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Efficacy and safety of acupuncture combined with bone-setting in the treatment of cervical vertigo: A systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

Support - Beijing Hospital of Integrated Traditional Chinese and Western Medicine.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 8 August 2025 and was last updated on 8 August 2025.

INTRODUCTION

Review question / Objective Cervical vertigo (CV) is a common clinical syndrome characterised by dizziness associated with cervical dysfunction, especially vertebral arterial cervical spondylosis. Although acupuncture and bone-setting are widely used in CV treatment, there remains uncertainty about the optimal protocol and efficacy of the two in combination. This study aimed to evaluate systematically the effectiveness and safety of acupuncture combined with bone-setting in the treatment of CV.

Condition being studied Cervical vertigo (CV) refers to a clinical syndrome with vertigo as the main manifestation caused by abnormal cervical spine structure or function. Its pathogenesis is complex and may involve various factors, such as cervical proprioception, the vestibular system and the vertebral artery (VA) blood supply.

METHODS

Search strategy In accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guideline manual, systematic searches were conducted in five English databases (PubMed, the Cochrane Library, Embase, the Web of Science and the National Library of Medicine) and four Chinese databases (the China National Knowledge Infrastructure, the Wanfang Database, the China Biomedical Literature Database and the VIP Chinese Science and Technology Journal Full-text Database). The search period covered from the establishment of the databases until 31 January 2025. The search was conducted using a combination of subject terms and free words, and the search strategy was determined after multiple pre-searches. Additionally, a grey literature search was carried out; this involves contacting experts in the field and corresponding authors to obtain important information that was not obtained through the above search. A manual search of

relevant journals and books was also conducted, and the references of the included studies were traced to supplement the acquisition of relevant literature. The search terms were as follows: (1) 'Bone-setting' OR 'Bone Setting' OR 'Chinese Osteopathy' OR 'Chiropractic manipulation'; (2) 'Acupuncture and Moxibustion' OR 'Acupuncture' OR 'Traditional Chinese acupuncture' OR 'Electroacupuncture' OR 'fire acupuncture' OR 'warm acupuncture'; (3) 'Cervical Vertigo' OR 'Vertebral Artery Cervical Spondylosis' OR 'CV'.

Participant or population Patients with CV who meet the diagnostic criteria of Western and traditional Chinese medicine.

Intervention Received bone-setting therapy combined with traditional acupuncture therapy; acupuncture specifics – selection of acupoints, manipulation techniques and needle retention time were unrestricted; bone-setting specifics – school/sect affiliation of bone-setting or chiropractic practitioners was not restricted.

Comparator Received either traditional acupuncture therapy (including electroacupuncture, fire needling and warm needling) or bone-setting therapy (including bone-setting, chiropractic manipulation and manual reduction tuina).

Study designs to be included Primary outcome – overall clinical efficacy rate, categorised as 'clinical cure' ,'markedly effective','effective' , 'ineffective',postoperative mean flow velocity (Vm) in the VA and BA and the postoperative quality of life score.

Eligibility criteria Inclusion criteria
(1)Study type: RCTs.
(2)Study participants: patients with CV who meet the diagnostic criteria of Western and traditional Chinese medicine.
(3)Interventions: control group – received either traditional acupuncture therapy (including electroacupuncture, fire needling and warm needling) or bone-setting therapy (including bone-setting, chiropractic manipulation and manual reduction tuina); experimental group – received bone-setting therapy combined with traditional acupuncture therapy; acupuncture specifics – selection of acupoints, manipulation techniques and needle retention time were unrestricted; bone-setting specifics – school/sect affiliation of bone-setting or chiropractic practitioners was not restricted. Other interventions were consistent between both groups.
Acupuncture and bone-setting therapy are common methods of traditional Chinese medicine to treat this disease; however, their efficacy is greatly affected by the operator's experience. To this end, the studies included in this study all adopted the standard operating procedures described in the Diagnostic Efficacy Standards for Traditional Chinese Medicine Syndromes issued by the State Administration of Traditional Chinese Medicine or expert consensus to maximise the reproducibility of treatment.
(4) Outcome measures: primary outcome – overall clinical efficacy rate, categorised as 'clinical cure' (disappearance of clinical symptoms and signs, restoration of normal neck function), 'markedly effective' (substantial disappearance or alleviation of clinical symptoms and signs and restoration of normal neck function, with only mild symptoms occurring during fatigue or weather changes that do not affect daily life), 'effective' (reduction in clinical symptoms and signs compared with pre-treatment but with some residual symptoms/signs or functional impairment), 'ineffective' (no improvement or worsening of symptoms and signs compared with pre-treatment). Total effective rate = clinical cure + markedly effective + effective. Secondary outcomes – postoperative CV symptom and functional assessment score, postoperative mean flow velocity (Vm) in the VA and BA and the postoperative quality of life score.
Exclusion criteria
(1) Studies investigating the mechanisms of CV.
(2) Clinical studies primarily focusing on cervicogenic cervical spondylosis, lumbar disc herniation, sacroiliac joint dysfunction or other cervical/lumbosacral spine disorders.
(3) Studies with non-compliant diagnostic criteria or irrelevant outcome measures.
(4) Studies using non-traditional acupuncture therapies (e.g. acupotomy, traction).
(5) Duplicate publications.

