Doi.org/10.36721/PJPS.2024.37.6.REG.1581-1589.1

Clinical observation of shujin tongluo granules combined with orthopedic manipulation for the treatment of qi stagnation and blood stasis type cervical spondylotic radiculopathy

Wei Li[1], Xiaoya Li[2], Jingya Wu[3], Wei Huang[4] and Xiaohong Yang[5]*

[1]Department of Traditional Chinese Medicine and Rehabilitation, Henan Vocational College of Nursing, Anyang, China
[2]Department of Pharmacology, Henan Vocational College of Nursing, Anyang, China
[3]Department of Traditional Chinese Medicine, Henan Vocational College of Nursing, Anyang, China
[4]Department of Radiology, Henan Vocational College of Nursing, Anyang, China
[5]Department of Cardiology, Henan Vocational College of Nursing, Anyang, China

Abstract: Cervical spondylotic radiculopathy (CSR) seriously affects patients' quality of life and faces clinical treatment dilemmas. The study aimed to evaluate the clinical efficacy of Shujin Tongluo Granules combined with orthopedic techniques in the treatment of CSR of the qi stagnation and blood stasis type. From 2022 to 2024, 96 CSR patients were selected and randomized into two groups. Both groups were treated with traditional Chinese medicine orthopedic manipulation treatment, the study group added Shujin Tongluo granules. Observe and analyse both groups' clinical outcomes, assess the improvement of symptoms, serum levels of pain factors and inflammatory factors, and record the incidence of adverse reactions. After treatment, both groups of patients improved. Compared with the control group, the traditional Chinese medicine main symptom, visual analog scale, neck disability index scores, pain factors and inflammatory factors levels in study group patients decreased significantly, while the Japanese orthopaedic associationscores and regulatory oriented motion scores increased significantly. Comparing to control group, the study group had a more clinical treatment effect. Shujin Tongluo granules combined with orthopedic manipulation have a better effect on improving the symptoms of qi stagnation and blood stasis type of CSR, which deserves to be further explored in future clinical trials.

Keywords: Cervical spondylotic radiculopathy, Shujin tongluo granules, orthopedic manipulation, traditional Chinese medicine therapy.

Submitted on 29-08-2024 – Revised on 14-10-2024 – Accepted on 1-11-2024

INTRODUCTION

Cervical spondylotic radiculopathy (CSR) is a common type of cervical spondylosis. It accounts for 60%~70% of cervical spondylosis and is gradually getting younger. The incidence rate of CSR is 83 cases per 100,000 people (Xue *et al.*, 2021). The CSR is the clinical syndrome resulting from cervical degenerative discs, stretched cervical joints and ligaments and irritation or compression by subluxation of the cervical nerve roots. It often develops into a combined effect of inflammatory mediators, changes in vascular response and neuroedema, resulting in nerve compression (Huo *et al.*, 2022; Shen *et al.*, 2020). According to research reports, more than half of cases are caused by spinal disorders that stimulate intervertebral foramen, with common factors being reduced disc height or degenerative changes in the anterior or posterior zygomatic epiphyseal joints of the external vertebrae. Compared with lumbar nerve root disease, intervertebral disc herniation is not common. Unless the dorsal root ganglion is affected, simple compression does not necessarily lead to radicular pain (McCormick *et al.*, 2020). CSR belongs to the category of Traditional Chinese Medicine (TCM) conditions such as Xiang Bi and shoulder and back pain. Its patients mainly present with neck and shoulder pain, stiffness and stiffness, numbness in the shoulders, arms, and fingers, and even nerve root weakness and muscle atrophy, which seriously affect their work and quality of life (Ding *et al.*, 2021). The TCM believes that CSR belongs to the categories of “Xiang Bi disease” and “Bi syndrome” and research on real-world data shows that the main syndrome type in CSR patients is Qi stagnation and blood stasis syndrome, with “meridian obstruction, pain when blocked" as its pathogenesis (Wu *et al.*, 2019).

In terms of CSR treatment, it is mainly divided into surgical treatment and non-surgical treatment. Surgical treatment requires extremely strict indications and carries corresponding risks, while conservative treatment can also achieve improvement effects, mainly including traction therapy and physical therapy. Studies have shown that conservation treatments can last for several months if not years, whereas in other studies, surgeries were administered following the first consultations (Fu *et al.*, 2024). In addition, it has been reported in the literature that surgical procedures should be taken into consideration only in the presence of severe pain, failure of conventional treatment, or significant weakness or atrophy of the muscle. However, many clinical practice

**Corresponding author:* e-mail: B19913896728@163.com

guidelines indicate a shortage of corroborating evidence to determine the indications and timings of CSR (Xu *et al.*, 2020).

In terms of conservative treatment, the TCM has unique advantages in the treatment of CSR, including acupuncture and moxibustion, Chinese medicine, manipulation, massage, physiotherapy and other unique methods that are widely used in clinical practice. Do not stick to single therapy, often combined treatment has a better effect (Xie *et al.*, 2019). Among them, massage is widely used, mainly by massaging and pushing the acupoints on the affected side of CSR patients, which has an auxiliary effect on promoting the circulation of qi and blood in the body and relaxing muscles, helping to improve blood circulation, supplement nutrition for the body, scientifically repair damaged tissues and lubricate joints, thereby reducing pain and improving neck and shoulder function. In addition, the traditional Chinese medicine Shujin Tongluo Granules is the TCM formula composed of nine herbs: Bone broken tonics, *Achyranthes bidentata, Astragalus membranaceus,* Earthworm, Frankincense, Chuanxiong, Pueraria root, Tianma and Weilingxian. It has the effects of nourishing the liver and kidneys, promoting blood circulation and relaxing tendons, and has significant clinical efficacy in treating CSR (Yang *et al.*, 2011). However, specific research on Shujin Tongluo Granules combined with orthopedic manipulation for the therapy of patients who have CSR of the qi stagnation and blood stasis kind has not yet been reported. Therefore, this study selected 96 CSR patients with qi stagnation and blood stasis in the research to explore the clinical effectiveness of Shujin Tongluo granules in conjunction with orthopedic manipulation for treating CSR patients of the qi stagnation and blood stasis kind.

