

Review Article

Effectiveness of traditional Chinese medicine combined with Chinese massage therapy for enhancing cervical function in cervical spondylosis: a meta-analysis

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Abstract: Objective: To determine the relative effectiveness of Traditional Chinese medicine (TCM) formula combined with Chinese massage therapy (Tui Na) for cervical spondylosis (CS). Methods: A comprehensive search was conducted across multiple databases, including Wanfang, CNKI, Chinese Biomedical Literature, VIP, Embase, PubMed, Cochrane Library, and Web of Science. Studies were screened to include randomized controlled trials (RCTs) that examined the efficacy of TCM combined with Tui Na for CS. The clinical curative effect was evaluated by analyzing the effective rate, pain level (Visual Analogue Scale, VAS), and Neck Disability Index (NDI) score. Pooled and sensitivity analyses were performed, and risk of bias was evaluated. Results: A total of 11 studies met the inclusion criteria. Compared to Chinese Massage therapy alone, TCM combined with Tui Na exhibited a more pronounced reduction in VAS score (SMD: -1.72; 95% CI = [-2.57, -0.86]; $I^2 = 94.5\%$, $P < 0.001$) and also a significant improvement in NDI score (SMD = -0.61; 95% CI = [-1.78, 0.56]; $P < 0.0001$). The combined treatment resulted in a higher clinical efficacy compared to Tui Na alone (SMD: 0.87; 95% CI = [0.80-0.95]; $I^2 = 0\%$, $P = 0.978$), although the difference was not statistically significant. Quality of life were significantly improved in CS patients treated with combined therapy (SMD = 1.06, 95% CI = [0.03-2.09], $P = 0.001$). Conclusion: Traditional Chinese medicine encapsulation combined with Chinese massage therapy is effective in treating cervical spondylosis, significantly reducing the pain levels and improving cervical vertebral function.

Keywords: Traditional Chinese medicine encapsulation, chinese massage therapy, Tui Na, cervical spondylosis, clinical effect, meta-analysis

Introduction

Cervical spondylosis (CS) is a prevalent condition, affecting over 30% of the population [1], and is of significant clinical importance in the field of orthopedics. With increasing pressures from modern lifestyle changes, and an ongoing aging population, the prevalence of CS is rising steadily each year. Moreover, the condition is increasingly affecting younger individuals, severely affecting their daily lives and work [2].

Currently, the management of CS primarily involves two main approaches: non-surgical and surgical interventions [3, 4]. Non-surgical treatments typically include the use of western medications aimed at dilating blood vessels, reducing blood viscosity, and improving micro-

circulation, as well as nerve block techniques [5]. Surgical options include decompression surgery, unciniate process resection, and intervertebral bone graft fusion [6-8]. While these treatments offer certain therapeutic benefits, they are associated with notable limitations, such as the side effects of non-surgical medications, and considerable trauma associated with surgical interventions, making them less suitable for widespread clinical application [9].

In contrast, traditional medicine, including traditional Chinese medicine (TCM), massage therapy, acupuncture, cupping, and physical therapy, offers a variety of therapeutic approaches for CS [10-13]. However, high-quality evidence to definitively establish the efficacy of TCM-based treatments remains insufficient. For in-

stance, one study found that acupuncture provides effective immediate relief for CS, though its long-term benefits are unsatisfactory [14]. Conversely, a meta-analysis indicated that pharmacopuncture, both as a standalone therapy and as an adjunct treatment, significantly alleviated pain in patients with CS [15]. These findings highlight the need for further research to better evaluate the effectiveness of traditional therapies in the treatment of CS. The efficacy of TCM in treating CS has been well-documented. Through various modalities such as acupuncture, moxibustion, and herbal medicine, TCM effectively alleviates pain and discomfort, contributing to an improved quality of life for patients [16]. However, its therapeutic effects may vary among individuals, often requiring prolonged treatment durations for optimal results. Additionally, the quality and standardization of certain TCM preparations still need of further refinement.

Tui Na therapy is another widely used approach for managing CS. By alleviating muscle tension and stiffness in the neck, improving local blood circulation, and reducing pain and discomfort, Tui Na helps restore functional balance. Through manual manipulation of the muscles and joints, it can also partially adjust the biomechanical alignment of the cervical spine. Many patients report immediate symptom relief following Tui Na therapy [17]. However, its efficacy is similarly influenced by individual variability, and in severe cases, Tui Na alone may not fully address the underlying problem. To achieve better outcomes, Tui Na often needs to be integrated into a comprehensive treatment regimen, typically involving multiple sessions over a sustained period to maintain its therapeutic effect. Furthermore, the available literature on Tui Na therapy is limited, with most studies being of low methodological quality.

Given these limitations, we propose a rigorous evaluation to determine whether combining TCM formula with Tui Na therapy yields superior outcomes compared to either treatment modality alone in the management of CS. This study aims to provide robust evidence to guide clinical practice and improve treatment strategies for this condition. The overall goal of this project is to determine the relative effectiveness and safety of TCM formula combined with Tui Na for CS.

Methods

Data sources

A systematic retrieval of randomized controlled trials (RCTs) on the combination of TCM and massage therapy for the treatment of CS was conducted. Eligible studies were identified through comprehensive electronic searches in multiple databases, including Wanfang, CNKI, Chinese Biomedical Literature, VIP, Embase, PubMed, the Cochrane Library, and Web of Science, covering publications from their inception to June 2024. The search strategy utilized a combination of MeSH terms and keywords, including: (((“traditional Chinese medicine encapsulation” [Mesh]) OR ((((((Chinese medicine encapsulation [Title/Abstract]) OR (traditional [Title/Abstract]))) AND (massage [Title/Abstract]))) OR (Tui Na [Title/Abstract]))) AND (“cervical spondylosis”) AND ((randomized controlled trial [Publication Type] OR randomized [Title/Abstract] OR placebo [Title/Abstract])). This meta-analysis has been pre-registered in the International Prospective Register of Systematic Reviews (PROSPERO) under the registration number CRD42024610870.

