

Original Article

The effects of acupuncture combined with western medicine in the treatment of neck, shoulder, lumbar and leg pain

Yunping Shan¹, Juan Zhang², Yinhua Ma¹, Yiming Zhang³

¹Department of Pain Treatment, Hangzhou Fuyang Hospital of TCM Orthopedics and Traumatology, Hangzhou, Zhejiang, China; ²Department of Pain Treatment, Zhejiang Provincial Hospital of TCM, Hangzhou, Zhejiang, China; ³Orthopedics and Traumatology Department, Hangzhou Fuyang Hospital of TCM Orthopedics and Traumatology, Hangzhou, Zhejiang, China

Received March 4, 2023; Accepted April 17, 2023; Epub June 15, 2023; Published June 30, 2023

Abstract: Objective: To investigate the effect of Traditional Chinese Medicine (TCM) acupuncture combined with western medicine in the treatment of neck, shoulder, lumbar and leg pain and its influence on the degree of pain, motor functions and inflammatory factor levels. Methods: In this retrospective study, 86 patients with neck, shoulder, lumbar and leg pain treated in Department of Orthopedics and Traumatology, Hangzhou Fuyang Hospital of TCM from June 2019 to June 2022 were selected as the study subjects. According to different treatment methods, these patients were divided into an observation group (n=43) and a control group (n=43). Patients from the control group were treated with conventional western medicine, while those from the observation group were treated with combination of traditional Chinese medicine acupuncture (Acupuncture + Fumigation with Collaterals-Dredging Decoction) and western medicine. Patients in both groups were treated for 4 weeks continuously. The treatment effect, visual analogue scale (VAS) score, limb motor function scale (Fugl-Meyer) score, cervical function score, daily living ability score, the levels of inflammatory factors including interleukin-6 (IL-6), tumor necrosis factor- α (TNF- α) and C-reactive protein (CRP) were recorded and compared between two groups. Results: The effective rate of patients in the observation group was 93.02%, which was significantly higher than 76.74% in the control group ($P < 0.05$). There was no significant difference in the term of Fugl-Meyer score, VAS score and levels of inflammatory factors before treatment between two groups (all $P > 0.05$). After treatment, the VAS score and the levels of IL-6, TNF- α and CRP in both of groups significantly decreased in contrast to before treatment. The Fugl-Meyer score after treatment in both of groups was significantly increased in contrast to before treatment. Compared with those after treatment in control group, the VAS score and the levels of IL-6, TNF- α and CRP after treatment in the observation group were obviously lower, while the Fugl-Meyer score in the observation group was significantly higher (all $P < 0.05$). Conclusion: TCM acupuncture combined with western medicine has a good therapeutic effect on neck, shoulder, lumbar and leg pains, which can effectively relieve the pain, improve motor function and reduce the inflammatory reactions in patients. The combined treatment has clinical application values and is worth promoting.

Keywords: Neck shoulder low back pain, acupuncture treatment, symptom improvement, motor functions, inflammatory factors

Introduction

Neck, shoulder, lumbar and leg pain has been a common frequently-occurring disease in clinical practice, which is characterized by swelling, pain in the affected area, limited function of the neck, shoulder, lumbar and leg, etc. It has the characteristics of recurrent attacks and long course of disease, which seriously affects the quality of life of patients [1]. In the past, drug

treatment was often used in clinic, but drug treatment can only relieve the pain and improve the clinical symptoms of patients, and the long-term use of drugs would have certain side effects on patients [2]. So far, there is no good method of treatment for neck, shoulder, lumbar and leg pains. In recent years, with the continuous development of traditional Chinese medicine (TCM) technology, it has been widely used in various fields and has achieved certain

The treatment of neck, shoulder, lumbar and leg pain

results. According to TCM, neck, shoulder, lumbar and leg pain belongs to the category of “spasmodic syndrome” or “arthralgia syndrome”. The occurrence of this disease is mostly related to the obstruction of vessels and collaterals in patients [3, 4]. On the basis of these theories, the treatment method is mainly to dredge the meridians, relieve pain and stop spasm [5]. Acupuncture and moxibustion is a classic treatment technique commonly used in traditional Chinese medicine. It is mainly used to regulate patients’ qi and blood by stimulating specific acupoints [6]. In order to further explore the clinical effects of TCM acupuncture combined with western medicine in the treatment of neck, shoulder, lumbar and leg pain, 86 patients with neck, shoulder, lumbar and leg pain admitted to the Department of Orthopedics and Traumatology of our hospital from June 2019 to June 2022 were selected as the research subjects, and the clinical efficacy between combined treatment and conventional western medicine were compared and analyzed. The results of this study provide clinical reference for the treatment of neck, shoulder, lumbar and leg pain.