MATERIALS AND METHODS

Clinical data

(1) Research subjects: 96 patients with CSR of qi stagnation and blood stasis type admitted to our hospital from March 2022 to March 2024 were selected as the research subjects. The electronic medical record system was used to collect patient data, including general information such as age, gender and disease course.

(2) Diagnostic criteria (Mansfield *et al.*, 2020): Refer to the clinical diagnostic criteria for CSR in the "Guidelines for Clinical Research of TCM New Drugs" and the "Diagnostic and Therapeutic Efficacy Standards for TCM Diseases" and confirm the diagnosis through imaging examination. Main symptoms: soreness/tension pain, numbness, etc. in the neck, shoulders and arms, consistent with the range of cervical nerve root innervation affected. Auxiliary examination showed abnormalities such as cervical degeneration and intervertebral foramen stenosis on cervical spine imaging.

(3) Inclusion criteria: Meet the diagnostic criteria for CSR and Qi stagnation and blood stasis syndrome mentioned above, age range: 25-70 years old. The patients, physicians and doctors and evaluators in this study were informed and signed informed consent for the treatment study components.

(4) Exclusion criteria: ① Other types of CSR patients; ② Patients with cervical infection, tuberculosis, tumors, or intraspinal space occupying lesions; ③ Patients with severe damage to organs such as liver, liver, and kidneys; ④ Individuals with mental disorders; ⑤ Individuals with concurrent infections, bleeding, or allergies; ⑥ People who have allergies to the medications employed in this research; ⑦ Pregnant and lactating women.

(5) The study strictly adheres to and implements the Declaration of Helsinki (Hellmann *et al.*, 2024).

Randomization and blind method

Standardized methods of rectangular table of random numbers and dual-blind methods were used for the present study. The sequence of random numbers corresponding with the quantity of participants was generated using SPSS 25.0 statistical software and randomly allocated to the study group and control group. Based on the results of the random assignment, prepared medications (OR traditional Chinese medicine orthopedic manipulation) were dispensed to the participants, and the investigators who were not engaged in the treatment and assessment of the participants were responsible for ensuring blinding. The grouping was unbeknownst to the researchers (including the statistician) throughout the study.

Grouping and treatment methods

The chosen patients were randomly allocated to a control and a study group employing the randomized number chart technique, with 48 patients in each group.

(1) Control group: Treated with traditional Chinese medicine orthopedic manipulation with reference to the method of Qu *et al.* (2020). First, use techniques such as rubbing, pointing and pressing to relax the soft tissues around the affected area. Then, use the "three-step positioning diagnosis method" to determine the precise location of the technique, and apply orthopedic manipulation techniques such as lateral pressing, downward shaking and sitting rotation reduction. Perform corrective massage treatment once every 3 days, with a weekly follow-up for a duration of 4 weeks.

(2) Study group: on the basis of the control group, all patients were given Shujin Tongluo granules (Shenwei Pharmaceutical Co., Ltd., batch number: 13040101), 12 g three times a day, with one follow-up visit per week based on and modified from the study methodology reported by Chen *et al.* (2024). The prescription was adjusted according to the symptoms and the treatment lasted for 4 weeks.

Observation of therapeutic effect

Traditional Chinese medicine main symptom (TCMMS)
Reference to and modification of the method of T. Zhang *et al.* (2022) and H. Zhao *et al.* (2012), the primary and secondary symptoms of patients were mainly scored in the form of a survey questionnaire, including several items such as limb numbness, chills, dry mouth, constipation, *etc*., with scores ranging from 0 to 10. The greater the score, the more serious the condition.

Pain visual analog scale (VAS) score
According to the Chai *et al.* (2020) method, VAS scores were set from 0 to 10 points. A 10 cm long straight line was used, with the 0 end of the line indicating the lowest level of pain and the 10 end of the line indicating the highest level of pain.

Cervical spine function assessment
According to the method proposed by Tong *et al.* (2020), cervical spine function was evaluated in each group of patients using the neck disability index (NDI) and the Japanese orthopaedic association scores (JOA) score.

Assessment of regulatory oriented motion (ROM)
Using a specialized protractor to measure cervical spine range of motion (D. Zhao and Zhang, 2024).

Serum pain factor
Referring to the method of Sur *et al.* (2023), the serum levels of pain-related factors in each patient group were measured both pre-treatment and post-treatment. Patients were kept on an empty stomach in the morning, and 3 mL of serum samples from the superficial elbow vein were collected for pain factor content detection. Our hospital's laboratory uniformly used ELISA to detect serum samples, and the Human neuropeptide Y (NPY) ELISA Kit (D711352, Beyotime) and cyclooxygenase-2 (COX-2) inhibitor screening Kit (S0168, Beyotime) were used to detect the levels of NPY and COX-2 in the serum according to the instructions.

Serum inflammatory factors
According to the method of Roshanravan *et al.* (2021), the analysis was conducted on the serum levels of inflammatory factors in patients from each group both before and after the treatment. Maintain the patient on an empty stomach in the morning and collect 3mL of serum samples from the superficial elbow vein. Our laboratory will use ELISA to detect the serum samples. The Human Interleukin 6 (IL-6) ELISA Kit (97068ES96, Yeasen), Human Tumor necrosis factor-α (TNF-α) ELISA Kit (97072ES96, Yeasen) and Human Interleukin 1β (IL-1β) ELISA Kit (97028ES96, Yeasen) will be used to analyze the changes in serum contents of TNF-α, IL-6 and IL-1β according to the instructions.