Inclusion and exclusion criteria of literature

Inclusion criteria: (1) Research type: RCT investigating the combination of TCM and massage therapy for the treatment of CS; (2) Research subjects: The included studies had to meet one of the following diagnostic criteria for CS, regardless of the course of treatment, age, gender, or ethnicity. a. “Diagnostic and Therapeutic Standards of Traditional Chinese Medicine Diseases and Syndromes” promulgated by the State Administration of Traditional Chinese Medicine [18]; b. CS diagnostic criteria formulated with reference to “Expert Consensus on Classification, Diagnosis and Non-surgical Treatment of Cervical Spondylosis (2018)” [19]; (3) Intervention method: The treatment group received primarily TCM formula, including TCM injections and Chinese patent medicines, supplemented by Chinese Massage alone. The control group was treated with Chinese Massage alone; (4) Outcome indicators: at least one of following outcome indicators: total effective rate, Visual Analogue Scale (VAS) score, and Neck Disability Index (NDI) score.

Exclusion criteria: (1) Research subjects with cervical spondylosis that lack a clear syndrome

type, or those with other syndrome types or coexisting conditions that interfere with the results; (2) Studies where clinical intervention methods are mixed, making it impossible to determine if the RCT specifically investigates the combination of traditional Chinese medicine and massage for the treatment of cervical spondylosis; (3) Studies lacking clear outcome indices; (4) Repeatedly published literature; (5) Non-RCTs, such as animal experiment types, review types, and special medical case types.

Literature screening and data extraction

All collected literature was imported into End-Note X9 software for management. Duplicate entries were removed to ensure data accuracy. Subsequently, two researchers independently reviewed the titles and abstracts of the remaining studies and conducted an initial screening based on the predefined inclusion and exclusion criteria. Following this, the full texts of potentially eligible studies were thoroughly assessed to determine their final inclusion. In cases of disagreement, discussions were held to reach a consensus. If disagreements persisted, a third researcher was consulted, and a decision was made through voting, adhering to the principle of majority rule. This rigorous process ensured objectivity, consistency, and the reliability in study selection.

The full texts of studies meeting the inclusion criteria were carefully reviewed, and key characteristics were extracted, including the first author, year of publication, sample size, mean age, grouping methods, intervention strategies, intervention duration, follow-up period, and outcome indicators. These data were systematically documented using a Meta-analysis data collection form. To ensure accuracy and reliability, the extracted data were cross-verified by three independent researchers to avoid errors or omissions.

Evaluation of literature quality

The methodological quality of the included studies was assessed using the Risk of Bias assessment tool outlined in the Cochrane Handbook for Systematic Reviews of Interventions. The evaluation covered seven key domains: (1) random sequence generation, (2) allocation concealment, (3) blinding of participants and trial personnel, (4) blinding of outcome assessors, (5) handling of incomplete outcome data, (6) selective reporting of outcomes, and (7) ot-

her potential sources of bias. Each domain was categorized into one of three levels of risk—"low risk", "unclear risk", or "high risk"—following the Cochrane guidelines. The assessments were performed and annotated using Review Manager 5.4 statistical software, ensuring consistency and transparency throughout the evaluation process. This rigorous quality assessment framework provides a comprehensive understanding of the risk of bias across the included studies.

Statistical methods

Meta-analysis was performed using Review Manager (RevMan 5.3, Nordic Cochrane Center, Copenhagen, Denmark) and Stata 13.1 (Stata-Corp, College Station, Texas). The I^2 test was employed to assess heterogeneity. Based on the P value and I^2 value: when $P \leq 0.1$ or $I^2 > 50\%$, heterogeneity was assumed, and a random effects model was adopted; when $P > 0.1$ and $I^2 < 50\%$, homogeneity was assumed, and a fixed effects model was applied. For binary efficacy outcomes, the odds ratio (OR) was calculated, and for continuous outcomes, the mean difference (MD) was used, along with the 95% confidence interval (95% CI). An inverted funnel plot was employed to examine potential publication bias. Sensitivity analysis was performed by either sequentially excluding studies or using subgroup analysis to evaluate the robustness of the results.

Results

Literature search and study characteristics

A total of 296 studies were initially identified through the systematic search. After removing duplicates and irrelevant records, 194 potentially relevant studies remained. Subsequent exclusions were made for reviews, case reports, letters, and studies that did not meet the inclusion criteria. Ultimately, 11 studies [20-30] were included in the meta-analysis. The study selection process is illustrated in **Figure 1**, and the characteristics of the included studies are summarized in **Table 1**. All studies were conducted in China. Randomization in most trials was achieved using either computer-generated randomization lists or randomly generated number sequences. The overall quality of the included studies was assessed as moderate to high, as shown in **Figure 2**. This systematic selection process ensured the robustness and reliability of the meta-analysis findings.