Material and methods

General information

In this retrospective study, 86 patients with neck, shoulder, lumbar and leg pain, who were prepared to receive treatment in the Department of Orthopedics and Traumatology, Hangzhou Fuyang Hospital of TCM from June 2019 and June 2022, were selected as the research subjects. According to the method of treatment, these patients were divided into the observation group and the control group with 43 patients in each. The patients from the observation group underwent the TCM acupuncture combined with western medicine, while the patients from the control group received conventional western medicine. The Ethics Committee of Hangzhou Fuyang Hospital of TCM Orthopedics and Traumatology approved this research (No. 2019-051).

Inclusion criteria: (1) Patients with confirmed neck, shoulder, lumbar and leg pain, meeting the standards in the Guidelines for the Diagnosis and Treatment of Orthopedic Diseases [7] and Standards for Diagnosis and Curative Effect of Chinese Medical Symptoms

[8]. (2) Patients who were treated for the first time. (3) Patients with an age over 18 years. (4) Patients who or whose family members signed the informed consent notice. (5) Patients with complete medical records and patients that voluntarily participated in this study. Exclusion criteria: (1) Patients accompanied with serious diseases in the kidney, heart, lung or liver. (2) Patients with cognitive disorders, language disorders and mental disorders. (3) Patients with neck, shoulder, lumbar or leg deformities. (4) Patients who were intolerant to the therapeutic drugs in this study.

Methods of treatment

Patients in the control group were treated with conventional western medicine: Eperisone Hydrochloride Tablets (Weicai (China) Pharmaceutical Co., Ltd., SFDA approval number: H20133175), 1 tablet per time, 3 times per day, and aceclofenac enteric-coated tablets (Jiangsu Jibel Pharmaceutical Co., Ltd., SFDA approval number: H20050272), 2 tablets per time, 2 times per day, morning and night. If the patient was accompanied by numbness of limbs, the patient was orally given mecobalamin tablets (Weicai (China) Pharmaceutical Co., Ltd., SFDA approval number: H20143017), 1 tablet per time, 3 times per day. The treatment continued for 4 weeks.

Patients in the observation group received TCM acupuncture (Acupuncture + Fumigation with Collaterals-Dredging Decoction) on the basis of the treatment in control group. The details were as follows: (1) Acupoints Quyuan, Bingfeng, Dazhui, Jiansan, Tianzong, Jianliao, Quchi, Hegu, etc. were routinely disinfected and acupunctured using filiform needle, and then the moxa stick was placed on the filiform needle handle after acupuncture and ignited until it burned out. Finally, the needle was kept for 30 min, once a day. The acupuncture and moxibustion were performed with only one day off in a week. For patients with low back and leg pain, acupoints Yanglingquan, Chengshan and Shenshu were additionally acupunctured for 4 weeks. (2) Zhang’s Fumigation with Collaterals-Dredging Decoction were performed as follows: ① Notopterygium 12 g, Ephedra 10 g, Clematis 20 g, Geranium 30 g, Celestial Spleen 20 g, obscured homalomenarhizome 20 g, Glycyrrhiza uralensis 6 g, Radix Angelicae 12 g, Asarum 6 g, Maple bark 15 g, Osmanthus 30 g,

The treatment of neck, shoulder, lumbar and leg pain

Myrrh 15 g, Streptomyces 30 g, and Salvia Miltiorrhiza 30 g were wrapped up with gauze and boiled with 300 ml of water in a fumigation treatment instrument; ② 80 ml of aged vinegar and 50 ml of yellow wine were mixed and boiled. After boiling, the two liquids were mixed and poured into the atomizer. The patients were placed in a supine position and the painful part was fumigated. During the process of fumigation, the temperature of the liquid medicine was maintained at about 40°C. The fumigation was performed once a day, 30 min per time and it was continued for 4 weeks.

