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Research Article

Systematic Review and Meta-Analysis of the Evaluation of the Efficacy of Manipulation and Cervical Traction in the Treatment of Radical Cervical Spondylosis

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Background. With the accelerated pace of life in modern society, changes in work style, and the popularity of computers, the prevalence of cervical spondylosis (CSR) is increasing, and the age of onset is advancing. Once suffering from this disease, it is often difficult to cure and recurring, with complex clinical symptoms, causing a serious impact on human health. *Objective*. To evaluate the efficacy of manipulation and cervical traction in the treatment of radical cervical spondylosis. *Methods*. The PubMed, CNKI, and Wanfang databases were searched for literature. The literature related to this study was included according to selective criteria and inhibitory elimination criteria, and valuable information was selected for statistical analysis, resulting in a total of 11 randomized controlled trials with 994 subjects. *Results*. The short-term efficacy of manual treatment for CSR was superior to that of cervical traction alone ($P < 0.05$); subgroup analysis showed that the short-term efficacy of pulling or rotational manipulation was superior to that of cervical traction ($P < 0.05$). The mean difference between symptoms and manipulation VAS scores was higher before and after treatment when compared with cervical traction for CSR ($P < 0.05$); the subgroup analysis showed that VAS scores, upper extremity anesthesia scores, and survivorship scores were lower for pulling or rotating manipulation than for cervical traction ($P < 0.05$). *Conclusion*. The advantages of manual therapy in terms of short-term efficacy, VAS pain scores, neck pain, upper extremity anesthesia, and survivorship improvement provide a theoretical basis for its clinical impact.

1. Introduction

The cervical spine is the smallest, but the most flexible and the most frequently active joint in the spine, and it is located below the skull and above the thoracic vertebrae. In order to accommodate visual, auditory, and olfactory stimulus responses, the cervical spine needs to have greater and sharper mobility, so its range of motion is much greater than that of the thoracic and lumbar spine [1, 2]. Therefore, the cervical spine is not only one of the most important parts of the human body but also the most susceptible part of the human body, and cervical spondylosis is currently a common and frequent clinical disease. Cervical spondylosis, also known as cervical spine syndrome, is a disorder based on degenerative pathological changes, mainly manifested as neck and shoulder pain, dizziness and headache, numbness of the upper limbs, muscle atrophy, spasm of both lower limbs in severe cases, difficulty in walking, and even paralysis of the extremities, urinary, and fecal disorders [3, 4].

Since entering the new century, the incidence of cervical spondylosis has shown a significant trend of increase in recent years due to the increasing busyness of work, increasing competitive pressure, the widespread use of food additives, pesticides, and fertilizers, environmental pollution, and the increasing trend of aging as the average life expectancy of our people increases, and the disease has become one of the extremely common diseases in the departments of orthopedic injury, neurology, acupuncture, massage, and physical therapy [5, 6]. As electronic products such as smartphones and computers are widely used in all areas of people's lives, as well as the increase in study and work pressure and irregular living habits of teenagers and middle-aged people, cervical spondylosis is no longer the "patent" of the elderly, but the number of people suffering from cervical spondylosis, such as college students and white-collar workers, is increasing year by year. After a survey, it was found that the rate of cervical spondylosis among college students in some universities is as high as 79% [7, 8]. According to the relevant literature, the rate of cervical spondylosis in white-collar workers in some areas is 34%, but the symptoms of neck pain or numbness are as high as 54% [9, 10].

Currently, both surgical and nonsurgical treatment options are mainly used to treat cervical spondylosis at home and abroad. Many traumas of the cervical spine and the early treatment of cervical spondylosis can be treated nonoperatively, while in those cases with neurological impairment and spinal instability, surgical treatment should be adopted when nonoperative treatment has no significant effect. As medical devices become more and more advanced and medical technology becomes more and more developed, the effect of surgical treatment becomes more and more obvious. For cervical spondylosis with poor self-healing ability at the injury site (e.g., soft tissue injury), surgical treatment should be preferred. The main purpose of surgical treatment is to address the following: (1) decompress the spinal cord and nerve tissue, (2) stabilize the cervical spine of the involved segment, (3) restore the vertebral space to a normal height, and (4) obtain a spinal canal volume compatible with the spinal cord. At present, the main surgical treatment methods for cervical spondylosis at home and abroad are decompression, fusion, and internal fixation. Nonsurgical treatments are important for the treatment of all types of cervical spondylosis. Although nonsurgical treatment has no obvious effect on the more acute spinal cord type of cervical spondylosis (cervical spondylosis that must be treated surgically), nonsurgical treatment has the following roles: (1) stabilizing the disease or slowing down the development of the disease, (2) providing time for preoperative preparation, and (3) determining that nonsurgical procedures are ineffective and providing a basis for doctors to choose surgical treatment. Not only that, nonsurgical treatment plays a vital role in the postoperative rehabilitation of cervical spondylosis and in reducing the occurrence of postoperative complications. The main methods of nonsurgical treatment are Western medicine, traction therapy, braking method therapy, sinus nerve block therapy, physical therapy, and hyperoxia therapy. Traction therapy must be taken before surgery. Cervical traction can relax the neck muscles, open the intervertebral foramen, facilitate the retraction of protrusions, relieve and correct the folding state of the vertebral artery, correct the disorder of the small vertebral joints, break and fix the head, and reduce the local traumatic reaction. For the two treatments of cervical spondylosis, cervical traction is an indispensable part, and it has an obvious effect on the treatment of various types of cervical spondylosis in clinical treatment, especially for early cases, so this treatment method is widely used in the treatment of cervical spondylosis.