PRISMA 2009 Flow Diagram

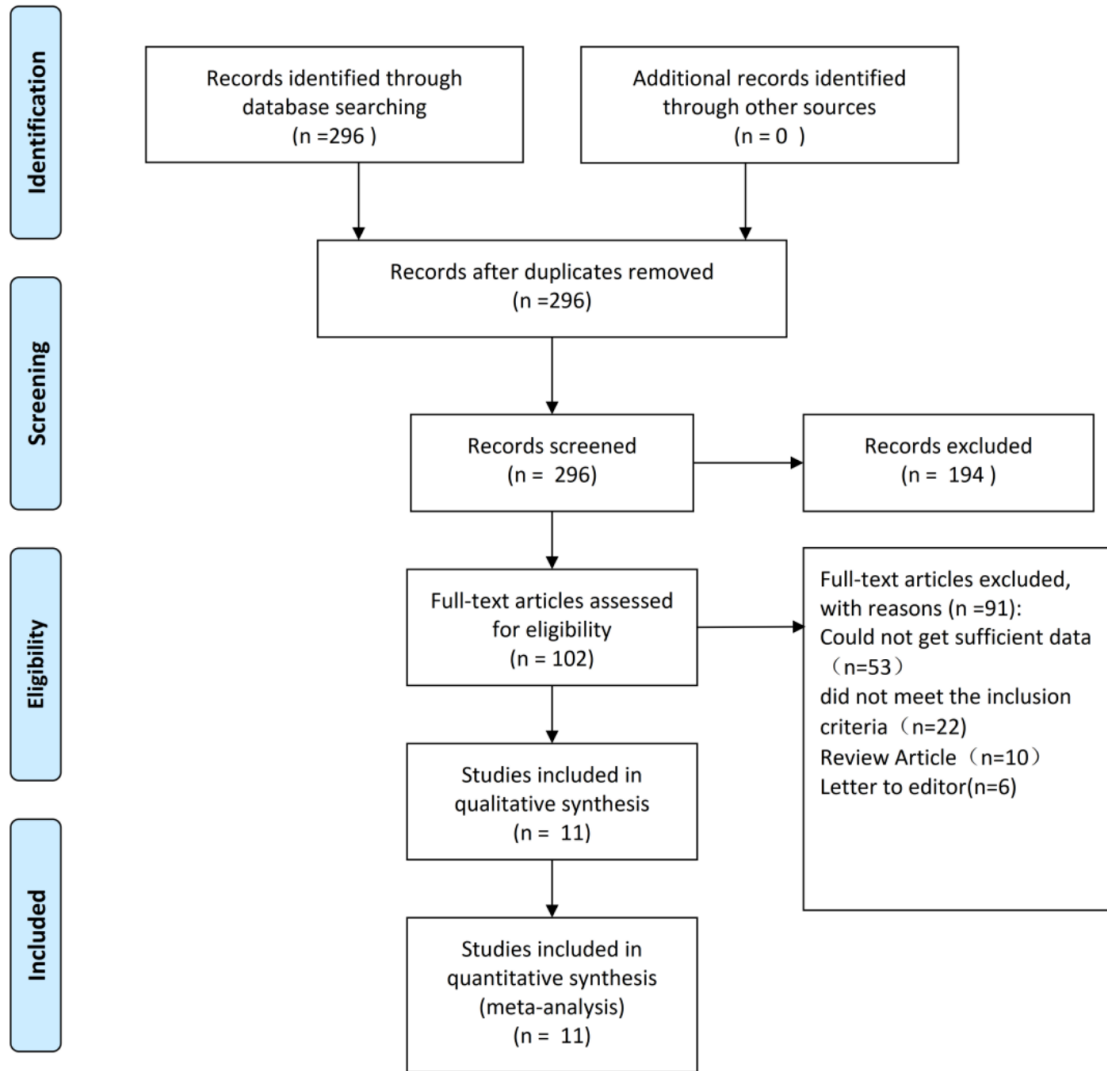


Figure 1. Flow diagram of literature search process.

Efficacy of TCM preparation combined with Chinese massage therapy on VAS score

Six studies [20-22, 26-28] evaluated the effect of TCM combined with Chinese massage therapy on the VAS score in patients with CS. The results indicated that the combination therapy achieved a significantly greater reduction in VAS scores compared to Chinese massage therapy alone (SMD = -1.72; 95% CI: [-2.57, -0.86]; $I^2 = 94.5\%$, $P < 0.001$) (Figure 3). This finding suggests that TCM in combination with Chinese massage therapy provides superior

pain relief compared to massage therapy alone, despite the observed heterogeneity among the studies.

Efficacy of TCM preparation combined with Chinese massage therapy on clinical effect

Nine studies [20-26, 28, 30] evaluated the clinical efficacy. The results demonstrated that the combined therapy achieved a slightly higher clinical effect compared to Chinese massage therapy alone (SMD = 0.87; 95% CI: [0.80-0.95]; $I^2 = 0\%$, $P = 0.978$) (Figure 4). However,

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Table 1. Basic characteristics of the included studies

Author/Year	Sample size	Course of disease		Interventions		NOS score	Outcome index
		Experimental group	Control group	Experimental group	Control group		
Dai 2024 [20]	25/25	8.92±4.35	9.34±3.68	TCM combined with dynamic stretching and manipulation massage	Acupuncture	7	Degree of pain, cervical function, range of motion of the cervical joint, curative effect and patient satisfaction
Liang 2020 [21]	35/35	3.42±0.65	3.50±0.56	TCM combined with traction and massage therapy	Traction and massage therapy	6	Cervical Spine Disability Index and Quality of Life Assessment Scale
Liu 2020 [22]	40/40	5.22±1.3	5.14±1.5	TCM combined with huolong cupping	TCM	7	Degree of pain, and curative effect
Meng 2020 [23]	19/19	Unknown	Unknown	TCM combined with massage	Massage	8	Clinical effect and range of joint motion
Xing 2016 [24]	70/70	Unknown	Unknown	TCM combined with cervical traction/ massage therapy	Cervical traction combined with massage therapy	7	Clinical effect
Yang 2019 [25]	60/60	3.1±0.3	3.3±0.4	TCM combined with dynamic stretching and manipulation massage	Acupuncture	6	Clinical effect
Fan 2024 [26]	40/40	Unknown	Unknown	TCM combined with massage	Massage	7	Clinical effect, VAS, NDI
Li 2024 [27]	67/67	21.44±6.85	20.76±7.12	TCM combined with massage	Massage	8	VAS, NDI
Wu 2024 [28]	75/72	4.61±0.74	4.74±0.26	TCM combined with massage	Massage	6	Clinical effect, VAS
Zhao 2023 [29]	54/53	9.31±2.28	9.78±2.14	TCM combined with massage	Massage	7	Clinical effect
Zhou 2022 [30]	28/28	Unknown	Unknown	TCM combined with massage	Massage	8	Clinical effect