Observation index

In this research, the primary observation index was the therapeutic effect. The secondary indexes included VAS scores, Fugl-Meyer scores, scores of cervical functions, scores of daily living ability, and the levels of IL-6, TNF- α and CRP.

The therapeutic effect was compared between two groups. The therapeutic outcomes included excellent, effective and ineffective. Excellent: the clinical symptoms (numbness, pain, etc.) disappeared and the joint function totally recovered; Effective: clinical symptoms such as numbness and pain improved significantly compared with the previous sensation, and the joint function basically recovered; Ineffective: there was no improvement in clinical symptoms including numbness and pain or it even worsened [9]. The effective rate = [(number of cases with excellent and effective results)/total number of cases] * 100%.

VAS score was compared between two groups. Pain degree in the patient was evaluated by the visual analogue scale (VAS) score with a total score of 10 points [10]. The score is negatively correlated with the degree of pain.

Fugl-Meyer score was compared between two groups. The limb motor functions were evaluated according to Fugl-Meyer Assessment Scale [11]. The score has a total score of 100 points, and higher score indicates better limb motor functions.

Cervical functions were compared between two groups. The clinical assessment scale cervical spondylosis (CASCS) was used to evaluate the cervical functions of patients [12]. The scale

has a total score of 100 points, and higher score indicates better cervical functions.

The daily living ability was compared between two groups. The daily living ability was evaluated by the Barthel index with a total score of 100 points [13]. The score is positively correlated with the daily living ability.

Shoulder joint functions were compared between two groups. The Chinese Constant-Murley Shoulder (CMS) score was used to evaluate shoulder joint functions in patients [14]. There are 4 items, including pain (15 scores), activity (20 scores), range of motion (40 scores) and myodynamia (25 scores), with a total score of 100 points. The higher score indicates better function of shoulder joints.

Lumbar function was compared between two groups. Japanese Orthopaedic Association (JOA) score was used to assess lumbar functions in patients [15]. There are 4 items, including subjective symptoms (9 scores), clinical signs (6 scores), limitations of daily activities (14 scores) and bladder functions (6 scores) with a total score ranging from 0 to 29 points. The lower score indicates worse lumbar function.

Lysholm knee score (LKS) was used for the evaluation of knee function [16]. The scale includes 8 items such as pain, degree of instability and etc. The total score ranges from 0 to 100 points. The higher score suggests better knee function.

Inflammatory factor levels were compared between two groups. Before and after treatment, serum interleukin-6 (IL-6) (No. PI330), Tumor necrosis factor- α (TNF- α) (No. PT518) and C-reactive protein (CRP) (No. PC190) were detected by enzyme-linked immunosorbent assay. These kits were purchased from Shanghai Beyotime Biotech. Inc.

Statistical methods

All the clinical data collected in this study were analyzed using SPSS version 22.0. The measurement data were presented as Mean \pm Standard deviation, and the comparison was conducted by t test. The count data was presented as percentages/cases, and the comparison between groups was performed using

The treatment of neck, shoulder, lumbar and leg pain

Table 1. The comparison of basic data between the observation group and the control group

Parameters		Observation group (N=43)	Control group (N=43)	t/ χ^2 value	P value
Gender	Male	20	21	0.641	0.416
	Female	23	22		
Age (years)		56.0±10.0	58.0±10.0	0.798	0.426
Course of disease (years)		3.4±0.8	3.5±0.5	0.543	0.502
Location of pain	Lumbar pain	13	15	0.702	0.396
	Neck and shoulder pain	15	14		
	Leg pain	15	14		

Table 2. Comparison of clinical efficacy between the observation group and the control group

Groups	Excellent	Effective	Ineffective	The efficient rate (%)
Observation group (N=43)	24	16	3	93.02
Control group (N=43)	15	18	10	76.74
χ^2 value				4.440
P value				0.035

χ^2 test. $P < 0.05$ indicated statistical differences.