However, there are relatively few evidence-based studies on the effectiveness of manipulation and cervical traction in the treatment of CSR. Therefore, the purpose of this meta-analysis was to evaluate the literature on the efficacy of the use of manipulation and cervical traction in the treatment of CSR.

2. Materials and Methods

2.1. Inclusion and Exclusion Criteria

2.1.1. Inclusion Criteria. The inclusion criteria were as follows: systematic reviews and randomized controlled trials (RCTs), subjects with symptomatic cervical spondylosis radiculopathy and diagnosed by CT or MRI, and the area and race are not limited.

2.1.2. Exclusion Criteria. The exclusion criteria were as follows: literature reviews, case reports, convention abstracts, retrospective or cross-sectional studies, and meta-analysis; literature lacking original information, and literature included less than the above two endpoints.

2.2. Intervention. The treatment group was given manipulation, and the type of manipulation was limited to pulling manipulation and rotation manipulation. The control group was assigned cervical traction.

2.3. Primary Endpoint. Short-term efficacy: According to the "Diagnosis and Curative Effect Standards of Traditional Chinese Medicine Diseases," "Guiding Principles for Clinical Research of New Chinese Medicines," "Cervical Spondylopathy Treatment Scores," and "22 Specialties 95 Disease Types of Chinese Medicine Diagnosis and Treatment Plan," a method developed by Tanaka Yasuji, short-term efficacy is classified as valid and invalid.

2.4. Secondary Endpoints. The secondary endpoints were as follows: mean difference scores before and after treatment of the Visual Analogue Scale (VAS) scores and the mean difference scores of symptom scores before and after treatment: neck pain, upper extremity anesthesia, and survivorship were calculated according to the evaluation method of "95 diseases in 22 specialties of Chinese medicine consultation and treatment program" developed by the study [11] and the pain distribution and proportion method published by a study [12].

2.5. Literature Retrieval. Keywords including massage, orthopedic manipulation, spinal manipulation, cervical traction, cervical radical treatment, and randomized controlled trials were searched in databases such as PubMed, Embase, The Cochrane Library (Issue 8, 2020), Web of Science,

Table 1: Basic characteristics.

Study	Year	Cases ($n=$)		Gender (M/F)		Age, mean ± SD (years)		Type of manipulation	Endpoints
—	—	—		—		—		—	—
—	—	T1	T2	T1	T2	T1	T2	—	—
Deng [5]	2020	57	55	36/21	32/23	46.31 ± 10.21	44.18 ± 13.62	Rotation manipulation	AB
Zhang [6]	2015	36	36	24/12	26/10	43.42 ± 13.31	46.52 ± 14.52	Rotation manipulation	AB
Zhan [7]	2006	154	117	—	—	—	—	Pulling manipulation	AC
Qin [8]	2012	30	30	17/13	16/14	—	—	Rotation manipulation	AC
Liu [9]	2007	40	38	22/18	18/20	46.51 ± 6.24	43.3 ± 8.97	Rotation manipulation	AC
Fan [10]	2011	40	40	18/22	16/24	46.71 ± 10.67	44.75 ± 13.17	Rotation manipulation	AB
Jiang [11]	2012	41	38	—	—	51.82 ± 10.37	48.93 ± 10.11	Pulling manipulation	BC
Zhao [12]	2012	36	36	10/26	15/21	41.08 ± 10.48	44.17 ± 9.12	Rotation manipulation	AB
Li [13]	2012	30	30	14/16	12/18	44.82 ± 10.89	45.26 ± 9.64	Rotation manipulation	ABC
Zhang [14]	2008	31	19	—	—	54.23 ± 5.3	55.68 ± 4.63	Pulling manipulation	AB
Li [15]	2010	30	30	17/13	15/15	—	—	Pulling manipulation	AC

Note. T1: treatment group; T2: control group; A: short-term efficacy; B: mean differential VAS scores before and after treatment; C: mean differential symptom scores before and after treatment (neck pain, upper limb anesthesia, or viability).

CNKI, and Wanfang between January 2000 and August 2020. Studies in other databases, such as Google Scholar, and Baidu Library, were also included as supplements.

2.6. Literature Selection and Data Collection. Following the predetermined specific criteria, two reviewers independently read the titles and abstracts of the publications and independently excluded articles that did not meet the criteria while conducting a full-text reading and data removal on articles that did meet the requirements. Conflicts were resolved through discussion, and a third reviewer was brought in when necessary. Data extraction included: (1) general information: title, publisher, and date of reporting; (2) basic characteristics of the included publications: study population, treatment method, number of cases, and basic patient information; (3) primary endpoint: short-term efficacy; (4) secondary endpoints: mean difference scores in visual analog scale (VAS) scores before and after treatment and mean difference scores in symptom scores (neck pain, upper extremity anesthesia, and survivorship) before and after treatment difference scores.

2.7. Quality Assessment. The tool for assessing the risk of bias for Systematic Reviews of Interventions 6.0, developed by the Cochrane Collaboration, was carried out to evaluate RCTs.

