematic reviews that include various acupuncture treatment options or herbal treatments have been reported. Many included patients with PHN. However, we focused on acupuncture and EA, which doctors of Korean medicine use most for treatment as an intervention. We also limited our analysis to patients with HZ, excluding those with PHN. And we included studies from countries other than China. Further research is needed to address the limitations observed in our analysis. Although this study examining the effectiveness and safety of acupuncture in acute HZ has some limitations, it could be used as basic data for future studies of acupuncture in HZ.

CONCLUSION

The results of our meta-analysis suggest that acupuncture could be a reasonable treatment for patients with HZ who suffer from pain and have accompanying symptoms. Acupuncture treatment might also lower the possibility of PHN. However, there are some limitations related to the included studies, and further studies are needed to confirm our results. Nevertheless, this systematic review suggests that clinical evidence supports acupuncture as a treatment for HZ.

AUTHOR CONTRIBUTIONS

Conceptualization: EJK. Data curation: JHM, SKC. Formal analysis: WSS. Funding acquisition: EJK. Investigation: SDL, KHK. Methodology: WSS. Project administration: JHM, SKC. Supervision: EJK. Visualization: SKC. Writing – original draft: SKC. Writing – review & editing: SKC, JHM, WSJ, JEJ, SHP, CYJ, BKS, SDL, KHK, EJK.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

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ETHICAL STATEMENT

This research did not involve any human or animal experiment.

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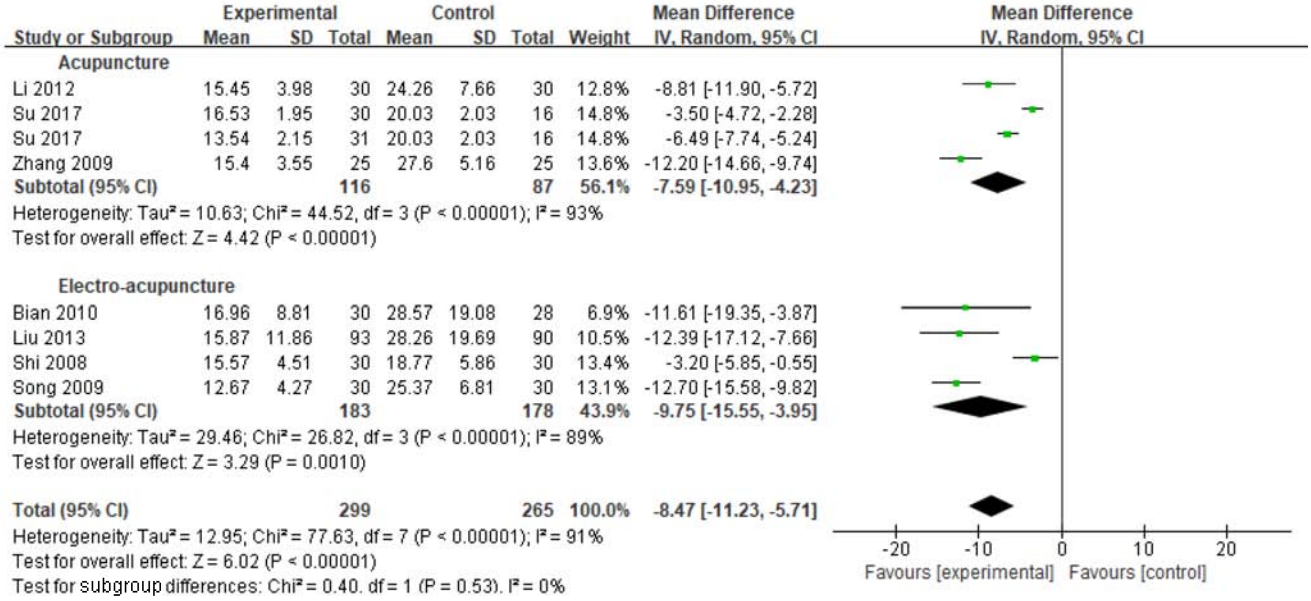
REFERENCES

1. Weinberg A, Levin MJ. VZV T cell-mediated immunity. Curr Top Microbiol Immunol 2010;342:341-357. doi: 10.1007/82_2010_31
2. HIRA. Statistics on subcategories of disease (3-stage disease).