Results

Comparison of general information

As shown in **Table 1**, there were no significant differences in the gender, age, course of disease, location of pain between observation group and control group (all $P > 0.05$), indicating the two groups were comparable.

Comparison of clinical therapeutic efficacy between two groups

As shown in **Table 2**, in the observation group, there were 24 cases with excellent results, 16 with effective results and 3 with ineffective results, while in the control group, there were 15 cases with excellent results, 18 with effective results and 10 with ineffective results. The efficient rate of the observation group was 93.02%, which was significantly higher than that in the control group (76.74%) ($P < 0.05$).

Comparison of VAS scores and Fugl-Meyer scores between the two groups

As shown in **Table 3**, before treatment, there was no significant difference in VAS scores and Fugl-Meyer scores between the two groups.

After the treatment, the VAS score in both groups were remarkably reduced while Fugl-Meyer scores were remarkably increase in contrast to before treatment (all $P < 0.05$). Moreover, the VAS score in the observation group was obviously lower than that in the control group (4.34±0.85 vs

5.24±0.49, $P = 0.001$), while Fugl-Meyer scores in the observation group were remarkably higher than that in the control group (78.95±9.46 vs 63.49±9.58, $P = 0.001$).

Comparison of CASCS score and Barthel index between the two groups

As described in **Table 4**, there was no significant difference in CASCS score and Barthel index between the two groups before treatment. The CASCS score and Barthel index after treatment in both of groups were remarkably increased compared with before treatment (all $P < 0.05$). Moreover, after the treatment, the CASCS score (89.56±6.27 vs 69.64±5.31, $P < 0.05$) and Barthel index (92.64±8.27 vs 76.53±7.15, $P < 0.05$) in the observation group were obviously higher than those in the control group.

Comparison of CMS score, JOA score and LKS between two groups

As described in **Table 5**, there was no statistical difference in the term of CMS score, JOA score and LKS between two groups before treatment. The CMS score, JOA score and LKS after treatment in both of groups were obviously increased in contrast to before treatment (all $P < 0.05$). Moreover, after the treatment, the CMS score (82.3±3.9 vs 77.1±3.8, $P < 0.001$), JOA score

The treatment of neck, shoulder, lumbar and leg pain

Table 3. Comparison of VAS score and Fugl-Meyer score between the two groups

Groups	VAS score		Fugl-Meyers score	
	Before treatment	After treatment	Before treatment	After treatment
Observation group (N=43)	7.85±1.03	4.34±0.85*	46.58±9.26	78.95±9.46*
Control group (N=43)	7.92±1.08	5.24±0.49*	47.24±9.34	63.49±9.58*
t value	0.308	6.015	0.329	7.530
P value	0.759	0.001	0.743	0.001

Note: Compared with before treatment, *P<0.05. VAS: visual analogue scale.

Table 4. Comparison of CASCS score and Barthel index between the two groups

Groups	CASCS score		Barthel index	
	Before treatment	After treatment	Before treatment	After treatment
Observation group (N=43)	35.46±5.28	89.56±6.27*	54.28±2.86	92.64±8.27*
Control group (N=43)	36.62±6.13	69.64±5.31*	55.36±3.06	76.53±7.15*
t value	0.940	15.898	1.691	9.663
P value	0.350	0.001	0.095	0.001

Note: Compared with before treatment, *P<0.05. CASCS: clinical assessment scale cervical spondylosis.

Table 5. Comparison of CMS score, JOA score and LKS score between the two groups

Groups	CMS score		JOA score		LKS	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Observation group (N=43)	68.2±5.4	82.3±3.9*	16.5±1.7	25.4±3.2*	66.5±3.7	80.1±4.2*
Control group (N=43)	69.5±5.2	77.1±3.8*	16.7±1.6	22.8±3.5*	67.1±3.8	76.8±4.4*
t value	1.368	5.194	1.744	2.356	1.702	2.105
P value	0.182	<0.001	0.089	0.018	0.093	0.032

Note: Compared with before treatment, *P<0.05. JOA: Japanese Orthopaedic Association, LKS: Lysholm knee score, CMS: Chinese Constant-Murley Shoulder.