2.8. Statistical Analysis. RevMan 5.3 software was used to perform all data analysis. As for effect sizes, binary data used odds ratio (OR), and continuous data used mean difference (MD), both with 95% confidence intervals (CI). For heterogeneity analysis, the chi-square test was performed (I^2 values of 25% are regarded as low heterogeneity, 25% to 50% are regarded as moderate heterogeneity, and >50% are regarded as high heterogeneity). If $P > 0.10$, I^2 <50%, the heterogeneity degree used to be low, and fixed-effects mannequin evaluation used to be adopted, whereas $P \leq 0.10$, $I^2 \geq 50\%$ suggested an excessive heterogeneity degree and a random-effects mannequin used to be utilized to verify sources of heterogeneity. Aside from research studies with evident heterogeneity, a fixed-effects mannequin evaluation was applied. Small study consequences and guide bias were once evaluated via visible inspection of respective funnel plots. Funnel plots are plots of the general error (SE (log (OR)) of the estimated effect size (OR) on log-transformed estimates for the trials, which can also be shown to be skewed and asymmetric in the presence of guidelines or differential bias. In addition, we performed a subgroup analysis according to the type of manipulation, and $\alpha = 0.05$ was statistically significant.

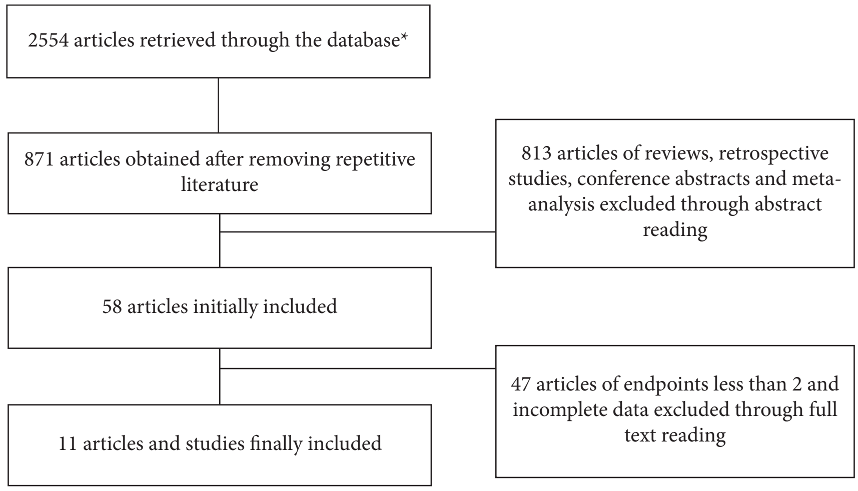
3. Results

3.1. RCT Selection and Description. There were 11 RCTs with a total of 994 patients included, and the general patient profile is shown in Table 1. Although a total of 58 publications were searched for in this meta-analysis. However, 47 were irrelevant, incomplete, or described duplicate data and were excluded from further analysis, and a total of 11 RCTs were eligible. Figure 1 presents the process of literature selection. 525 and 469 patients were in the treatment and control groups, respectively. Basically, the exceptionality of proof was once low with an excessive chance of bias. Most studies are not blind in nature, a loss is generally underreported or unclear, and there is usually a lack of hidden information about allocation. The risk of bias summary and graph are shown in Figures 2 and 3.

3.2. Publication Bias. Visual detection of each funnel plot verified a positive degree of asymmetry, indicating publication bias for short-term effects with 10 RCTs (Figure 4).

3.3. Meta-Analysis Results

3.3.1. Short-Term Efficacy. After analysis, 10 studies reported short-term efficacy. The Chi-square test showed P = 0.78 and $I^2 = 0\%$. As shown in Figure 5, the fixed-effects method of assessment showed OR = 0.38, 95% CI (2.21, 5.41), $P < 0.00001$, and the short-term efficacy of



*Literature search results: PubMed (340) , Embase (49) , Web of Science (24) , The Cochrane Library (23) , CNKI (1269) , Wanfang Data (849)

Figure 1: Literature selection process.

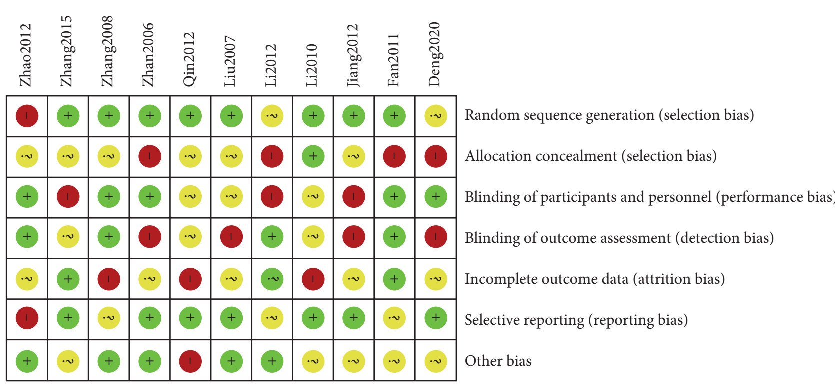


Figure 2: Risk of bias summary.