Efficacy criteria
Recovery: Symptoms and signs such as numbness have reduced scores by ≥95%. Significant effect: Symptoms and signs such as pain and numbness have reduced scores by ≥70% and <95%. Effective: Symptoms and signs such as pain and numbness have a score reduction of ≥30% and <70%. Invalid: Symptoms and signs such as pain and numbness have reduced scores by <30%. The calculation formula (Nimodipine method) is as follows:
Pre-treament score

$$\text{Efficacy criteria}\,(\%) = \frac{\text{Pre - treament score - post - treatment score}}{\text{Pre - treament score}} \times 100$$

Adverse reaction occurrence
Statistics on the occurrence of adverse reactions such as increased dizziness and headache, gastrointestinal reactions, palpitations and skin and muscle pain during the treatment period in two groups of patients.

Ethical approval
This study was approved by the Ethics Committee of Henan Nursing Vocational College, Anyang City, Henan Province, China (Approval No.20240615).

STATISTICAL ANALYSIS

SPSS 25.0 statistics program was used to be analyzed and processed for all the figs. used in this study. The "$\bar{x}\pm s$" indicates the data being used as a metric data, *t*-test was used for intra group comparisons, F-test was used for inter group comparisons and x^2 test was used for count data expressed as "*n*, %". The *P*-value of less than 0.05 suggests significant differences.

RESULTS

Patients' basic information
The total of 96 patients participated in this study, among whom 48 patients received traditional Chinese medicine orthopedic manipulation treatment and 48 patients received Shujin Tongluo granules combined with orthopedic manipulation treatment. As shown in table 1, baseline characteristics were comparable between the two groups. These results indicate that the two groups matched well in baseline features, minimizing the risk of confounding variables that could affect the study results.

Comparisons of TCMMS pre-treatment and post-treatment
The comparison of TCMMS pre-treatment and post-treatment between the study group and the control group is shown in fig. 1. Compared with before treatment, there was a significant decrease in TCMMS in all groups of patients after treatment (P<0.01). In addition, the TCMMS values of the study group after treatment were significantly lower than those of the control group (P<0.001), suggesting that the cervical spine condition of the patients in the study group was alleviated after treatment.

Comparison of therapeutic efficacy scores pre-treatment and post-treatment
The comparison of VAS pain scores, NDI scores and cervical JOA scores between study and control groups

pre-treatment with post-treatment are shown in table 2. Compared with before treatment, the NDI and VAS scores of each group of patients showed a decreasing trend after treatment (P<0.001), while the JOA scores increased (P<0.001). Moreover, after treatment, the study group demonstrated significantly lower VAS and NDI scores than control group (P<0.05), while their JOA scores were higher (P<0.05). This indicates a decrease in cervical spine pain levels among patients in the study group following the intervention.

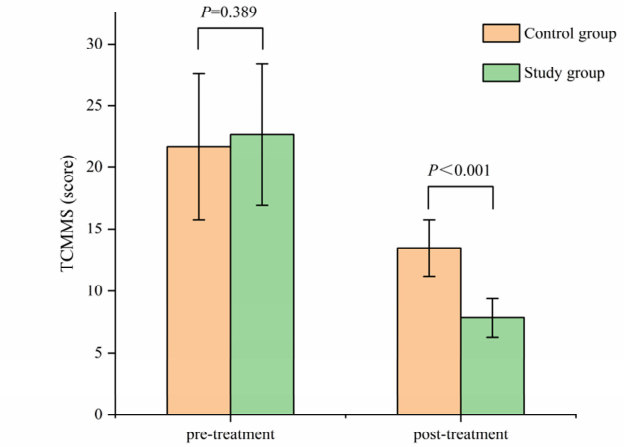

Fig. 1: Comparison of TCMMS pre-treatment and post-treatment in each group of patients (score, $x\pm s$)

Comparison of ROM activity pre-treatment and post-treatment

The comparison results of ROM activity between the study and the control group pre-treatment and post-treatment are shown in table 3. Compared with pre-treatment with post-treatment, the left rotation, right rotation, left flexion, right flexion, forward cervical flexibility and backward extensions of the cervical vertebrae in each group of patients in the control group and study group showed a significant increase trend (P<0.001). Furthermore, post-treatment, all parameters in the study cohort exhibited significantly superior values better than in the control group (P<0.05), implying enhanced cervical spine mobility among the study group patients.

Comparison of pain factors pre-treatment and post-treatment (pg/mL, $\bar{x}\pm s$)

The comparison results of pre-treatment and post-treatment NPY and COX-2 levels of pain factors in each group are shown in fig. 2(a) and (b), respectively. Compared with before treatment, the levels of NPY and COX-2 in all groups of patients decreased after treatment (P<0.05). After the intervention, the levels of NPY and COX-2 in the study cohort were notably reduced in comparison to those in the control group post-treatment (P<0.05), indicating that the degree of cervical pain in the study group patients was reduced after treatment.