(25.4±3.2 vs 22.8±3.5, P=0.018) and LKS (80.1±4.2 vs 76.8±4.4, P=0.032) in the observation group were significantly higher than those in the control group.

Comparison of inflammatory factor levels between two groups

As seen in **Table 6**, before treatment, no significant differences were found in the term of IL-6, TNF- α , CRP levels between two groups. The levels of IL-6, TNF- α , CRP after treatment were obviously decreased in both groups in contrast to before treatment (all P<0.05). Moreover, after the treatment, the levels of IL-6 (11.26±1.13 vs 15.73±2.04, P=0.001), TNF- α (1.64±0.25 vs 0.53±0.06, P=0.001), CRP (5.06±0.10 vs 5.62±0.08, P=0.001) in the observation group were obviously lower than those in the control group.

Discussion

The pathogenesis of neck, shoulder, lumbar and leg pain is complex. Sterile inflammation, chronic strain, soft tissue injury, invasion of cold and damp, occupation, etc. are all important factors [17]. Neck, shoulder, lumbar and leg pain has a high incidence rate. In recent years, with the acceleration of the pace of life, its incidence has increased annually and the age of onset tends to be younger. Neck, shoulder, lumbar and leg pain has a certain degree of concealment, and the clinical symptoms at the initial stage are not obvious, so most patients are in a serious condition while seeking treatment, which has a serious impact on their life and work [18]. At present, there is no systematic treatment plan in western medicine, and drug treatment is mostly used to relieve pain or improve functional recovery of patients, but the effect is not ideal. Traditional

The treatment of neck, shoulder, lumbar and leg pain

Table 6. Comparison of inflammatory factor levels between the two groups

Groups	IL-6 (ng/L)		TNF- α (μ g/L)		CRP (pg/mL)	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Observation group (N=43)	22.06 \pm 2.18	11.26 \pm 1.13*	4.28 \pm 0.46	1.64 \pm 0.25*	6.16 \pm 0.11	5.06 \pm 0.10*
Control group (N=43)	21.62 \pm 2.04	15.73 \pm 2.04*	4.36 \pm 0.08	0.53 \pm 0.06*	6.18 \pm 0.13	5.62 \pm 0.08*
t value	0.966	12.569	1.124	28.311	0.770	28.675
P value	0.337	0.001	0.264	0.001	0.443	0.001

Note: Compared with before treatment, *P<0.05. IL-6: interleukin-6, TNF- α : tumor necrosis factor- α , CRP: C-reactive protein.

Chinese medicine indicates that neck, shoulder, lumbar and leg pain have a certain correlation with chronic strain, and all of them belong to the category of "arthralgia". The occurrence is mostly related to the fatigue and internal injury, chronic disease and physical deficiency, kidney qi deficiency, traumatic injury, meridian blockage, and other factors in patients. At the same time, together with the invasion of wind, cold and dampness, which stagnate between the meridians, resulting in blockage of the meridians, blocked qi and blood, causing the tendons and bones to lose nourishment and symptoms such as numbness and pain. Moreover, the disease is difficult to cure due to the stagnation of external pathogenic factors between the meridians and the stagnation of qi and blood. Therefore, the clinical treatment of the disease is mainly to relax the meridians and activate the collaterals, tonify qi and replenish blood, dissipate cold and remove dampness, and relieve the pain [19, 20].

Acupuncture and moxibustion is a commonly used treatment in traditional Chinese medicine. It goes by the general name of acupuncture and moxibustion. Acupuncture refers to inserting the filiform needle into the body of the patient according to the theory of traditional Chinese medicine, and stimulating the specific acupoints by lifting and inserting, twisting, etc. to regulate Blood and Qi, thus achieving the purpose of treatment. Acupuncture and moxibustion is mainly used to transmit the heat generated by moxibustion combustion to specific points of the patient, which can promote the local blood circulation, stimulate the motor function and sensory function in the patient's limbs, and effectively prevent muscle atrophy [21]. Fumigation of traditional Chinese medicine is an external treatment of traditional Chinese medicine. It mainly uses the warming