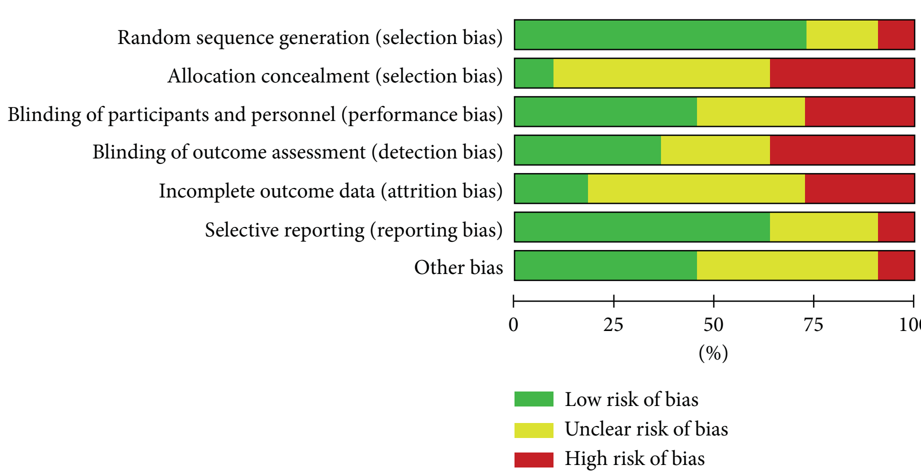


Figure 3: Risk of bias graph.

manipulation for CSR was superior to cervical traction treatment in all cases, with a statistically significant difference; subgroup analysis showed that the short-term efficacy of distraction manipulation for CSR was superior to cervical traction treatment alone, with no statistically significant difference (OR = 1.51.95% CI (0.68, 3.36), P = 0.32, I^2 = 0%);

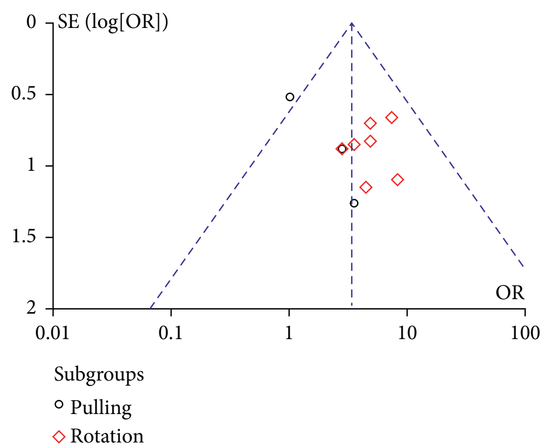


Figure 4: Funnel plots of short-term efficacy with 10 RCTs.

Study or Subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight (%)	Odds Ratio M-H,Fixed, 95% CI
1.2.1 Pulling						
Zhang2008	30	31	17	19	3.3	3.53 [0.30, 41.86]
Zhan2006	145	154	110	117	35.8	1.03 [0.37, 2.84]
Li2010	28	30	25	30	8.2	2.80 [0.50, 15.73]
Subtotal (95% CI)		*215*		*166*	*47.4*	*1.51 [0.68, 3.36]*
Total events	203		152			
Heterogeneity: Chi² = 1.50, df = 2 (P = 0.47); I² = 0%						
Test for overall effect: Z = 1.00 (P = 0.32)						
1.2.2 Rotation						
Zhao2012	34	36	28	36	7.6	4.86 [0.95, 24.75]
Zhang2015	33	36	25	36	10.2	4.84 [1.22, 19.21]
Qin2012	29	30	26	30	4.3	4.46 [0.47, 42.51]
Liu2007	38	40	32	38	8.1	3.56 [0.67, 18.89]
Li2012	28	30	25	30	8.2	2.80 [0.50, 15.73]
Fan2011	39	40	33	40	4.0	8.27 [0.97, 70.73]
Deng2020	54	57	39	55	10.3	7.38 [2.01, 27.10]
Subtotal (95% CI)		*269*		*265*	*52.6*	*5.06 [2.74, 9.36]*
Total events	255		208			
Heterogeneity: Chi² = 1.17, df = 6 (P = 0.98); I² = 0%						
Test for overall effect: Z = 5.17 (P < 0.00001)						
Total (95% CI)		*484*		*431*	*100.0*	
Total events	458		360			
Heterogeneity: Chi² = 7.93, df = 9 (P = 0.54); I² = 0%						
Test for overall effect: Z = 5.05 (P < 0.00001)						
Test for subgroup differences: Chi² = 5.51, df = 1 (P = 0.02), I² = 81.8%						

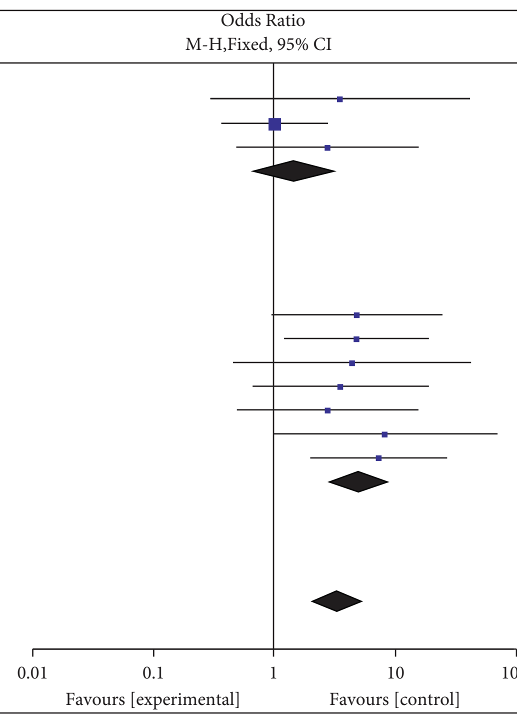


Figure 5: Comparison between the short-term efficacy of manipulation and cervical traction in the treatment of CSR.

rotational manipulation was superior to cervical traction alone, with a statistically significant difference (OR = 5.06, 95% CI (2.74, 9.36), $P < 0.00001$, $I^2 = 0\%$).