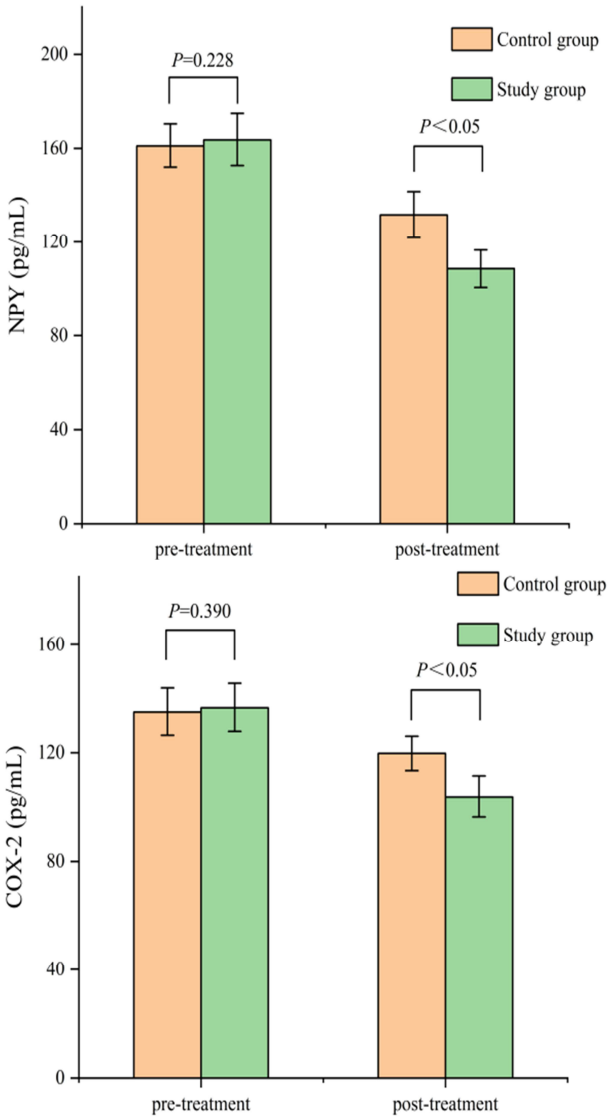

Fig. 2: Comparison of pain factor levels pre-treatment and post-treatment in each group (pg/mL, $x\pm s$), where (a) represents the comparison of NPY levels and (b) represents the comparison of COX-2 levels

Comparison of inflammatory factor levels pre-treatment and post-treatment (pg/mL, $\bar{x}\pm s$)

The comparative results of the levels of inflammatory factors TNF-α, IL-6 and IL-1β before and after treatment in each group are shown in fig. 3(a), (b) and (c), respectively. After the treatment, the post-intervention levels of inflammatory markers TNF-α, IL-6 and IL-1β in all patient groups exhibited a notable decrease compared to their pre-treatment values (P<0.05). Following treatment, the study group exhibited significantly lower contents of inflammatory markers TNF-α, IL-6 and IL-1β than in the control group (P<0.05), suggesting that after treatment, the serum suggests of inflammatory factors in the study group were lower and the inflammatory response was significantly reduced.

Table 1: Baseline characteristics of patients in each group

Parameter	Control group (*n*=48)	Study group (*n*=48)	t/x^2	*P*
Age (years)	48. 38 ±10. 72	47. 44 ± 11. 01	0.106	0.921
Gender (Male/Female)	25/23	27/21	0.168	0.682
course of disease (weeks)	4.28±1.21	4.55±1.54	-0.239	0.823
Previous Treatment (Yes/No)	23/25	26/22	0.375	0.540

Table 2: Comparison of pain levels and functional scores (score, *x*±*s*) pre-treatment and post-treatment among different groups of patients

Group	Time	VAS	NDI	JOA
Control group (n=48)	pre-treatment	5.18±1.01	28.83±2.79	9.23±2.04
	post-treatment	3.55±0.55**	15.56±1.07**	11.58±1.30**
Study group (n=48)	pre-treatment	5.24±1.21	29.10±3.31	9.63±1.62
	post-treatment	2.41±0.38**△	11.63±1.53**△	13.61±2.02**△

Note: Compared to the pre-treatment values within the same group (P<0.001), and in comparison to the post-treatment control group (P<0.05), there were significant differences as indicated by ** and Δ, respectively.

Table 3: Comparison of ROM activity pre-treatment and post-treatment among different groups of patients (°, *x*±*s*)

Parameter	Control group (n=48)		study group (n=48)	
Time	pre-treatment	post-treatment	pre-treatment	post-treatment
Left rotation	44.70±9.31	58.29±5.91**	43.93±5.24	62.72±6.95**△
Right rotation	43.69±6.38	55.35±7.46**	44.35±5.88	63.94±6.38**△
Left side flexion	27.68±5.90	36.88±3.48**	28.97±5.31	42.51±2.52**△
Right side bend	27.21±3.25	36.44±2.72**	27.85±3.17	41.09±2.61**△
Anteflexion	34.78±2.06	40.29±2.27**	36.35±2.62	45.91±2.11**△
Extension	35.16±1.65	39.03±2.15**	36.79±2.98	43.45±2.22**△

Note: Compared to the pre-treatment values within the same group (P<0.001), and in comparison to the post-treatment control group (P<0.05), there were significant differences as indicated by ** and Δ, respectively.

Table 4: Comparison of adverse reaction incidence between the two groups throughout the treatment phase

Group	*n*	Dizziness and headache worsen	Nausea and vomiting	Increased skin and muscle pain	total	x^2	*P*
Control group	48	2	2	1	5(10%)	0.545	0.460
Study group	48	2	1	0	3(6%)		

Comparison of clinical effectiveness

The clinical comparison results are shown in fig. 4. Compared with the control group, the recovery rate and efficacy of the study group were significantly higher and the overall effective rate showed a marked advantage (*P*<0.01). The above findings demonstrated that Shujin Tongluo granules together with orthopedic manipulation can effectively alleviate and treat CSR of qi stagnation and blood stasis type.

Comparison of adverse reactions

Both patient groups maintained stable vital signs pre- and post-treatment, with an evaluation of adverse events during the treatment period shown in table 4. In the control group, 2 patients experienced worsening dizziness and headache, 2 patients experienced nausea and vomiting and 1 patient experienced worsening skin and muscle pain. The total incidence of adverse reactions was 10% (5/48). In the study group, one patient experienced worsening dizziness and headache, and one patient experienced nausea and vomiting. The total incidence of adverse reactions was 6% (3/48). No statistically significant differences were observed between the two groups (x^2=0.545, *P*=0.460).