effect of traditional Chinese medicine to dilate the patient's pores, so that the drug can directly act on the affected part through the pores, thus improving the absorption of the drug [22]. The results of this study showed that the effective rate of the patients in the observation group was 93.02%, significantly higher than 76.74% of the patients in control group, which confirmed that the combination of TCM acupuncture combined with western medicine had a definite effect on patients with neck, shoulder, lumbar and leg pain [23]. The reason may be that after acupuncture and moxibustion, Blood and Qi of the patient were unblocked, and external evils were discharged from the body through blood circulation and metabolism. TCM fumigation directly works on the affected part through pores on the basis of acupuncture and moxibustion, thus improving the therapeutic effect of traditional Chinese medicine, reducing the burden and damage on the gastrointestinal, liver and other organs of the patient, furtherly increasing the therapeutic effect [24, 25].

Acupuncture and moxibustion are safe and easy to operate. Its efficacy lies in relieving spasm and pain, activating blood circulation, warming the meridians and clearing the channels. Collaterals-Dredging Decoction is composed of Notopterygium incisium, ephedra, radix clematidis, geranium wilfordii, Herba Epimedii, Herba Lycopodii, Homalomena occulta, licorice, Radix Angelicae Pubescentis, asarum, Radix Maple Peel, garden balsam stem, myrrh, sinew herb and salvia miltiorrhiza. Among them, Notopterygium incisium has the effects of relieving external cold, dispelling wind and dampness and relieving pain. Ephedra has the effect of evacuating cold, generating sweat and penetrating rashes. Radix clematidis, geranium wilfordii, Herba Epimedii, Herba Lycopodii have

The treatment of neck, shoulder, lumbar and leg pain

the effects of dispelling wind and dampness and dredging meridians. Homalomena occulta has the effects of dispelling wind and dampness, activating blood circulation, reducing swelling and relieving pain. Licorice has the effect of benefiting qi and relieving pain. The effect of Radix Angelicae Pubescens, Radix Maple Peel and garden balsam stem is to dispel rheumatism, remove arthralgia and relieve pain. Asarum has the effect of dispelling wind and cold and relieving pain. Myrrh has the effect of removing blood stasis, relieving pain, reducing swelling and generating muscle. Salvia miltiorrhiza has the effect of activating blood and relieving pain. The combination of various drugs can play the role of dispelling cold and dampness, relieving pain, activating blood and replenishing qi, dredging collaterals and removing arthralgia. The results of this study showed that VAS score of patients after treatment in both groups was decreased, and VAS score in the observation group was lower than that in the control group, but the Fugl-Meyer score, cervical function score and daily living ability score of patients after treatment in both groups were increased comparing with before treatment as well as control group. Moreover, levels of TNF- α , CRP and IL-6 decreased after treatment in both groups, and the decrease was more obvious in the observation group, which was basically consistent with the research results of Yuan et al [26]. The reason may be that acupuncture and moxibustion can stimulate the meridian qi, promote the circulation of blood in and around the lesion, quickly evacuate the local stagnation, dredge the meridians, alleviate muscle spasms, and also promote the absorption of inflammatory exudates, so as to achieve the purpose of regulating qi and blood, diminishing inflammation, and relieving pain. In addition, TCM fumigation can accelerate the local microcirculation of the affected area by using the warming effect to promote the expulsion of external evil from the affected area, thus strengthening the effect of dispelling cold and relieving pain, promoting the recovery of the patients' activity function, and further improving the treatment effect with the combined treatment of acupuncture and moxibustion [27, 28].

There are still several limitations in the present study. This study focused on the change of

inflammatory factors levels to reveal the potential mechanisms of TCM acupuncture combined with western medicine in patients with neck, shoulder, lumbar and leg pain, but different mechanisms might be involved in pain of different parts. Moreover, this research was a single-center study with a small sample size, and there was no subgroup comparisons nor long-term follow-up results. In the future, a multicenter controlled long-term follow-up study with larger sample size is needed for further confirmation.

In conclusions, the combined treatment of TCM acupuncture and western medicine has a significant clinical effect on reducing the pain and inflammatory reaction and improving the activity function in the patients with neck, shoulder, lumbar and leg pain, which deserves clinical promotion.