3.3.2. Mean Difference Scores before and after Treatment of VAS Scores. Six studies covered the mean difference scores in VAS scores before and after treatment. The Chi-square test resulted in $P = 0.26$, $I^2 = 23\%$. As shown in Figure 6, the fixed-effects Mannix assessment indicated SMD = 1.23, 95% CI (1.02, 1.45), $P < 0.00001$, a statistically significant difference, and the analysis showed that the mean difference manipulated VAS scores before and after CSR treatment were higher than those of cervical traction treatment alone, with a statistically significant difference; the subgroup analysis showed that the mean difference in distraction manipulation in CSR treatment score was higher than that of cervical traction treatment alone, with a statistically significant difference (SMD = 1.58, 95% CI (1.18, 1.98), $P < 0.0001$, $I^2 = 0\%$); the rotation manipulation was higher than that of cervical traction treatment alone, with a statistically significant difference (SMD = 1.10, 95% CI (0.85, 1.35), $P < 0.00001$, $I^2 = 0\%$).

3.3.3. Mean Difference Scores before and after Treatment of Symptom Scores (Neck Pain). Mean difference symptom scores (neck pain) before and after treatment were mentioned in 5 studies.The Chi-square test resulted in $P = 0.27$ and $I^2 = 22\%$. Fixed-effects human model evaluation showed MD = 0.28, 95% CI (0.15, 0.41), $P < 0.0001$ (Figure 7). The mean difference scores of manipulation in the treatment of

Study or Subgroup	Experimental Mean	Experimental SD	Experimental Total	Control Mean	Control SD	Control Total	Weight (%)	Std. Mean Difference IV, Fixed, 95% CI
2.2.1 Pulling								
Jiang2012	3.01	0.67	41	1.8	0.76	38	17.0	1.68 [1.16, 2.19]
Zhang2008	3.65	1.58	31	1.47	1.35	19	11.0	1.43 [0.79, 2.07]
Subtotal (95% CI)			*72*			*57*	*28.0*	*1.58 [1.18, 1.98]*
Heterogeneity: Chi^2 = 0.34, df = 1 (P = 0.56); I^2 = 0%								
Test for overall effect: Z = 7.70 (P < 0.00001)								
2.2.2 Rotation								
Fan2011	3.76	1.01	40	2.43	0.97	40	19.2	1.33 [0.84, 1.82]
Li2012	3.92	1.68	30	2.34	1.16	30	15.3	1.08 [0.54, 1.62]
Zhang2015	18.58	5.61	36	14.11	5.13	36	19.5	0.82 [0.34, 1.30]
Zhao2012	3.03	1.31	36	1.58	1.14	36	18.0	1.17 [0.67, 1.67]
Subtotal (95% CI)			*142*			*142*	*72.0*	*1.10 (0.85, 1.35]*
Heterogeneity: Chi^2 = 1.21, df = 3 (P = 0.53); I^2 = 0%								
Test for overall effect: Z = 8.58 (P < 0.00001)								
Total (95% CI)			*214*			*199*	*100.0*	*1.23 [1.02, 1.45]*
Heterogeneity: Chi^2 = 6.51, df = 5 (P = 0.26); I^2 = 23%								
Test for overall effect: Z = 11.36 (P < 0.00001)								
Test for subgroup differences: Chi^2 = 3.96, df = 1 (P = 0.05), I^2 = 74.8%								

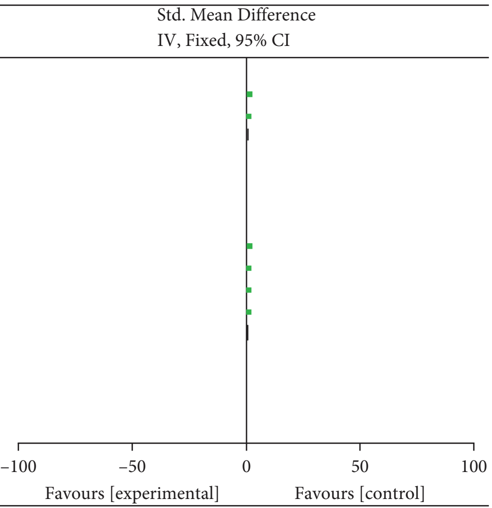


Figure 6: Comparison between the mean difference scores before and after treatment of VAS scores of manipulation and cervical traction in the treatment of CSR.

Study or Subgroup	Experimental Mean	Experimental SD	Experimental Total	Control Mean	Control SD	Control Total	Weight (%)	Mean Difference IV, Fixed, 95% CI
3.1.1 Pulling								
Li2010	1.52	0.58	30	1.23	0.72	30	16.0	0.29 [−0.04, 0.62]
Zhan2006	1.63	0.98	154	1.46	0.63	117	47.4	0.17 [−0.02, 0.36]
Subtotal (95% CI)			*184*			*147*	*63.5*	*0.20 [0.03, 0.37]*
Heterogeneity: Chi^2 = 0.38, df = 1 (P = 0.54); I^2 = 0%								
Test for overall effect: Z = 2.36 (P = 0.02)								
3.1.2 Rotation								
Li2012	1.62	1.13	30	1.01	1.38	30	4.3	0.61 [−0.03, 1.25]
Liu2007	1.09	0.86	40	0.81	0.21	38	23.2	0.28 [0.01, 0.55]
Qin2012	1.56	1.23	30	0.9	0.1	30	9.0	0.66 [0.22, 1.10]
Subtotal (95% CI)			*100*			*98*	*36.5*	*0.41 [0.19, 0.63]*
Heterogeneity: Chi^2 = 2.47, df = 2 (P = 0.29); I^2 = 19%								
Test for overall effect: Z = 3.69 (P < 0.00002)								
Total (95% CI)			*284*			*245*	*100.0*	*0.28 [0.15, 0.41]*
Heterogeneity: Chi^2 = 5.13, df = 4 (P = 0.27); I^2 = 22%								
Test for overall effect: Z = 4.11 (P < 0.00001)								
Test for subgroup differences: Chi^2 = 2.28, df = 1 (P = 0.13), I^2 = 56.2%								