Information sources In accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guideline manual, systematic searches were conducted in five English databases (PubMed, the Cochrane Library, Embase, the Web of Science and the National Library of Medicine) and four Chinese databases (the China National Knowledge Infrastructure, the Wanfang Database, the China Biomedical Literature Database and the VIP Chinese Science and Technology Journal Full-text Database). The search period covered from the establishment of the databases until 31 January 2025. The search was conducted using a combination of subject terms and free words, and the search strategy was determined after multiple pre-searches. Additionally, a grey literature search

was carried out; this involves contacting experts in the field and corresponding authors to obtain important information that was not obtained through the above search. A manual search of relevant journals and books was also conducted, and the references of the included studies were traced to supplement the acquisition of relevant literature. The search terms were as follows: (1) 'Bone-setting' OR 'Bone Setting' OR 'Chinese Osteopathy' OR 'Chiropractic manipulation'; (2) 'Acupuncture and Moxibustion' OR 'Acupuncture' OR 'Traditional Chinese acupuncture' OR 'Electroacupuncture' OR 'fire acupuncture' OR 'warm acupuncture'; (3) 'Cervical Vertigo' OR 'Vertebral Artery Cervical Spondylosis' OR 'CV'.

Main outcome(s) Overall clinical efficacy rate

A total of 15 literature studies reported the overall clinical efficacy rate. There was no heterogeneity among the studies (I2 = 0.0%). A meta-analysis using the fixed-effect model was conducted as shown in Figure 2. The difference in the overall clinical efficacy rate between the treatment group and the control group was statistically significant (OR = 3.88, 95% CI: 2.89, 5.19, $p < 0.001$), and the overall clinical efficacy rate of the treatment group was higher than that of the control group. The sensitivity analysis was performed by eliminating each study individually. No study was found to have an impact on the combined effect value.

Symptoms and functional assessment scores of cervical vertigo

A total of 10 literature studies reported the symptoms and functional assessment scores of CV. There was a high degree of heterogeneity among the studies (I2 = 92.0%). A meta-analysis was conducted using the random effects model, as shown in Figure 3. Compared with acupuncture alone or osteopathy treatment, the combination of acupuncture and osteopathy for treating CV resulted in significantly better symptoms and functional assessment scores of CV in the experimental group than in the control group (MD = 4.01, 95% CI: 3.19, 4.83, $p < 0.001$). Through sensitivity analysis by eliminating studies one by one, it was found that after excluding Fu [16], the heterogeneity decreased to 84%, and the combined effect value still had statistical significance.

Additional outcome(s) Mean flow velocity of the vertebral artery

A total of six literature studies reported the Vm of the VA. There was a high degree of heterogeneity among the studies (I2 = 84.0%). A meta-analysis was conducted using the random effects model, as shown in Figure 4. Compared with acupuncture alone or bone-setting alone, the combination of acupuncture and bone-setting resulted in significantly higher Vm of VA in the experimental group than in the control group (MD = 3.21, 95% CI: 1.58, 4.84, $p < 0.001$). A sensitivity analysis was performed by eliminating studies one by one. It was found that after excluding Liu [15], the heterogeneity decreased to 78%, and the combined effect value still had statistical significance (Supplementary Figure 2).

Mean flow velocity of the basilar artery

Five studies reported the Vm of the BA. There is a high degree of heterogeneity among these studies (I2 = 92.0%). A meta-analysis using the random effects model was conducted as shown in Figure 5. Compared with acupuncture alone or bone-setting alone, the combination of acupuncture and bone-setting resulted in significantly higher Vm of the BA in the experimental group than in the control group (MD = 5.09, 95% CI: 0.78, 9.40, $p = 0.02$). Through sensitivity analysis by eliminating studies one by one, it was found that after removing Teng [21], the heterogeneity decreased to 86%, and the combined effect value was not statistically significant, which had a certain impact on the results.

Quality assessment / Risk of bias analysis The risk of bias in RCTs was assessed using the tool recommended by the Cochrane Handbook 5.1.0. The evaluation contents included the following: (1) random sequence generation; (2) allocation concealment; (3) blinding of participants and personnel; (4) blinding of outcome assessment; (5) incomplete outcome data; (6) selective reporting; (7) other biases. Each criterion was evaluated using 'low risk bias', 'high risk bias' or 'unclear'. The quality of the literature was classified into 3 levels: A (indicating complete compliance with the criteria), B (partial compliance) or C (complete non-compliance). In case of disagreement in the evaluation results, the third researcher was consulted.

Strategy of data synthesis The meta-analysis was conducted using Stata 16.0 (StataCorp LLC, College Station, TX, USA) and RevMan 5.4.1 software. Count data were expressed as odds ratio (OR) or rate (%) as the effect indicator, and measurement data were expressed as mean difference (MD) as the effect indicator. All effect values were presented as point estimates and 95% confidence intervals (CIs).

Subgroup analysis Heterogeneity was tested using the chi-squared test to determine the magnitude of heterogeneity. If 0.1, it was considered that the included studies were homogeneous and the fixed effect model (Mantel–

Haenszel) was used for analysis; if > 50% or p ≤ 0.1, it was considered that there was some heterogeneity among the included studies, and the DerSimonian–Laird random effect model was used for analysis.Funnel plots and Egger's test were used for publication bias analysis.

Sensitivity analysis Sensitivity analysis was performed by eliminating studies one by one to assess the impact of each included study on the combined effect indicators. The significance level for the meta-analysis was set at α = 0.05.

Country(ies) involved China.

Keywords Cervical vertigo; acupuncture therapy; acupoint.

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