Moxibustion Combined With Wuqinxi For Relieving Neck Pain In Cervical Spondylosis: A Randomized Controlled Trial

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Abstract

Background: Evidence has shown that moxibustion and wuqinxi can relieve neck pain respectively, however the combined effect of the two treatments is still unclear. This study aim to investigate the alleviating effect of moxibustion combined with wuqinxi exercises on neck pain in patients with cervical spondylosis.

Methods: One hundred patients with neck pain due to cervical spondylosis were screened and randomly equally divided into a moxibustion group (MG), a wuqinxi group (WG), a combination group (receiving moxibustion combined with wuqinxi) (MW), and a control group (CG). The MG received moxibustion for 20 min each time; the WG were required to practice wuqinxi for 20 min each time; the MW received moxibustion and practiced wuqinxi; and the CG were treated after the trial. The frequency of treatment was five times per week. The primary outcome measured was the change in the simple McGill Pain Questionnaire (MPQ) score between pre- and post-intervention measurements.

Results: There were no significant differences at baseline among the four groups. After the intervention, the MPQ scores of the MG (6.9 ± 3.9), WG (7.6 ± 3.6), and MW (4.6 ± 2.7) were significantly lower than that of the CG (16.4 ± 4.3). The MPQ score decreased by 10.0 ± 6.3 in the MG, 11.3 ± 6.8 in the WG, 13.1 ± 5.2 in the MW, and -0.2 ± 3.0 in the CG. There were no significant differences in the change in MPQ score between the MW, MG and WG. The neck disability index (NDI), Self-rating Anxiety Scale (SAS), and Self-rating Depression Scale (SDS) scores of the MG, WG, and MW all decreased, but those of the CG did not change significantly. In comparison with the MG and WG, the changes in the NDI, SAS, and SDS scores of the MW were not significantly different.

Conclusion: Our study suggests that four weeks of moxibustion or wuqinxi can alleviate symptoms of neck pain in patients with cervical spondylosis. However, the effect of moxibustion combined with wuqinxi was no better than that of moxibustion or wuqinxi alone.

Trial registration: ChiCTR2000034258. Retrospectively registered: 29/06/2020.

Background

Cervical spondylosis refers to a series of syndromes that involve hyperplastic cervical spondylitis, prolapse of cervical intervertebral disks, degenerative changes in cervical articular ligaments and other tissues, and stimulation and compression of the cervical nerve roots, spinal cord, vertebral arteries, and cervical sympathetic nerves.[1] Neck pain is the commonest symptom of this disease and is often accompanied by limitations on neck movement, which affect the life and work of patients.[2, 3] Neck pain is mainly caused by dehydration and aging of disks[4] and muscle tension in the neck.[2] Studies have shown that the incidence of neck pain is closely associated with occupation, with a higher incidence among people who sit for long periods of time, such as programmers and financiers.[5] A survey showed that neck pain accounted for approximately 25% of all cases in physical therapy clinics and an even higher percentage in specialist pain clinics,[6] which makes cervical spondylosis the fourth most

disabling condition.[2, 7, 8] Studies have shown that with changes in lifestyle and office work cervical spondylosis is occurring at an increasingly young age,[5, 9] which seriously affects the daily life and work of patients. Therefore, it is urgently necessary to find simple and effective methods for the prevention and treatment of neck pain.

At present, the treatment of neck pain caused by cervical spondylosis mainly involves nonsurgical methods, including oral painkillers,[10] acupuncture,[11] massage, and cervical spine exercises.[12, 13] Like Tai Chi, wuqinxi is a traditional Chinese form of qigong. Practicing wuqinxi can move the joints and muscles of the whole body and has always been a good choice for pain treatment.[14, 15] Moxibustion is a traditional Chinese medicinal therapy. It has a good analgesic effect and has been proved to be effective in relieving knee joint pain and lower back pain.[16, 17] However, there have been few studies on the use of moxibustion in combination with wuqinxi for relieving neck pain in patients with cervical spondylosis. In this study, moxibustion in combination with wuqinxi was adopted to treat neck pain.

Materials And Methods

Study design

We designed a randomized clinical trial in which 100 participants were randomly assigned to a moxibustion group (MG), a wuqinxi group (WG), a combination group (MW), and a control group (CG) in a ratio of 1:1:1:1. Randomization was performed by randomly drawing opaque envelopes numbered from 1 to 100, and the evaluator was blinded to the participants' groups. Each participant received five treatments per week (except for the CG) for four consecutive weeks. The relief of neck pain in participants with cervical spondylosis was observed. The study was approved (2019KL-022) by the Ethics Committee of Chengdu University of Traditional Chinese Medicine and underwent registration in the Chinese Clinical Trial Registry (www.chictr.org.cn; Registration Number: ChiCTR2000034258). All subjects signed an informed consent form in accordance with the Helsinki Declaration.

Participants

We recruited 168 prospective subjects, who attended Wenjiang Hospital of Chengdu University of Traditional Chinese Medicine for evaluation, by telephone and poster advertising and in partnership with community hospitals. Subjects who met the inclusion criteria could be included in the study. The required sample size was estimated before the trial ($\alpha=0.05$, $\beta=0.8$). The total number of subjects needed was 84 across the four groups, accounting for a dropout rate of 15%. There were 100 cases across the four groups, and 25 cases were needed for each group.

Inclusion criteria

The inclusion criteria were as follows: 1) The case conformed to the standard diagnosis and treatment of cervical spondylosis. Reference was made to the Guidelines for Diagnosis, Treatment, and Rehabilitation of Cervical Spondylosis formulated by the Cervical Spondylosis Professional Committee of the Chinese

Rehabilitation Association in 2010. 2) The main symptoms included neck pain. 3) The participant was aged between 18 and 45 years (male and female). 4) The visual analog scale (VAS) score for neck pain was >3. 5) The duration of the disease exceeded 3 months. 6) The participant was willing to actively cooperate with this trial and agreed to sign an informed consent form. All subjects included in this study had to meet the above six criteria.