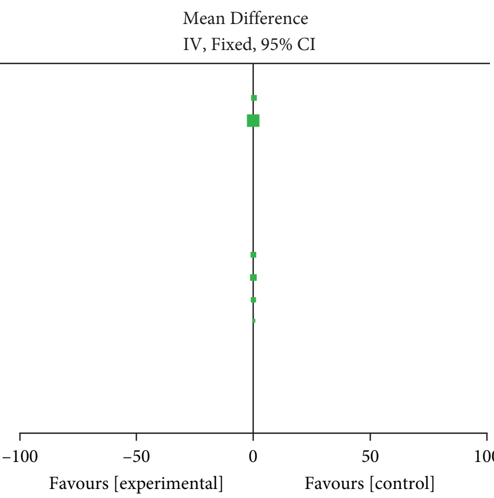


Figure 7: Comparison between the mean difference scores before and after treatment of symptom scores (neck pain) of manipulation and cervical traction in the treatment of CSR.

CSR were higher than those of cervical traction treatment alone. The difference was statistically significant. Subgroup analysis showed that the mean difference scores of pulling manipulation in the treatment of CSR were higher than that of cervical traction treatment alone. The difference was statistically significant (MD = 0.20, 95% CI (0.03, 0.37), $P < 0.0001$, $I^2 = 0\%$), and rotation manipulation was higher than that of cervical traction treatment alone. The difference was statistically significant (MD = 0.41, 95% CI (0.19, 0.63), $P < 0.0002$, $I^2 = 19\%$).

3.3.4. Mean Difference Scores before and after Treatment of Symptom Scores (Upper Limb Anesthesia). Six studies reported mean differential symptom scores (upper extremity anesthesia) before and after treatment. Chi-square test results: $P = 0.26$, $I^2 = 23\%$. A fixed-effects mannequin evaluation indicated MD = 0.11, 95% CI (0.08, 0.14), $P < 0.0001$ (Figure 8). The mean difference scores of manipulation in the treatment of CSR were higher than those of cervical traction treatment alone, the difference was statistically significant. Subgroup analysis showed that the mean difference scores of pulling manipulation in the treatment of CSR were higher than that of cervical traction treatment alone. The difference was statistically significant (MD = 0.10, 95% CI (0.07, 0.14), $P < 0.0001$, $I^2 = 0\%$), and rotation manipulation was higher than that of cervical traction treatment alone. The difference was statistically significant (MD = 0.25, 95% CI (0.10, 0.41), $P = 0.002$, $I^2 = 10\%$).

3.3.5. Mean Difference Scores before and after Treatment of Symptom Scores (Viability). Two studies reported mean differential symptom scores (Viability) before and after treatment. The Chi-square test showed $P = 0.77$, $I^2 = 0\%$. A fixed-effects mannequin evaluation indicated MD = 0.42, 95%CI (0.25, 0.59), $P < 0.00001$ (Figure 9). The viability mean difference scores of manipulation in the treatment of

Study or Subgroup	Experimental Mean	Experimental SD	Experimental Total	Control Mean	Control SD	Control Total	Weight (%)	Mean Difference IV, Fixed, 95% CI
3.2.1 Pulling								
Zhan2006	1.03	0.87	154	0.83	0.88	117	2.3	0.20 [−0.01, 0.41]
Li2010	1.85	0.51	30	1.72	0.89	30	0.8	0.13 [−0.24, 0.50]
Jiang2012	0.9	0.09	41	0.8	0.06	38	92.6	0.10 [0.07, 0.13]
Subtotal (95% CI)			*225*			*185*	*95.7*	*0.10 [0.07, 0.14]*
Heterogeneity: $Chi^2 = 0.87$, df = 2 (P = 0.65); $I^2 = 0\%$								
Test for overall effect: Z = 6.11 (P < 0.00001)								
3.2.2 Rotation								
Qin2012	1.44	1.05	30	0.83	0.91	30	0.4	0.61 [0.11,1.11]
Liu2007	0.72	0.43	40	0.51	0.34	38	3.5	0.21 [0.04, 0.38]
Li2012	2.64	1.01	30	2.39	1.22	30	0.3	0.25 1–0.32.0.821
Subtotal (95%CI)			*100*			*98*	*4.3*	*0.25 [0.10, 0.41]*
Heterogeneity: $Chi^2 = 2.22$, df = 2 (P = 0.33); $I^2 = 10\%$								
Test for overall effect: Z = 3.17 (P = 0.002)								
Total (95% CI)			*325*			*283*	*100.0*	*0.11 [0.08, 0.14]*
Heterogeneity: $Chi^2 = 6.48$, df = 5 (P = 0.26); $I^2 = 23\%$								
Test for overall effect: Z = 6.63 (P < 0.00001)								
Test for subgroup differences: $Chi^2 = 3.39$, df = 1 (P = 0.07), $I^2 = 70.5\%$								