DISCUSSION

In recent years, the number of CSR patients has gradually increased and become younger, whose pathogenesis includes cervical degenerative changes, strain, inflammation, and trauma, among other related factors (Podlewski *et al.*, 2020). CSR is caused by neck deformation stimulation, which leads to neck pain and upper limb numbness, local muscle contraction and tenderness and symptoms such as local edema (Lin *et al.*, 2024) and these damaged tissues release a large amount of inflammatory and pain factors, such as NPY, COX-2, etc., stimulating nerve roots and causing root pain (Jiang *et al.*,

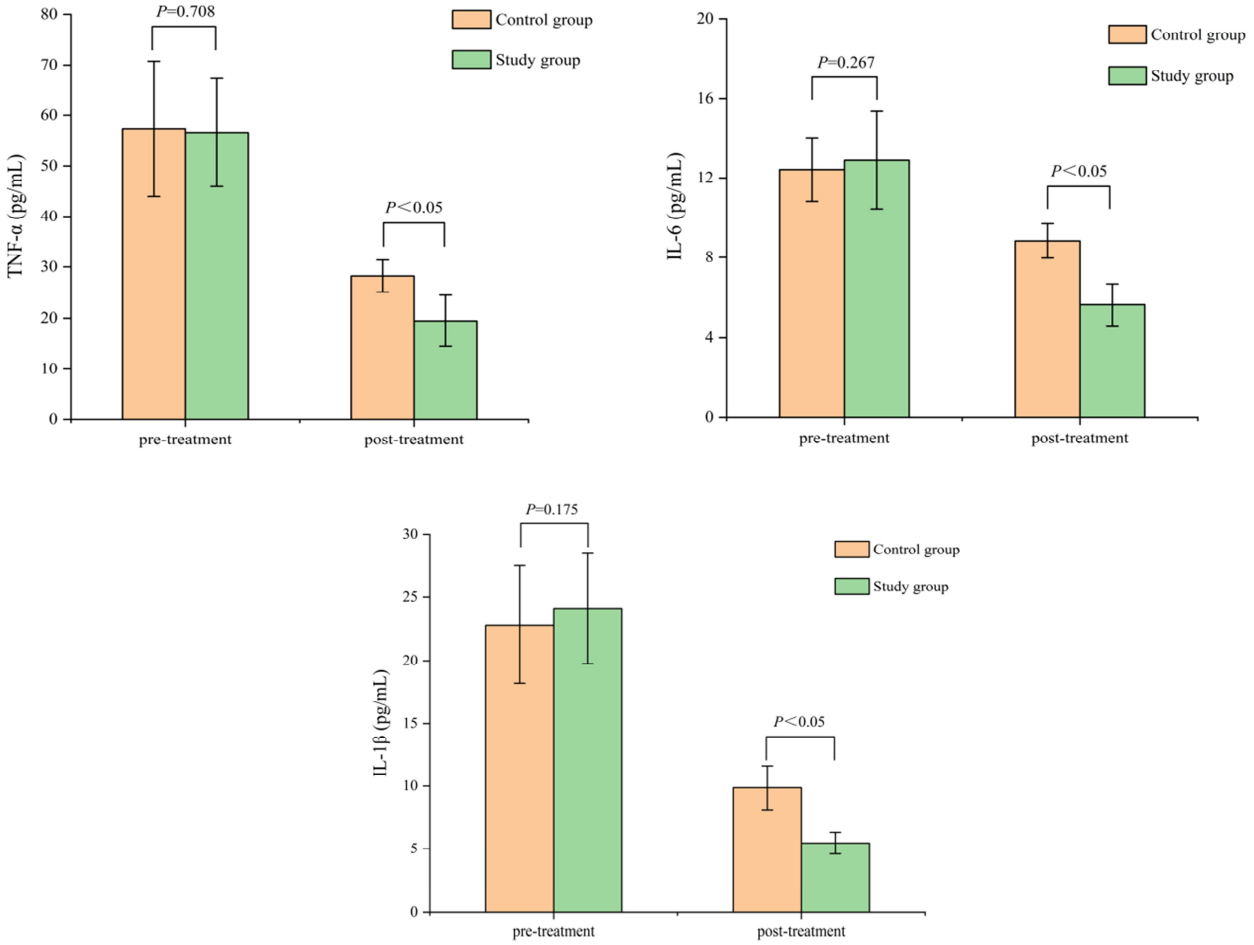

Fig. 3: Comparison of inflammatory factor contents pre-treatment and post-treatment in each group (pg/mL, $\bar{x}\pm s$), where (a) represents the comparison of TNF-α contents, (b) represents the comparison of IL-6 contents and (c) represents the comparison of IL-1β contents

2023). Modern medicine mainly applies drugs such as pain relief and nerve nutrition for treatment (Abdelrahman and Hackshaw, 2021). The TCM treatment of CSR includes internal and external treatment, such as Chinese medicine, acupuncture and moxibustion, massage, traction, etc. Traditional Chinese medicine mainly focuses on oral administration of traditional Chinese medicine for internal treatment, massage for external treatment and comprehensive treatment to achieve the goal of "general rule without pain", relieve and relieve nerve root pain, improve local microcirculation and treat muscle spasms (Dai *et al.*, 2022).

When performing orthopedic manipulation in traditional Chinese medicine, the practitioner first relaxes the soft tissue around the affected area using traditional Chinese medicine techniques such as "rubbing, pointing and pressing" (Liang *et al.*, 2024). Then, based on the distribution of neurological symptoms, palpation and X-ray imaging, the type of "bone dislocation" and the point of application are determined and appropriate spinal manipulation techniques are chosen to restore the bone and achieve the treatment goal of relieving nerve root compression. At the same time, joint disorders and misalignment can be reasonably corrected to alleviate neck compression symptoms, effectively improve blood circulation, and help improve cervical spine function and mobility (Han *et al.*, 2021; Zhu *et al.*, 2020). The research results show that orthopedic manipulation can improve the TCMMS, VAS score and NDI score of CSR patients; Moreover, the treatment group combined with Shujin Tongluo Granules for CSR showed a more significant improvement in the above scores, which can better relax the muscles and collaterals, release adhesions, restore cervical physiological function and mobility, effectively improve cervical microcirculation and alleviate local soft tissue symptoms and cervical symptoms. The similar study was reported by Zhen *et al.* (2024) in Shi Cervical Rotational Manipulation in Patients With Atlantoaxial Joint Subluxation.