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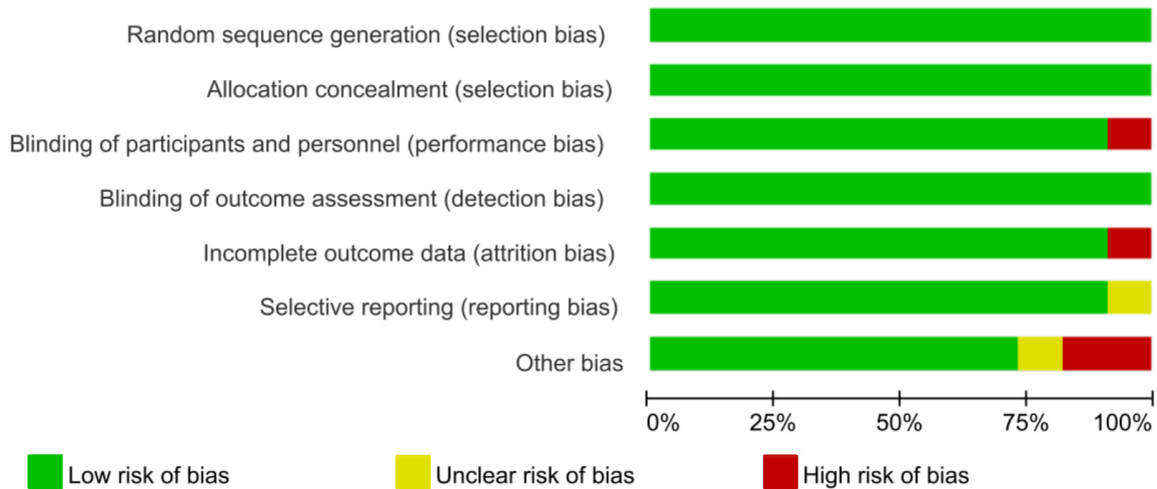


Figure 2. Assessment of risk of bias of included studies.

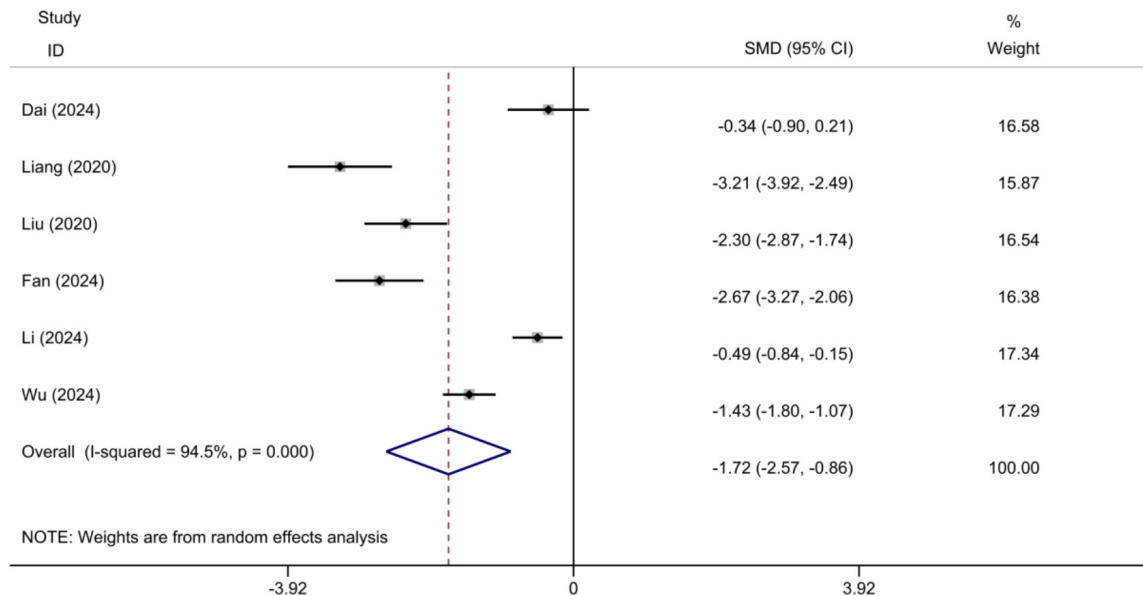


Figure 3. Forest plot of VAS score.

the difference was not statistically significant, indicating limited evidence to support the superiority of the combined treatment over massage therapy alone in terms of overall clinical effectiveness. This highlights the need for further high-quality studies to confirm these findings.

Efficacy of TCM preparation combined with Chinese massage therapy on NDI score

Five studies [20, 21, 25-27] assessed the clinical efficacy of traditional Chinese medicine (TCM) encapsulation combined with Chinese massage therapy for the treatment of cervical

spondylosis (CS), with the NDI score as the primary outcome. The combined therapy showed an overall standardized mean difference (SMD) of -0.61 (95% CI: [-1.78, 0.56], $I^2 = 96.9%$, $P = 0.000$) (Figure 5). The forest plot suggested that while there was variation across the studies, the overall result was a moderate effect size favoring the combined therapy over control.

Efficacy of TCM preparation combined with Chinese massage therapy on cervical vertebrae mobility

(1) Forward flexion: A meta-analysis of four eligible studies [20, 26-28] demonstrated a sig-

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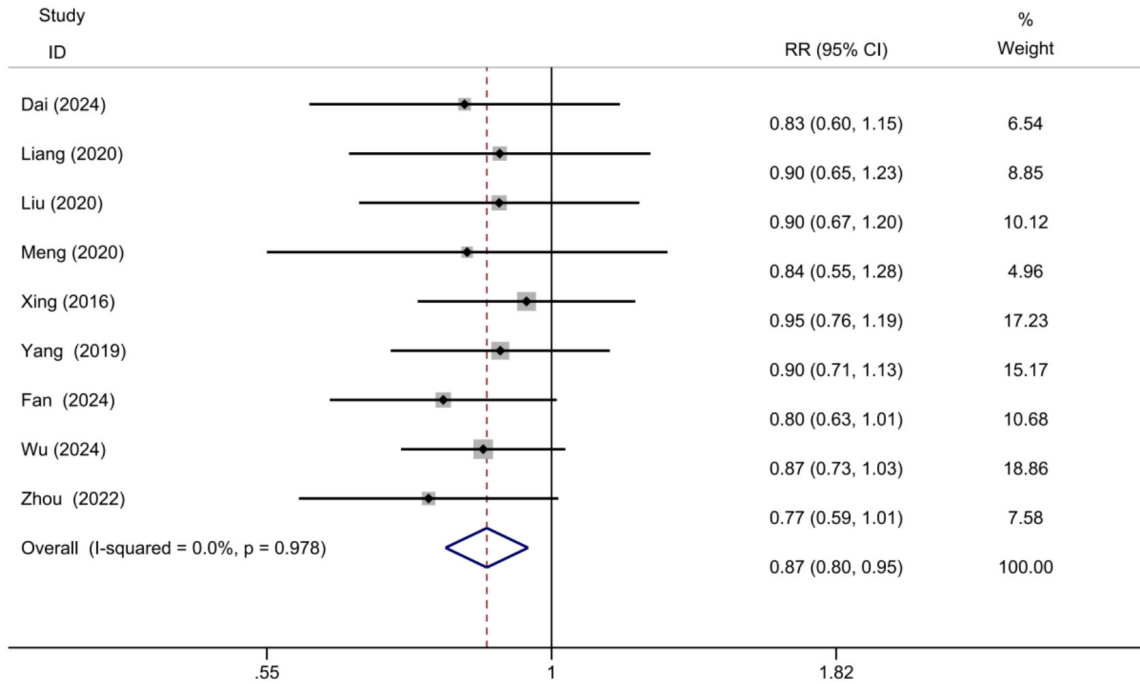


Figure 4. Forest plot of clinical effect.