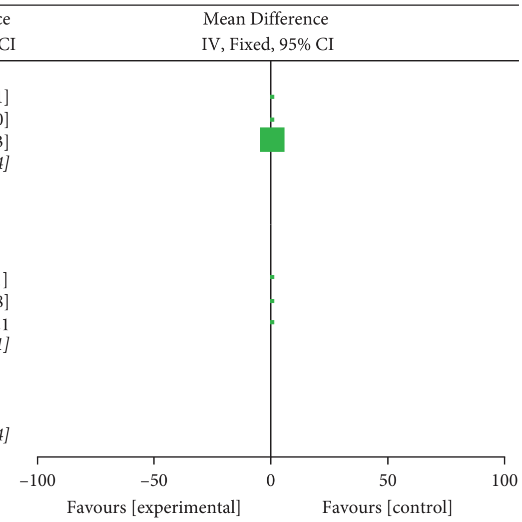


Figure 8: Comparison between the mean difference scores before and after treatment of symptom scores (upper limb anesthesia) of manipulation and cervical traction in the treatment of CSR.

Study or Subgroup	Experimental Mean	Experimental SD	Experimental Total	Control Mean	Control SD	Control Total	Weight (%)	Mean Difference IV, Fixed, 95% CI
Qin2012	1.06	1.2	30	0.7	0.09	30	14.8	0.36 [−0.07, 0.79]
Zhan2006	0.99	0.91	154	0.56	0.59	117	85.2	0.43 [0.25, 0.61]
Total (95% CI)			*184*			*147*	*100.0*	*0.42 [0.25, 0.59]*
Heterogeneity: $Chi^2 = 0.09$, df = 1 (P = 0.77); $I^2 = 0\%$								
Test for overall effect: Z = 4.97 (P < 0.00001)								

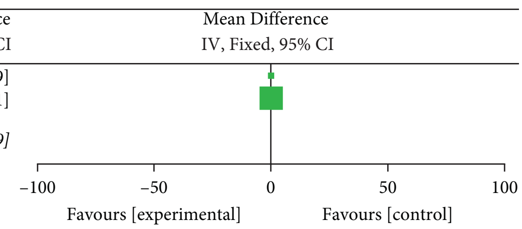


Figure 9: Comparison between the mean difference scores before and after treatment of symptom scores (viability) of manipulation and cervical traction in the treatment of CSR.

CSR were higher than those of cervical traction treatment alone. The difference was statistically significant.

4. Discussion

The onset of cervical spondylosis is becoming younger and younger and occurs early when the normal biomechanical equilibrium is disrupted, with the earlier manifestation being a change in physiological curvature [13, 14]. Changes in the physiological curvature of the cervical spine (referred to as cervical curvature) are a manifestation of degenerative changes in the overall function of the cervical spine, which include disc degeneration and biomechanical and pathophysiological changes. The cervical spine and the surrounding tissues work together to maintain stability, and they are susceptible to static or dynamic damage, as a large movable ball is placed on top of a thin column in a chain relationship between the head and the neck. The biomechanical significance of cervical flexion lies in its function of increasing the resistance to longitudinal pressure to support head elevation. Cervical spine manipulative rotation therapy has been found to be clinically effective in the treatment of cervical spondylosis, drop pillow, and muscle strain, but inappropriate use of rotation techniques has been reported to decrease the mechanical properties of vascular stretch [15, 16].

Abnormal changes in cervical curvature are very closely related to the disruption of the normal biomechanical balance of the cervical spine [17, 18]. The degeneration of cervical curvature is pathologically based on long-term abnormal stress in the cervical spine and its development is in addition to the previously thought causes of disc degeneration [19]. Current studies have shown that vertical hyperplasia (congenital or developmental) of the cervical articular processes are the cause of the posterior concavity and straightening of the cervical curve [20]. In daily work, the neck is often in a flexed position, the posterior wall joints are stretched and subjected to greater tensile stress, and the paravertebral muscle tissue plays a significant role in maintaining stability. The degeneration of the intervertebral disc, the proliferation of the articular processes, and the destruction of the muscle tissue may be the root causes of the physiological curvature of the cervical spine.