The traditional Chinese medicine Shujin Tongluo granules have significant therapeutic effects on CSR. Among them, Chuanxiong promotes blood circulation, relieves blood stagnation, relieves soreness and improves body tone. This is complemented by Tianma, Weilingxian and Dilong

to boost the benefits of improving blood flow, dispersing blood clots and alleviating pain. Achyranthes and bone fragments can improve the circulation of blood, eliminate blood stagnation and nourish both liver and kidneys. These ensure that the liver, kidney, blood and qi are sufficient in the human body, promoting the circulation of qi and blood, ensuring smooth flow of qi and blood, nourishing joints, tendons and meridians and achieving the goal of joint circulation (Peng *et al.*, 2022).

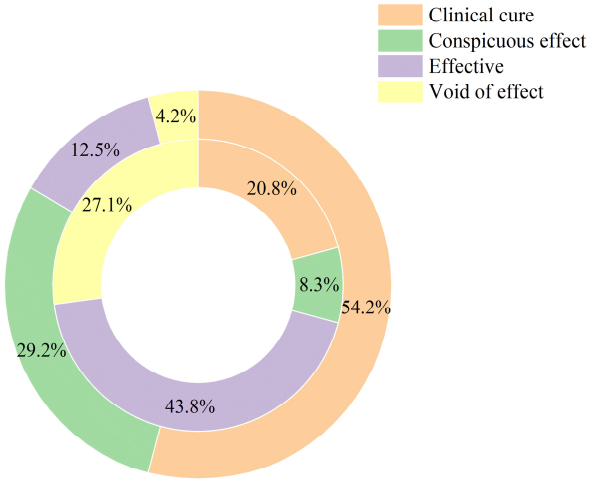

Fig. 4: Comparison of clinical effectiveness among different groups (%, inner circle represents control group, outer circle represents study group)

Contemporary pharmacological studies indicate that the steroids found in Tianma, gentiopicroside present in Weilingxian and magnolol are capable of effectively suppressing the expression of inflammatory mediators and influencing pain factor levels. Meanwhile, bone fragment supplementation can effectively reduce the contents of IL-6 and TNF-α. After processing, *Achyranthes bidentata* has significant analgesic and pain factor influencing effects and can also reduce TNF-α levels (Wang *et al.*, 2023). Therefore, we used a combination of Shujin Tongluo granules and orthopedic manipulation to treat CSR of the qi stagnation and blood stasis kind in our study group to achieve better clinical effectiveness.

The findings of this research show that patients in both groups have experienced notable improvements in their conditions. The clinical efficacy of Shujin Tongluo Granules combined with orthopedic manipulation treatment group was markedly better than the group treated with orthopedic manipulation alone and there is no significant difference in the incidence of adverse reactions. After treatment, the TCMMS, VAS and NDI scores in the cervical spine assessment were significantly lower in the study group in comparison with the control group (P<0.05), which verified that the combined treatment could effectively improve the clinical efficacy, alleviate the clinical symptoms, reduce the adverse reactions, effectively improve the cervical function and reduce the level of pain. T. Wang *et al.* (2021) reported consistent findings in a study of the clinical efficacy of the use of tendon modulation with bruxism (SRBSM) in combination with Xiaoyu osteolytic powder (XYJGP) in the treatment of knee osteoarthritis (KOA). Patients with cervical spondylosis usually have symptoms of cervical stiffness, and cervical mobility, as a sensitive indicator reflecting cervical function, is often manifested as high cervical mobility in individuals with normal cervical spine, but the opposite is true in patients with cervical spondylosis. According to the research results, the study group exhibited significantly higher JOA scores and ranges of motion (ROM) for left, right and lateral neck flexion in comparison with control group (P<0.05), demonstrating the combination of Shujin Tongluo granules and orthopedic manipulation treatment group was superior to the single treatment orthopedic manipulation treatment group.

Cai (2024) reported similar conclusions in their study on the treatment of CSR with Acupuncture and Moxibustion and Massage on Ceramic Shoulder Pain. The NPY and COX-2 are pain factors closely related to neuropathic pain and studying them can indirectly analyze the degree of neuropathic pain (Gupta *et al.*, 2022). Combined with pro-inflammatory cytokines TNF-α, IL-6 and IL-1β, CSR treatment can be effectively analyzed. The research results showed that the levels of pain factors NPY, COX-2, inflammatory markers TNF-α, IL-6 and IL-1β showed a decreasing trend in the study group. Combined with the clinical effectiveness of each group of patients, the study group showed significantly superior outcomes compared to the control group (P<0.05). Similar findings were reported by Li *et al.* (2021) in their study of the anti-inflammatory effects of acupuncture through neuro-immune modulation from acupoints to target organs. These results once again confirmed that the treatment group of Shujin Tongluo granules combined with orthopedic manipulation had a better effect on treating CSR.

Combining orthopedic manipulation with finger acupoints to release the starting and ending points of muscles and their pain points, the contractures and adhesions in the cervical bowstring junction and its muscles are released, the curvature and biomechanical recovery and cervical mobility are improved, nerve root stimulation is relieved, and clinical local pain symptoms are relieved (Zhang *et al.*, 2024). The traditional Chinese medicine Shujin Tongluo Granules can relax the muscles and collaterals, promote blood circulation and ensure that there is no pain in the general principles. The meridians and blood flow are unobstructed, which can effectively reduce the levels of inflammatory and pain factors in the serum, thereby alleviating symptoms of neuropathic pain, combining the two treatments has complementary advantages and is superior to monotherapy (Liu *et al.*, 2020; Qin *et al.*,

2024). Therefore, the combination of Shujin Tongluo granules and orthopedic manipulation for the comprehensive treatment of CSR presents a dual effect in clinical effectiveness.