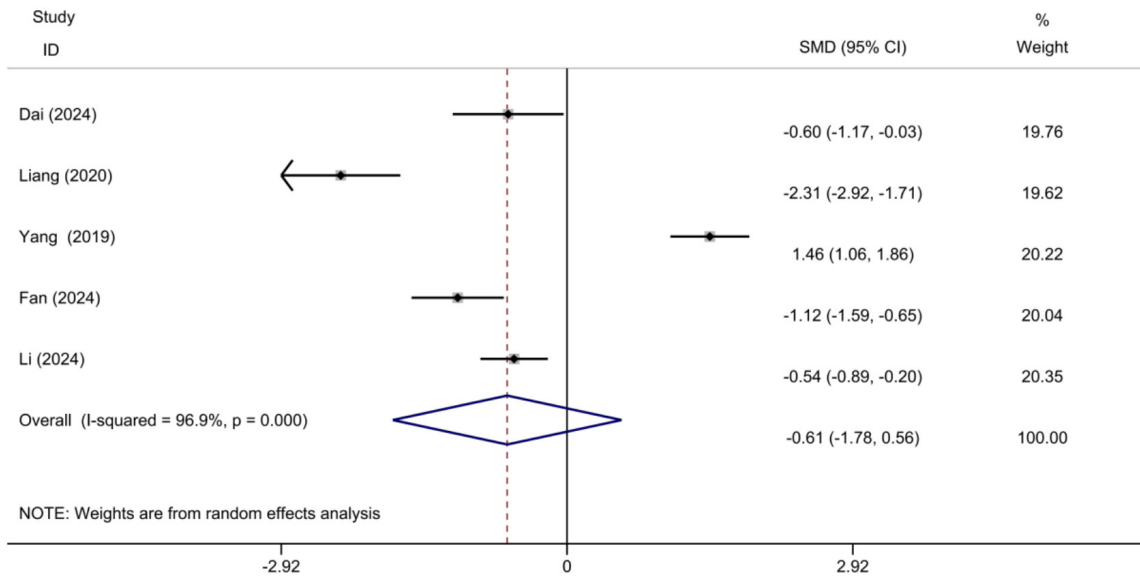


Figure 5. Forest plot of NDI score. NDI: Neck Disability Index.

nificant improvement in forward flexion among CS patients treated with TCM combined with Chinese massage therapy (SMD = 0.72, 95% CI: [0.37-1.07], P = 0.036, I² = 64.9%) (**Figure 6**).

(2) Backward extension: Data from three eligible studies [20, 26, 28] showed slightly better

improvement in backward extension after combined treatment (SMD = 0.71, 95% CI: [0.28-1.15], P = 0.059, I² = 64.7%). However, the improvement was not statistically significant (**Figure 6**).

(3) Left lateral flexion: A meta-analysis of three studies [20, 26, 28] revealed significant im-

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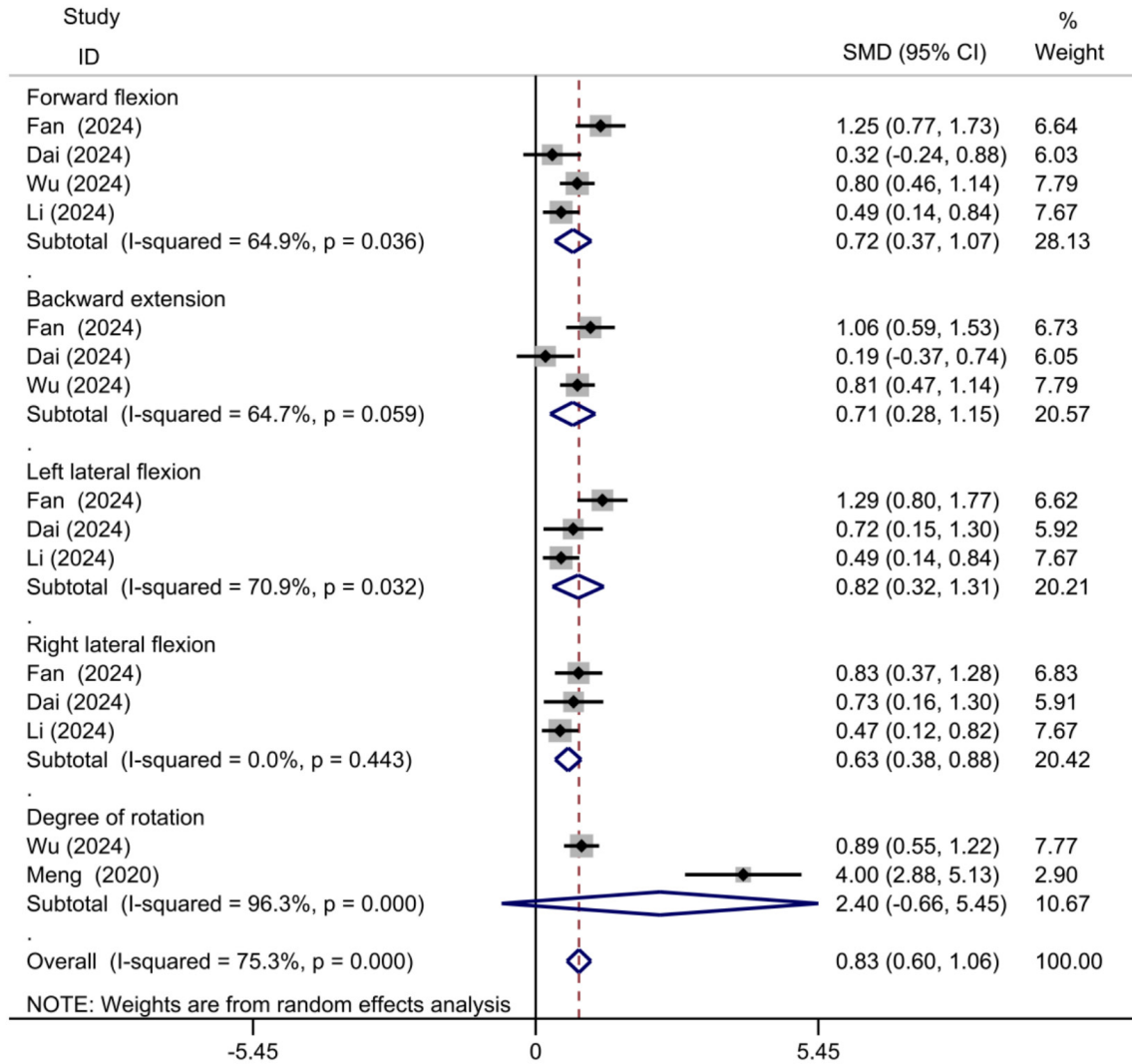