In adolescence, the cervical spine curve is round and smooth, but later, as age increases, early degeneration of the intervertebral discs occurs, affecting the cervical curve profile. Adverse stress stimuli (e.g., posture, external force) exacerbate the compensatory mechanical response of the cervical curve. The compensatory mechanical response of the cervical curve is dual in nature, i.e., stable and compressive, and manifests itself primarily through changes in the cervical curve, which can maintain internal and external balance by altering the stress state of the cervical spine while paying a price in the indeterminate transition to stability, and is more likely to stimulate a sensitive structure when the damage accumulates to produce the associated symptoms. Clinical X-ray observations of low-age cervical spondylosis are mainly changes in cervical A-degree values with little relationship to dorsal stromal hyperplasia [21, 22]. Even in degeneration-related cervical spondylosis, abnormalities such as straightening, reversion, S-shape, and interruption of cervical curvature are widely observed in about 52%–97%, with straightening of cervical curvature being particularly predominant [23]. The change of cervical curvature is an early sign and objective indication of cervical spondylosis, and the change of physiological curvature occurs before the formation of bone spurs. Therefore, restoring the normal curve of the cervical spine is becoming more and more of a consensus in the treatment of cervical spondylosis, and restoring the cervical curvature should be an important treatment in the early treatment of cervical spondylosis in young and middle-aged patients. The trend of cervical flexion and flexion-extension activity of traction as the most commonly used treatment method is gradually decreasing with age, while the performance of mobility is more obvious [24]. The cervical disc begins to degenerate after adulthood, and the degeneration process can induce nonspecific inflammatory reactions in the local soft tissue, synovial membrane, articular cartilage and ligaments, and other tissues, resulting in clinical symptoms [25]. Due to the stress relationship, the posterior part of the cervical spine is more reactive, and compensatory straightening of the cervical spine is required to relieve symptoms. Cervical degeneration causes narrowing of the intervertebral space, and a sharp decrease in the height of the anterior edge of the intervertebral space in the narrowed segment can cause a reduction in physiological pronation. Due to biological stress, the intervertebral joint mainly holds weight at the posterior part; especially at the posterior edge of the vertebral body, there is an imbalance in the long-term stress, and osteophytes occur at the weight-bearing part of the joint. The osteophytes of the cervical spine hook protrude mainly upward, resulting in an increase in the posterior height of the vertebral body. It has been reported that the anterior-posterior height difference of the degenerated cervical spine is higher than normal. As the height of the posterior edge of the vertebral body increases, the bones of the adjacent vertebral body protruding from the hyperplasia are close to each other and resist each other, so that the height of the posterior edge of the cervical vertebrae also increases and the physiological anterior convexity becomes smaller and disappears. The osteophytes of the small joints in the posterior part of the cervical spine can also increase the height of the posterior part of the cervical spine and have a certain influence on the change of curvature. When the cervical spine degenerates, the elastic tissue of the ligaments decreases, the laxity and tension of the collar ligaments decrease, and the ability to maintain physiological pronation decreases [26]. Due to the degeneration of the intervertebral junction structure, the elasticity of the fibrous ring and ligaments decreases, the osteophytes of the vertebral body edge and small joints, and the obstruction of the joint space narrows, resulting in the reduction of cervical spine mobility. Therefore, cervical degeneration is related to intervertebral mobility. Cervical spine degeneration can reduce cervical flexion and cervical flexion and extension mobility.

According to the traditional Chinese medicine “tendon-bone” theory, “tendons are also the eastern joints and bones, and they are the gateway to the whole body and facilitate the movement of the whole body. It can be seen that the tendons are described by the theory of Chinese medicine as “a complex and balanced movement system structure of the general term. Modern medicine believes that the main body of the tendons contains muscles, tendons, fascia, ligaments, joint capsule, synovial membrane, and other systems, which is the general name of the human tendon system. The connotation of the tendon system is not only the sum of different parts of the tendon tissue but also the unity of the tendon in structure and function. In the human body, the force generated by muscle contraction acts on the bone through the tendons, and the biological force is effectively integrated by the tendons of different parts through the bone. Ultimately, the tendons act on the bone to produce a coordinated and unified movement pattern. Therefore, tendons and bones are structurally inseparable and functionally coordinated with each other. The realization of the function of the cervical spine mainly depends on the balance between tendons and bones. The balance between the cervical vertebrae is based on the normal cervical curvature. In the normal cervical degree, the cervical spine is in a state of balance in motion, and in the abnormal cervical curvature, the cervical spine must also reach a state of balance in motion, so when the balance of maintaining the cervical spine pyloric degree is out of balance, its stability is bound to change. The physiological curvature will not be maintained. In order to maintain the stability of the cervical spine, the forces between the tissues of the neck must be redistributed. This means that the self-function is compensated and a new balance is established. This compensation and the establishment of a new equilibrium are mainly accomplished by the muscle tissue. When the compensatory demand exceeds the compensatory capacity of the cervical spine itself, it will cause a muscle spasm, congestion and edema, which will lead to a series of cervical spondylosis symptoms. It can be seen that the biomechanical balance of cervical spondylosis is disrupted at the beginning of the disease, especially the further contraction of the cervical curvature, which changes the degree between the anterior and posterior parts of the intervertebral disc, i.e., the anterior and posterior angles of the intervertebral disc, as well as the change in the activity of the small joints regulating the intervertebral disc’s pinchability. Through this pathological state of the cervical spine, we have realized through research that cervical flexion is closely related to the occurrence, development, rehabilitation, and prevention of cervical spondylosis. Pillows are commonly used in our daily lives, so it is an effective way to treat cervical spondylosis by using pillows to play their traction role and restore the physiological curvature and cervical flatness of the cervical spine. In addition, the pillow can work for a long time to improve the symptoms of the cervical spine for the use of cervical spine Li lead pillow can pass the external balance, pull the narrowed intervertebral space, and disc internal pressure, so that the fibrous tissue reset, the nerve root stimulation forced to relieve, limit the cervical spine activities, conducive to neuromuscular tissue edema and nerve root and surrounding tissue adhesion, so as to play a therapeutic role.

5. Conclusion

This study started from the monotherapy point of view, using manipulation to compare with cervical traction, and focused on evaluating the short-term efficacy and pain improvement of the two therapies in the treatment of cervical spondylosis radiculopathy. The results show that manipulation has advantages in short-term efficacy, VAS pain scores, neck pain, upper limb anesthesia, and viability improvement. Consequently, appropriate remedy strategies need to be chosen in accordance with the particular stipulations of patients. Nevertheless, the conclusion mentioned above should be verified by extra multicenter RCTs with a massive pattern variety and excessive quality.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

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