CONCLUSION

Shujin Tongluo granules combined with orthopedic manipulation have significant effects in relieving pain, restoring cervical physiological function and cervical mobility in the treatment of qi stagnation and blood stasis type CSR. Not only did these treatments lead to significant reductions in the relative expression contents of the inflammatory factors TNF-α, IL-6 and IL-1β, but they also had an impact on the expression levels of pain factors COX-2 and NPY. Therefore, the comprehensive treatment of CSR with traditional Chinese medicine has the advantages of superior efficacy, novel perspective and fewer side effects. Moreover, orthopedic manipulation is highly favored by patients due to its simple and non-invasive nature. In summary, the combination of Shujin Tongluo granules and orthopedic manipulation has shown good therapeutic effects in the comprehensive treatment of CSR and provides a certain scientific basis for the clinical treatment of related CSR. However, this study had a small sample size and a short treatment time and could not analyze the mechanism of cervical spine recovery in terms of neuromodulation due to the condition. Multicenter, large-sample, high-quality clinical studies can be conducted in the future.

REFERENCES

Abdelrahman KM and Hackshaw KV (2021). Nutritional supplements for the treatment of neuropathic pain. *Biomedicines,* **9**(6): 674.

Cai W (2024). Effect of acupuncture and moxibustion and massage on cervical shoulder pain and cervical activity in patients with nerve root type cervical spondylosis. *Guide of China Medicine,* **22**(15): 113-116.

Chai C, Hong F, Yan Y, Yang L, Zong H, Wang C, Liu Z and Yu B (2020). Effect of traditional Chinese medicine formula GeGen decoction on primary dysmenorrhea: A randomized controlled trial study. *J. Ethnopharmacol.,* **261**: 113053.

Chen L, Zhang X, Zhang W and Liu Y (2024). Exploring the potential of lotus leaf and its bioactive compounds for anti-obesity interventions. *Journal of Experimental Clinical Application of Chinese Medicine,* **5**: 40-54.

Dai Z, Liao X, Wieland LS, Hu J, Wang Y, Kim T, Liu J, Zhan S and Robinson N (2022). Cochrane systematic reviews on traditional Chinese medicine: What matters-the quantity or quality of evidence? *Phytomedicine,* **98**: 153921.

Ding X, Wu J, Shen Q, Xu J and Mo W (2021). Clinical control study of traditional Chinese medicine hot compress combined with traction in the treatment of cervical spondylotic radiculopathy: Study protocol. *Medicine,* **100**(4): e23880.

Fu Z, Xie Y, Li P, Gao M, Chen J and Ning N (2024). Assessing multidisciplinary follow-up pattern efficiency and cost in follow-up care for patients in cervical spondylosis surgery: A non-randomized controlled study. *Front. Med*., **11**: 1354483.

Gupta S, Bansal RN, Sodhi SPS and Brar GK (2022). Animal models-Mimicking the pain of trigeminal neuralgia. *Indian J Pharmacol*., **54**(2): 138-145.

Han Z, Li X, Liu Z, Bai M, Zhao Z and Wang J (2021). The study on the clinical effectiveness and safety of traditional Chinese medicine acupoint catgut embedding guided by musculoskeletal ultrasound in the treatment of nerve root sciatica: A protocol for systematic review and meta-analysis of randomized controlled trials. *Medicine,* **100**(13): e25387.

Hellmann F, Marceau E and Cruz RdL (2024). 60th anniversary of the Declaration of Helsinki: Ethical challenges in the 10th amendment. *JR Soc. Med.,* **117**(8): 257-263.

Huo L, Yang X, Feng T, Li Y and Wang P (2022). Management of Cervical Spondylotic Radiculopathy: A Systematic review. *Global Spine J.,* **12**(8): 1912-1924.

Jiang X, Zhu W, Yan S, Ren X, Liu Q, Zhang G, Hu L, Fu M, Liu Z and Chang X (2023). Effect and mechanism of electro-acupuncture on neuralgia of cervical spondylotic radiculopathy based on the neuron-gliocyte-chemokine signaling pathway. *J. Biomed. Nanotechnol.,* **19**(1): 109-116.

Li N, Guo Y, Gong Y, Zhang Y, Fan W, Yao K, Chen Z, Dou B, Lin X, Chen B, Chen Z, Xu Z and Lyu Z (2021). The anti-inflammatory actions and mechanisms of acupuncture from acupoint to target organs via neuro-immune regulation. *J. Inflamm. Res.,* **14**: 7191-7224.

Liang X, Xie Q, Zeng G, Yao B, Li Y and Su B (2024). Clinical study on traditional Chinese medicine bone-setting manipulations combined with minimally-invasive treatment and intramedullary plate fixation for the treatment of moderate *Hallux valgus*. *J. Guangzhou Univ. Tradit. Chin. Med.,* **6**: 868-875.

Lin Y, Zhong S, Huang C, Zhang G and Jiang G (2024). The efficacy of acupuncture therapies in cervical spondylotic radiculopathy: A network meta-analysis. *Heliyon,* **10**(11): e31793.

Liu J, Zhu Y, Wang Z, Yu P, Xue C, Jiang H, Li X and Tang D (2020). Clinical research for whether the Traditional Chinese medicine could promote the resorption of lumbar disc herniation: A randomized controlled trial. *Medicine,* **99**(27): e21069.

Mansfield M, Smith T, Spahr N and Thacker M (2020). Cervical spine radiculopathy epidemiology: A systematic review. *Musculoskeletal Care,* **18**(4): 555-567.

McCormick JR, Sama AJ, Schiller NC, Butler AJ and Donnally CJ (2020). Cervical spondylotic myelopathy:

a guide to diagnosis and management. *J. Am. Board Fam. Med.,* **33**(2): 303-313.

Peng X, Tang F, Yang Y, Li T, Hu X, Li S, Wu W and He K (2022). Bidirectional effects and mechanisms of traditional Chinese medicine. *J. Ethnopharmacol.,* **298**: 115578.