Figure 6. Forest plot of mobility of the cervical vertebrae.

provement in left lateral flexion after combined treatment (SMD = 0.82, 95% CI: [0.32-1.31], P = 0.032, I² = 70.9%) (**Figure 6**).

(4) Right lateral flexion: Data from three eligible studies [20, 26, 28] reported slightly better improvement in right lateral flexion in combined treatment cohort (SMD = 0.63, 95% CI: [0.38-0.88], P = 0.443, I² = 0%), and the group-difference was not statistically significant (**Figure 6**).

(5) Degree of rotation: Two studies [23, 28] reported a notable improvement in the degree of rotation (SMD = 2.40, 95% CI: [-0.66-5.45], P < 0.001, I² = 96.3%), demonstrating a significant difference despite high heterogeneity (**Figure 6**).

These findings suggest that TCM combined with Chinese massage therapy demonstrated superior improvements in forward flexion, left lateral flexion, and degree of rotation over single treatment modality in CS patients. However, improvements in backward extension and right lateral flexion were not statistically significant, underscoring the need for further research to confirm these outcomes.

Efficacy of TCM preparation combined with Chinese massage therapy on quality of life

The meta-analysis revealed that the quality of life in CS patients significantly improved following combined treatment with TCM and Chinese massage therapy (SMD = 1.06, 95% CI: [0.03-

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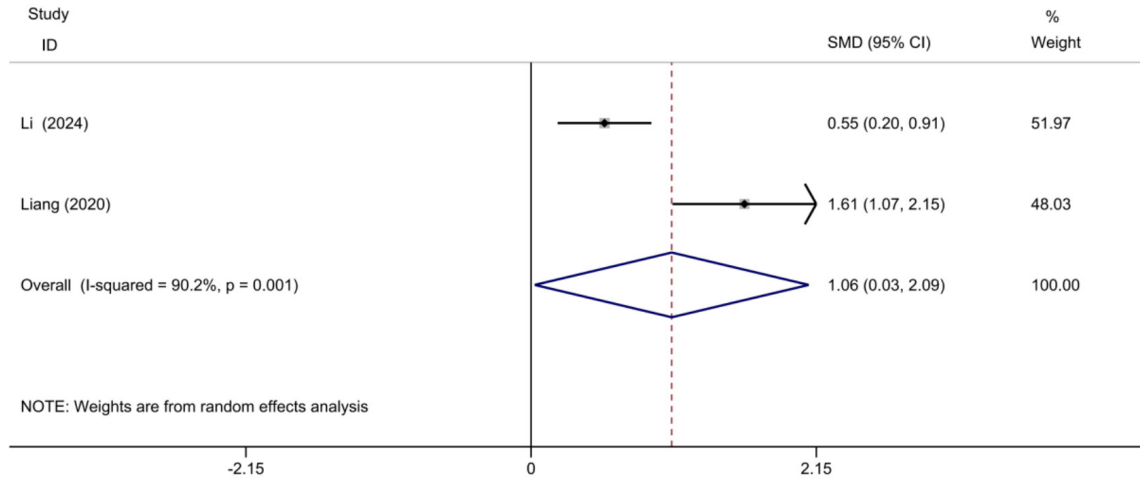


Figure 7. Forest plot of quality of life.

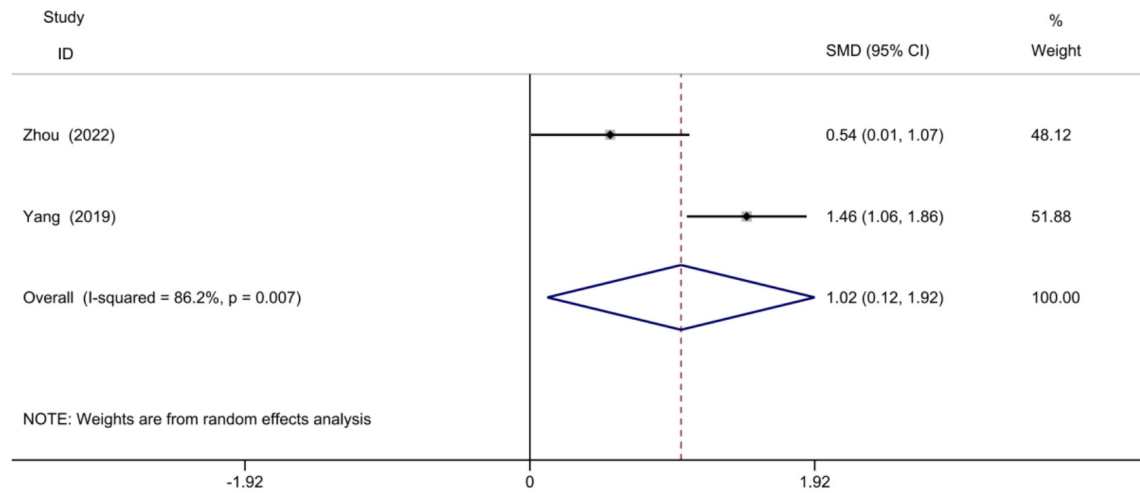


Figure 8. Forest plot of ESCV. Note: ESCV: evaluation scale for cervical vertigo.