HIRA [Internet]. Wonju: 2022 Oct 26 [cited 2022 Dec 9]. Available from: http://opendata.hira.or.kr/op/opc/olap3thDsInfo.do
3. Almutairi N, Almutairi AN, Almazyad M, Alwazzan S. Herpes zoster in the era of COVID 19: a prospective observational study to probe the association of herpes zoster with COVID 19 infection and vaccination. Dermatol Ther 2022;35:e15521. doi: 10.1111/dth.15521
4. Guo Z. [The relationship between postherpetic neuralgia and involving nerve of clinical analysis]. Chin J Pract Nerv Dis 2015;2:93-94. Chinese. doi: 10.3969/j.issn.1673-5110.2015.02.058
5. Opstelten W, McElhaney J, Weinberger B, Oaklander AL, Johnson RW. The impact of varicella zoster virus: chronic pain. J Clin Virol 2010;48 Suppl 1:S8-S13. doi: 10.1016/S1386-6532(10)70003-2
6. Stankus SJ, Dlugopolski M, Packer D. Management of herpes zoster (shingles) and postherpetic neuralgia. Am Fam Physician 2000;61:2437-2444, 2447-2448.
7. Fleischer R, Johnson M. Acyclovir nephrotoxicity: a case report highlighting the importance of prevention, detection, and treatment of acyclovir-induced nephropathy. Case Rep Med 2010;2010:602783. doi: 10.1155/2010/602783
8. Opstelten W, Mauritz JW, de Wit NJ, van Wijck AJ, Stalman WA, van Essen GA. Herpes zoster and postherpetic neuralgia: incidence and risk indicators using a general practice research database. Fam Pract 2002;19:471-475. doi: 10.1093/fampra/19.5.471
9. Cui Y, Wang F, Li H, Zhang X, Zhao X, Wang D. Efficacy of acupuncture for herpes zoster: a systematic review and meta-analysis. Complement Med Res 2021;28:463-472. doi: 10.1159/000515138
10. Qi T, Lan H, Zhong C, Zhang R, Zhang H, Zhu F, et al. Systematic review and meta-analysis: the effectiveness and safety of acupuncture in the treatment of herpes zoster. Ann Palliat Med 2022;11:756-765. doi: 10.21037/apm-22-109
11. MacPherson H, Thomas K, Walters S, Fitter M. The York acupuncture safety study: prospective survey of 34 000 treatments by traditional acupuncturists. BMJ 2001;323:486-487. doi: 10.1136/bmj.323.7311.486
12. Higgins JP, Altman DG, Gøtzsche PC, Jüni P, Moher D, Oxman AD, et al. The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. BMJ 2011;343:d5928. doi: 10.1136/bmj.d5928
13. Cohen J. Statistical power analysis for the behavioral sciences. Lawrence Erlbaum Associates. 1987:1-17.
14. Thoma S. [Acute zoster neuralgia: changes in sensitivity during therapy with acupuncture or gabapentin in a randomized, placebo-controlled comparison] [thesis]. Munich: LMU Munich; 2012. German.
15. Ursini T, Tontodonati M, Manzoli L, Polilli E, Rebuzzi C, Congedo G, et al. Acupuncture for the treatment of severe acute pain in herpes zoster: results of a nested, open-label, randomized trial in the VZV Pain Study. BMC Complement Altern Med 2011;11:46. doi: 10.1186/1472-6882-11-46
16. Su CH. Clinical study on cold-reducing needling technique for herpes zoster of liver meridian Yuheat type [thesis]. Gansu: Gansu University; 2017.
17. Sun YZ, Li L, Yu TY. Therapeutic observation of electroacupuncture for herpes zoster. Shanghai J Acupunct Moxib 2015;34:1046-1049. doi: 10.13460/j.issn.1005-0957.2015.11.1046
18. Li XW, Yang YK, Xie XM, Bai LN, Zhang XS. Economic evaluation of treating herpes zoster with various methods of acupuncture and moxibustion. J Tradit Chin Med 2012;32:125-128. doi: 10.1016/s0254-6272(12)60045-4
19. Liu YH, Yang YK, Chen HP, Luo R, Dou C, Lin GH, et al. [Different acupuncture methods in the treatment of herpes zoster observation of analgesic effect in RCT clinical study]. Lishizhen Med Mater Med Res 2013;24:164-166. Chinese.
20. Mao BZ, Zhang HF, Feng JQ, Zhang LK, Wang YX, et al. Therapeutic observation of surround needling plus high-energy red light for herpes zoster. Shanghai J Acupunct Moxib 2015;34:351-352. doi: 10.13460/j.issn.1005-0957.2015.04.0351
21. Zhang HX, Liu YN, Huang GF, Zou R, Wei W. [Observation on the analgesic effect of different acupuncture methods on herpes zoster]. J Emerg Tradit Chin Med 2009;18:1979-1980, 1996. Chinese.
22. Shi ZH. The study of clinical effect of treating acute herpes zoster with electric acupuncture combining with circling needles [thesis]. Guangzhou: Guangzhou University; 2008.
23. Song YN. The study of the clinical effect of treating acute herpes zoster with electroacupuncture [thesis]. Guangzhou: Guangzhou University; 2009.
24. Bian W. Clinical randomized controlled trial study on combination of surrounding acupuncture and electro-acupuncture for treating acute herpes zoster [thesis]. Cheongdu: Chengdu University; 2010.
25. Chen CY. Correlative analysis on therapeutic efficacy and patients' satisfaction of different acupuncture methods for treating acute herpes zoster. J Anhui TCM Coll 2012;31:47-51. doi: 10.3969/j.issn.1000-2219.2012.04.016
26. Ding XD. Clinical observation on the treatment of 59 cases of herpes zoster with acupuncture and TDP therapy. Guiding J TCM 2006;12:44-50. doi: 10.13862/j.cnki.cn43-1446/r.2006.03.022
27. Huang GF. Influence of different methods of acupuncture and moxibustion on incidence of neuralgia following herpes zoster. Chin J Rehabil 2012;27:104-105. doi: 10.3870/zgkf.2012.02.010
28. Li X, Zhang HX, Huang GF, Feng YF, Zou R. Observation on the therapeutic effect of electroacupuncture of Jiaji (EX-B 2) plus regional encircled needling for herpes zoster. Zhen Ci Yan Jiu