Podlewski S, Kłębczyk A and Radek M (2020). Degenerative cervical spine disease-pathogenesis and symptoms. *Med. Stud.,* **36**(4): 310-315.

Qin X, Sun K, Xu W, Gao J, Jiang H, Chen W, Zhang L, Li Z, Li W, Yuan P, Yang K, Tong P, Zhong Y, Zhu X, Wan X, He C, Wang Y, Xu X, Huang Y, Zhang Z, Huang Y, Guo W, Cao J, Feng T, Wang X, Yin Y, Wang H, Sun C, Xiao X, Wei X and Zhu L (2024). An evidence-based guideline on treating lumbar disc herniation with traditional Chinese medicine. *J. Evid. Based Med.,* **17**(1): 187-206.

Qu L, Xing L and Gao S (2020). Traditional Chinese spinal orthopedic manipulation. *TMR Non-Drug Therapy,* **3**(2): 69-78.

Roshanravan N, Shabestari A N, Alamdari N M, Ostadrahimi A, Separham A, Parvizi R, Jafarabadi M A, Ghodrat M, Akbarzadeh M, Naemi M, Ghazi M K K, Hadi A and Ghaffari S (2021). A novel inflammatory signaling pathway in patients with slow coronary flow: NF-κB/IL-1β/nitric oxide. *Cytokine,* **143**: 155511.

Shen W, Li C, Zhou Z, Zhai N and Pan L (2020). MicroRNA-204 silencing relieves pain of cervical spondylotic radiculopathy by targeting GDNF. *Gene Ther.,* **27**(6): 254-265.

Sur D, Mondal C, Balaraman A K, Haldar P K, Maji H S and Bala A (2023). Attenuation of COX-2 enzyme by modulating H2O2-mediated NF-κB signaling pathway by monoamine oxidase inhibitor (MAOI): A further study on the reprofiling of MAOI in acute inflammation. *Inflammopharmacology,* **31**(3): 1305-1317.

Tong Y, Huang Z, Hu C, Fan Z, Bian F, Yang F and Zhao C (2020). A comparison study of posterior cervical percutaneous endoscopic ventral bony decompression and simple dorsal decompression treatment in cervical spondylotic radiculopathy caused by cervical foraminal and/or lateral spinal stenosis: A clinical retrospective study. *BMC Musculoskelet. Disord,* **21**(1): 290.

Wang T, Chen Z, Hu R, Yao M, Xu H and Shi W (2021). Clinical observation of sinew-regulating and bone-setting manipulation combined with Xiaoyu Jiegu Powder in treating knee osteoarthritis. *J. Hainan Med. Univ.,* **27**(8): 19.

Wang Y, Tao X, Gao Y, Jin Z, Guo S, Li Z, Wang M, Zhao R, Zhou W and Wu J (2023). Study on the mechanism of Shujin Tongluo granules in treating cervical spondylosis based on network pharmacology and molecular docking. *Medicine,* **102**(29): e34030.

Wu S, Yun X, Xie J and Xie B (2019). Jingshu Keli in treatment of cervical spondyloticradiculopathy (CSR): A Systematic Review and Meta-Analysis. Paper presented at the 2019 10th International Conference on Information Technology in Medicine and Education (ITME).

Xie R, Yu J, Yin X, Li K-m, Chang X and Zhu L (2019). Advances in modern Chinese medicine treatment of cervical spondylotic radiculopathy. *J. Hainan Med. Univ.,* **25**(17): 80.

Xu X, Wang Y, Yang C, Song X, Chen Z, Yang L and Li Y (2020). Evaluation of rehabilitation effect of five-step exercises on patients with radiculopathy of cervical vertebra. *Medicine,* **99**(26): e20846.

Xue K, Liu H, Shi Q, Wang X, He Y, Cui J and Fu J (2021). The efficacy and safety of fire needle for cervical spondylotic radiculopathy: A protocol for systematic review and meta-analysis. *Medicine,* **100**(31): e26824.

Yang X, Zhang Y, Zhang X and Li X (2011). Simultaneous quantification of three major active components in granules of the traditional Chinese medicine "SHU-JIN-TONG-LUO" by high-performance liquid chromatography. *Instrum. Sci. Technol.,* **39**(1): 34-46.

Zhang K, Shen M, Zhang H, Ding L, Li C and Huang B (2024). Research status and prospects of traditional Chinese medicine in the treatment of lumbar intervertebral disc herniation. *J. Contemp. Med. Pract.,* **6**(7): 111-115.

Zhang T, Zhang B, Xu J, Ren S, Huang S, Shi Z, Guo S, Bian L, Wang P, Wang F, Cai Y and Tang X (2022). Chinese herbal compound prescriptions combined with Chinese medicine powder based on traditional Chinese medicine syndrome differentiation for treatment of chronic atrophic gastritis with erosion: a multi-center, randomized, positive-controlled clinical trial. *Chinese Medicine,* **17**(1): 142.

Zhao D and Zhang H (2024). Study on the impact of traditional Chinese medicine massage on cervical function and sleep quality in patients with cervical spondylotic radiculopathy. *Clin. Med. Eng.,* **31**(5): 581-582.

Zhao H, Xiong W, Zhao X, Wang L and Chen J (2012). Development and evaluation of a traditional Chinese medicine syndrome questionnaire for measuring sub-optimal health status in China. *J. Tradit. Chin. Med.,* **32**(2): 129-136.

Zhen D, Haibin S, Youli A, Weian Y, Huihao W, Hongsheng Z, Guozhong L, Ren D and Zhibi S (2024). Efficacy and safety of shi cervical rotational manipulation in patients with atlantoaxial joint subluxation: Protocol for a randomized controlled trial. *JMIR Res. Protoc.,* **13**(1): e57865.

Zhu L, Yu C, Zhang X, Yu Z, Zhan F, Yu X, Wang S, He F, Han Y and Zhao H (2020). The treatment of intervertebral disc degeneration using traditional Chinese medicine. *J. Ethnopharmacol*., **263**: 113117.