2.09], $P = 0.001$, $I^2 = 90.2\%$) (**Figure 7**), highlighting the potential of the combined therapy to enhance patients' overall well-being despite the presence of high heterogeneity.

Efficacy of TCM preparation combined with Chinese massage therapy on ESCV (evaluation scale for cervical vertigo)

The meta-analysis demonstrated that the ESCV score significantly improved in CS patients treated with TCM combined with Chinese massage therapy (SMD = 1.02, 95% CI: [0.12-1.92], $P = 0.007$, $I^2 = 86.2\%$) (**Figure 8**), supporting the efficacy of the combined therapy in enhancing ESCV outcomes, despite the presence of moderate heterogeneity.

Publication bias

The funnel plots for each meta-analysis are presented in **Figure 9**. The symmetry observed in these plots, with many studies clustered near the central axis, suggests a relatively low risk of publication bias. This indicates that the findings are less likely to be significantly influenced by selective reporting or the preferential publication of studies with positive results.

Sensitivity analysis

The sensitivity analysis was conducted to assess the robustness of the results to changes in assumptions or methods. Excluding one study at a time and recalculating the pooled effect size showed that the pooled effect sizes

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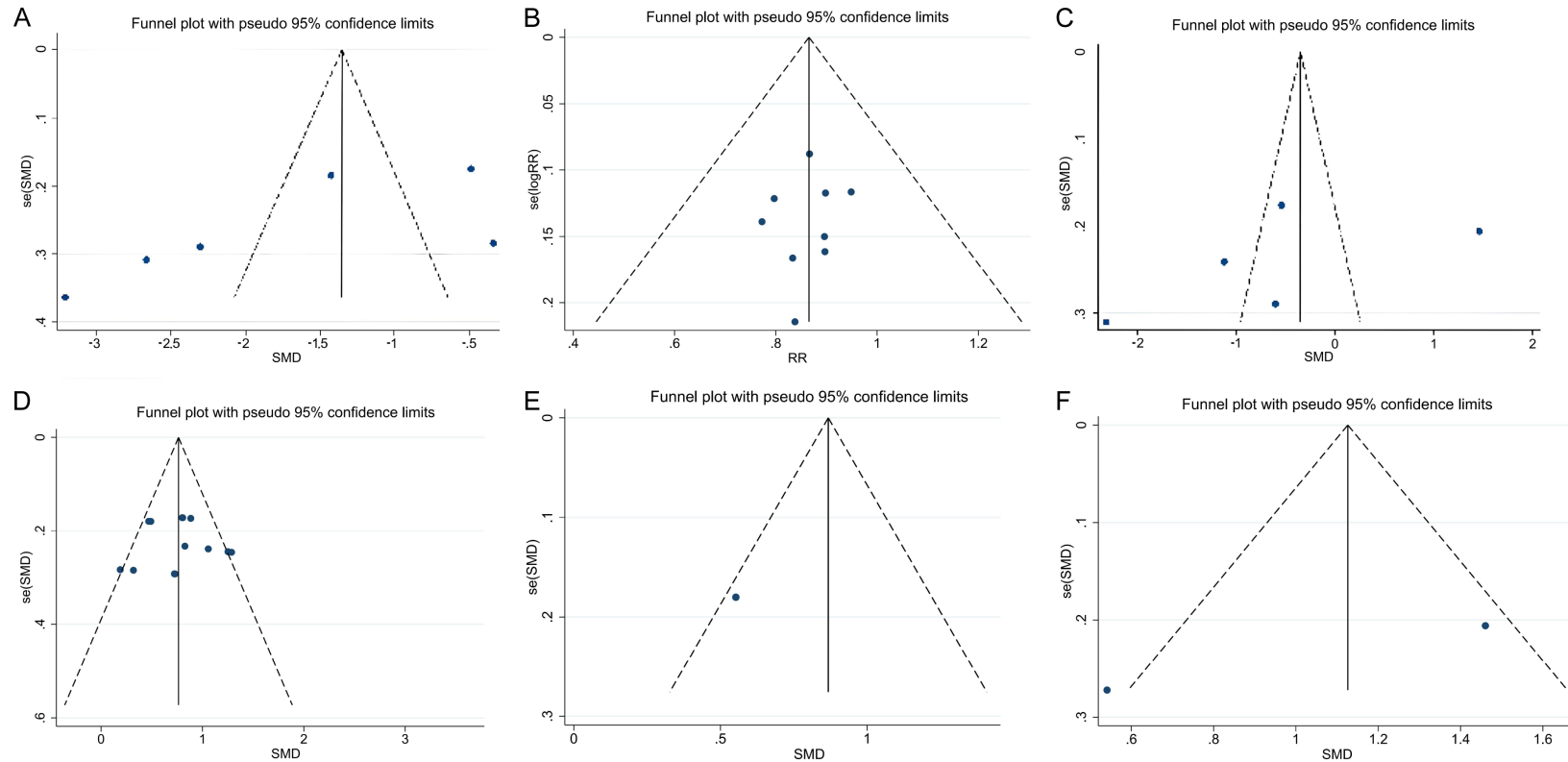


Figure 9. Publication bias analyzed using funnel plot. A. Publication bias for VAS score; B. Publication bias for clinical effect; C. Publication bias for NDI score; D. Publication bias for mobility of the cervical vertebrae; E. Publication bias for quality of life; F. Publication bias for ESCV. NDI: Neck Disability Index; ESCV: evaluation scale for cervical vertigo.

ranged from 1.15 to 1.22, with no significant changes when any single study was removed. This indicates a low sensitivity and high stability of this meta-analysis. Additionally, reanalyzing the data using an alternative model (Random-effect model) yielded similar results, with pooled effect sizes of 1.18 (95% CI: 1.10-1.26).