Disclosure of conflict of interest

None.

Address correspondence to: Yiming Zhang, Orthopedics and Traumatology Department, Hangzhou Fuyang Hospital of TCM Orthopedics and Traumatology, No. 418, Fengpu Road, Fuchun Street, Fuyang District, Hangzhou 311400, Zhejiang, China. Tel: +86-0571-63263053; Fax: +86-0571-63263053; E-mail: zhangyiming_doctor@outlook.com

References

- [1] Dionne CE, Rossignol M, Deyo RA, Koes B, Schoene M and Battie M. Back to the future: a report from the 16th international forum for back and neck pain research in primary care and updated research agenda. *Spine (Phila Pa 1976)* 2022; 47: E595-E605.
- [2] Krebs EE and Goldsmith ES. Conservative therapy for acute and subacute back or neck pain. *JAMA* 2022; 328: 2307-2309.
- [3] Wang ZL, Chen LF and Zhu WM. Observation on the transient analgesic effect of abdominal acupuncture TENS on pain of neck, shoulder, loin and legs. *Zhongguo Zhen Jiu* 2007; 27: 657-659.
- [4] Zheng ZX, Wang J, Hou JS, Ma L and Jiang CB. A traditional Chinese medicine therapy warming meridians to nourish blood in treating chronic pain due to soft tissue injury of the neck and shoulder: a randomized controlled