2009;34:125-127, 135.
29. Zheng Y, Zhang MB, Jin L. Clinical observation on herpes zoster by Jie-gen treatment with acupuncture syndrome differentiation. J Liaoning Univ Tradit Chin Med 2011;13:222-223. doi: 10.13194/j.jlunivtcm.2011.05.224.zhengy.067
30. Li NQ. The study of the clinical effect of treating acute herpes zoster with Shu Zhua Ci method [thesis]. Guangzhou: Guangzhou University; 2012.
31. Zhou SM, Sheng JQ, Hong QM. [Clinical study on surrounding acupuncture method with thumbtack needle combined with routine therapy for herpes zoster at acute stage]. J New Chin Med 2020;52:133-136. Chinese. doi: 10.13457/j.cnki.jncm.2020.23.038
32. Zhu XX. Therapeutic effect of press needle surround acupuncture on acute neuralgia of herpes zoster [thesis]. Nanjing: Nanjing University; 2019.
33. Li JW. [Clinical observation of scalp acupuncture for herpes zoster]. J Clin Acupunct Moxib 2006;22:32-33. Chinese.
34. Zhou RH. [Clinical observation of acupuncture on herpes zoster]. Qinghai Med J 2018;48:64-65. Chinese.
35. Liu XH. Effects of acupuncture combined with conventional western medicine on patients with herpes zoster. Med J Chin People's Health 2022;34:95-97.



Appendix 1. Treatment time to pain elimination (days). SD, standard deviation; IV, weighted mean difference; CI, confidence interval.