Discussion

This study conducted a comprehensive meta-analysis to evaluate the efficacy of TCM preparation combined with Chinese massage therapy for patients with cervical spondylosis (CS). Key outcome measures, including the VAS score, clinical efficacy, and NDI score, were analyzed to assess the therapeutic benefits and improvements in patients with CS.

In terms of pain relief, our analysis revealed that TCM combined with Tui Na therapy provided superior pain alleviation, as demonstrated by significant reductions in VAS scores. The therapeutic effects of TCM formula can be attributed to the active ingredients in the herbal formulations. First, these ingredients exhibit anti-inflammatory properties, effectively reducing inflammation in the cervical region and alleviating the associated pain [31, 32]. Secondly, certain components may enhance blood circulation, improving the delivery of oxygen and nutrients to cervical tissues while facilitating the removal of metabolic waste, thereby accelerating recovery and alleviating pain [28-30]. Additionally, some active compounds exert a regulatory effect on nerve function, reducing nerve irritation and consequently alleviating pain [33]. Massage therapy further enhances these benefits by influencing both the musculoskeletal and circulatory systems. It helps relax the muscles surrounding the cervical spine, alleviating tension and spasms commonly associated with cervical spondylosis, thereby providing pain relief. Furthermore, massage improves local blood circulation, enhancing the transport of essential nutrients and oxygen to the affected area [34]. Proper massage techniques may also contribute to realigning the vertebrae, improving the biomechanical balance of the cervical spine and relieving pressure on compressed nerves and soft tissues [35]. The combined effects of TCM formula and Chinese massage therapy-targeting inflammation, circulation, nerve function, and musculoskeletal balance-pro-

vide a synergistic therapeutic effect, resulting in significant and effective relief of cervical pain. This interaction highlights the potential of combined therapy for managing CS.

In terms of clinical efficacy, the meta-analysis demonstrated that the combination of TCM and Chinese massage therapy achieved a better clinical effect compared to Chinese massage therapy alone. However, the difference was not statistically significant. The therapeutic benefits of TCM are primarily attributed to its pharmacologically active ingredients, which promote blood circulation, reduce inflammation, and alleviate muscle tension. These actions improve microcirculation and metabolism in the cervical spine, facilitating tissue recovery and symptom relief [36]. Massage therapy further complements this by relaxing the cervical spine muscles, improving flexibility and range of motion, and partially correcting cervical misalignments [37]. Additionally, targeted massage techniques stimulate acupoints and tissues, regulating nerve function and enhancing therapeutic effects. Together, the combination of TCM and massage creates a synergistic effect that improves the physiological state of the cervical spine and effectively alleviates pain and discomfort associated with CS. Despite the promising trend favoring combined therapy, a lack of statistically significant results warrants further discussion. Possible reasons include: 1) Some studies may have had relatively small sample sizes, reducing the statistical power. 2) Variations in patient populations, treatment protocols, and evaluation criteria across studies may have contributed to inconsistencies in the results. 3) Differences in methodological rigor and standardization of individual studies may also have influenced the outcome. 4) Other possible factors, such as variations in practitioner expertise or unmeasured confounders, may not have been adequately controlled. Despite these limitations, the overall trend suggests that TCM combined and Chinese massage therapy offers an improved clinical efficacy. Future studies with larger sample sizes, standardized protocols, and better control of confounding factors are needed to validate these findings and further explore the use of this combined treatment.

In terms of NDI scores, the meta-analysis revealed that the combination of TCM and Tui Na therapy significantly reduced NDI scores com-

pared to the control group. This reduction highlights the efficacy of the combined treatment in improving the functional status of patients with CS. TCM formula typically contain a variety of herbal ingredients with pharmacologic properties such as promoting blood circulation, reducing inflammation, alleviating pain, and unblocking meridians. When applied to the affected area, these ingredients penetrate the tissues, enhancing local blood circulation and metabolism, relieving muscle tension, and reducing spasms [38]. Tui Na therapy further complements these effects through manual techniques such as kneading, pressing, and stretching, which directly target the muscles, joints, and soft tissues of the cervical spine [39]. These manipulations help relax tense muscles, improve joint mobility, correct cervical misalignment, and alleviate nerve compression. The combined use of TCM and Tui Na creates a synergistic effect, amplifying the therapeutic benefits. This combination not only improves blood flow and relaxes the muscles but also alleviates pain and discomfort, thereby contributing to a significant reduction in NDI scores. A lower NDI score reflects improved neck function and reduced disability, which are critical for enhancing the quality of life in patients with CS [40]. Additionally, the combined therapy may positively influence the body's physiological and biochemical processes, promoting tissue repair and regeneration, which further enhances overall outcomes. These findings suggest that the integration of TCM and massage therapy is a highly effective approach for managing CS and its associated disabilities.

This meta-analysis has several limitations to be acknowledged. First, the number of RCTs included in this analysis was relatively small, primarily due to the limited availability of published literature on this topic. Furthermore, there is a lack of research data from international studies, as all included studies were conducted domestically. Consequently, the findings of this meta-analysis may not be generalizable to foreign patient populations, limiting its global applicability. Second, many of the included studies had small sample sizes, resulting in a relatively small overall sample size. This may have increased the likelihood of random errors and reduce the statistical power of the analysis, potentially affecting the precision of the confidence intervals and the robustness of the conclusions. Third, the long-term effects and

safety of the combined treatment approach are not thoroughly addressed in the existing studies. Most included trials focus on short-term outcome, leaving gaps in understanding the sustained efficacy and potential risks of this treatment method over time. To address these limitations, future research should aim to include larger, multi-center, and high-quality RCTs involving diverse patient populations, particularly from international settings. Such studies will provide more comprehensive evidence to validate and generalize the findings of this meta-analysis.

Conclusion

This meta-analysis evaluated the efficacy of TCM combined with Chinese massage therapy (Tui Na) in patients with CS. The results demonstrate that the combined treatment provides significant therapeutic benefits, effectively alleviating pain and enhancing cervical spine function. These findings underscore the potential of integrating TCM and Tui Na therapy as a complementary and effective approach for managing cervical spondylosis.

Disclosure of conflict of interest

None.

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