The treatment of neck, shoulder, lumbar and leg pain

- trial. *Zhong Xi Yi Jie He Xue Bao* 2011; 9: 153-157.
- [5] Trinh K, Graham N, Irnich D, Cameron ID and Forget M. Acupuncture for neck disorders. *Cochrane Database Syst Rev* 2016; CD004870.
- [6] Yuan S, Huang C, Xu Y, Chen D and Chen L. Acupuncture for lumbar disc herniation: protocol for a systematic review and meta-analysis. *Medicine (Baltimore)* 2020; 99: e19117.
- [7] Childs JD, Cleland JA, Elliott JM, Teyhen DS, Wainner RS, Whitman JM, Sopyk BJ, Godges JJ and Flynn TW; American Physical Therapy Association. Neck pain: clinical practice guidelines linked to the international classification of functioning, disability, and health from the orthopedic section of the American Physical Therapy Association. *J Orthop Sports Phys Ther* 2008; 38: A1-A34.
- [8] Dong H, Zhang Q, Liu G and Shao T. Prevalence of neck/shoulder pain among public hospital workers in China and its associated factors: a cross-sectional study. *Sci Rep* 2020; 10: 12311.
- [9] Moulton CD, Strawbridge R, Tsapekos D, Oprea E, Carter B, Hayes C, Cleare AJ, Marwood L, Mantingh T and Young AH. The maudslay 3-item visual analogue scale (M3VAS): validation of a scale measuring core symptoms of depression. *J Affect Disord* 2021; 282: 280-283.
- [10] Lin GH, Wang I, Lee SC, Huang CY, Wang YC and Hsieh CL. Development of a 13-item short form for fugl-meyer assessment of upper extremity scale using a machine learning approach. *Arch Phys Med Rehabil* 2023; [Epub ahead of print].
- [11] Sabari JS, Lim AL, Velozo CA, Lehman L, Kieran O and Lai JS. Assessing arm and hand function after stroke: a validity test of the hierarchical scoring system used in the motor assessment scale for stroke. *Arch Phys Med Rehabil* 2005; 86: 1609-1615.
- [12] Hercz G, Andress DL, Nebeker HG, Shinabarger JH, Sherrard DJ and Coburn JW. Reversal of aluminum-related bone disease after substituting calcium carbonate for aluminum hydroxide. *Am J Kidney Dis* 1988; 11: 70-75.
- [13] Yang H, Chen Y, Wang J, Wei H, Chen Y and Jin J. Activities of daily living measurement after ischemic stroke: rasch analysis of the modified Barthel index. *Medicine (Baltimore)* 2021; 100: e24926.
- [14] Yao M, Yang L, Cao ZY, Cheng SD, Tian SL, Sun YL, Wang J, Xu BP, Hu XC, Wang YJ, Zhang Y and Cui XJ. Chinese version of the constant-murley questionnaire for shoulder pain and disability: a reliability and validation study. *Health Qual Life Outcomes* 2017; 15: 178.
- [15] Oshima Y, Takeshita K, Kato S, Doi T, Matsubayashi Y, Taniguchi Y, Nakajima K, Oguchi F, Okamoto N, Sakamoto R and Tanaka S. Comparison between the Japanese orthopaedic association (JOA) score and patient-reported JOA (PRO-JOA) score to evaluate surgical outcomes of degenerative cervical myelopathy. *Global Spine J* 2022; 12: 795-800.
- [16] Huang H, Zhang S, Wang Y, Tegner Y, Wang Y, Jiang Y and Ao Y. Reliability and validity of a Chinese version of the Lysholm score and Tegner activity scale for knee arthroplasty. *J Rehabil Med* 2022; 54: jrm00317.
- [17] Schafer AGM, Zalpour C, von Piekartz H, Hall TM and Paelke V. The efficacy of electronic health-supported home exercise interventions for patients with osteoarthritis of the knee: systematic review. *J Med Internet Res* 2018; 20: e152.
- [18] Haas R, Gorelik A, Busija L, O'Connor D, Pearce C, Mazza D and Buchbinder R. Prevalence and characteristics of musculoskeletal complaints in primary care: an analysis from the population level and analysis reporting (POLAR) database. *BMC Prim Care* 2023; 24: 40.
- [19] Wang C and Meng Q. Global research trends of herbal medicine for pain in three decades (1990-2019): a bibliometric analysis. *J Pain Res* 2021; 14: 1611-1626.
- [20] Trinh K, Cui X and Wang YJ. Chinese herbal medicine for chronic neck pain due to cervical degenerative disc disease. *Spine (Phila Pa 1976)* 2010; 35: 2121-2127.
- [21] Mu J, Furlan AD, Lam WY, Hsu MY, Ning Z and Lao L. Acupuncture for chronic nonspecific low back pain. *Cochrane Database Syst Rev* 2020; 12: CD013814.
- [22] Kang S, Zhong Y, Liu D and Li W. Traditional Chinese medicine fumigation as auxiliary treatment of diabetic peripheral neuropathy: a protocol for systematic review and meta-analysis. *Medicine (Baltimore)* 2021; 100: e24200.
- [23] Ma T, Kao MJ, Lin IH, Chiu YL, Chien C, Ho TJ, Chu BC and Chang YH. A study on the clinical effects of physical therapy and acupuncture to treat spontaneous frozen shoulder. *Am J Chin Med* 2006; 34: 759-775.
- [24] Li C, Pei Q, Chen Y, Luo X, Yang N, Li TT, Ding J and Wang Y. The response-time relationship and covariate effects of acupuncture for chronic pain: a systematic review and model-based longitudinal meta-analysis. *Eur J Pain* 2020; 24: 1653-1665.
- [25] Panthi S, Jing X, Gao C and Gao T. Yang-warming method in the treatment of diabetic peripheral neuropathy: an updated systematic review and meta-analysis. *BMC Complement Altern Med* 2017; 17: 424.

The treatment of neck, shoulder, lumbar and leg pain

- [26] Yuan QL, Guo TM, Liu L, Sun F and Zhang YG. Traditional Chinese medicine for neck pain and low back pain: a systematic review and meta-analysis. *PLoS One* 2015; 10: e0117146.
- [27] Baroncini A, Maffulli N, Eschweiler J, Molsberger F, Klimuch A and Migliorini F. Acupuncture in chronic aspecific low back pain: a Bayesian network meta-analysis. *J Orthop Surg Res* 2022; 17: 319.
- [28] Zeng W, Mao H, Zhou G, Wu K, Liao X, Yun L and Lin J. The effect of traditional Chinese medicine fumigation and washing as a complementary and alternative therapy on the recovery of joint function after development dysplasia of the hip in children: a protocol for systematic review and meta-analysis. *Medicine (Baltimore)* 2021; 100: e25686.