Exclusion criteria

1) The participant had a tendency to bleed, an allergic response to moxibustion, and/or skin disease. 2) The participant had received treatment for neck pain within 1 month prior to enrollment. 3) A serious condition such as a malignant tumor, fracture, or severe heart disease was present. 4) The participant was a pregnant or lactating woman or had a pregnancy planned within half a year. 5) The participant had an intellectual or mental disability and thus could not cooperate in completing the questionnaire and examination. 6) The subject had participated in another clinical trial within 3 months prior to enrollment. Subjects who met any one of the above criteria were excluded.

Interventions

In the MG, four to seven cervical Jiaji points (1.3 cm from the spinous process of the cervical spine) were selected. Participants were placed in the prone position. An operator ignited a moxa stick (Nanyang Mugwort leading enterprise, Nanyang China; Batch No. 20180908) and inserted it into a moxibustion box, which was fixed with bandages at the Jiaji points. The burning situation of the moxa stick was observed to prevent burns. It was appropriate for the participant to experience a local warm feeling without burning pain, and moxibustion was performed for 20 min each time.

Regarding the WG, wuqin qigong involves learning the different movements of five animals, namely, the tiger, deer, bear, ape, and bird, to complete the exercises. The specific practice referred to the standard practice of wuqin issued by the General Administration of Sport of China (<https://zhuanlan.zhihu.com/p/106238709>). In order to enable the participants to practice in the standard way, the participants were trained by professional teachers one week in advance.

In the MW, the specific methods of moxibustion and wuqinxi exercises were the same as those stated above. The participants received moxibustion treatment for 20 min first and then practiced wuqinxi for 20 min, giving a total treatment duration of approximately 40 min.

Outcomes

Primary outcome

The primary outcome was the score of the participants on the simple McGill Pain Questionnaire (MPQ), which includes the properties of pain (such as jumping, stabbing, and burning), the intensity of pain at the onset of cervical spondylosis (VAS score), and the current pain intensity. The higher was the score, the more severe was the pain.

Secondary outcomes

The secondary outcomes had two aspects, of which the first was related to the MPQ score, including the duration and frequency of pain within 4 weeks after treatment. The second aspect was the participants' scores for anxiety and depression on the Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS). Higher scores indicated more severe symptoms.

Test procedure

Participants were assessed at baseline before treatment, at the end of treatment, and at 1-month follow-up. Participants performed normal daily activities and tasks throughout the treatment and follow-up period but could not participate in other exercise programs. If participants experienced acute pain during the trial and received other treatments (eg oral drugs or acupuncture), these were documented.

Statistical analysis

All primary and secondary analyses were conducted on an intention-to-treat basis. Data were analyzed by SPSS 19.0 software. Measurement data with a normal distribution and uniform variance were expressed as the mean $\pm$ standard deviation. Intragroup comparisons were performed by a paired-sample *t*-test, and intergroup comparisons were performed by one-way analysis of variance. If the variance was not uniform, the median and 25th and 75th percentiles were used to represent the data and intergroup comparisons were performed by the Kruskal–Wallis test. Enumeration data were expressed as the number of cases and percentage, and the chi-squared test or Fisher's exact probability method was used for comparisons between groups. All statistical analyses were based on two-sided hypothesis testing with $\alpha=0.05$ as the significance threshold.

Results

Baseline characteristics of participants

From July to November 2019, 168 prospective subjects were recruited, of whom 100 met the inclusion criteria and were randomized. Two people dropped out of the study during the intervention, and 98 people completed the examination (Figure 1). We performed the Shapiro–Wilk test on all the measurement data. The MPQ score, neck disability index (NDI) score, SAS score, and SDS score of the participants were normally distributed. The body mass index of the participants had a skewed distribution. The sex and occupation of the participants were treated as quantitative data (Table 1). The statistical analysis showed no statistically significant differences in baseline data and demographic characteristics between the groups before treatment ($P>0.05$).

Primary outcome

A comparison of the MPQ scores of the four groups pre- and post-intervention is shown in Table 2. The overall mean MPQ scores of the four groups were statistically significantly different after the intervention

($F=48.187$, $P<0.001$). There were statistically significant differences between the CG and the MG, WG, and MW ($P<0.01$ for all comparisons), and there were also statistically significant differences between the MW and the MG ($P<0.05$) and WG ($P<0.001$). There were statistically significant differences between the pre- and post-intervention scores of the MG, WG, and MW. A comparison of the differences in MPQ score between the four groups pre- and post-intervention is shown in Table 3. After the intervention, the MPQ scores of the MG (6.9 ± 3.9 , 95% confidence interval [CI] 5.2–8.5), WG (7.6 ± 3.6 , 95% CI 6.1–9.1), and MW (4.6 ± 2.7 , 95% CI 3.5–5.8) were significantly lower than that of the CG (16.4 ± 4.3 , 95% CI 14.6–18.2) ($P<0.001$ for all comparisons). The MPQ score decreased by 10.0 ± 6.3 (95% CI 7.3–12.6) in the MG, 11.3 ± 6.8 (95% CI 8.4–14.2) in the WG, 13.1 ± 5.2 (95% CI 10.9–15.2) in the MW, and -0.2 ± 3.0 (95% CI -1.27 to 1.23) in the CG in comparison with the respective pre-intervention scores. There were no statistically significant differences in the change in MPQ score between the MW and the MG (3.1, 95% CI 0.2–6.4; $P=0.065$) and WG (1.7, 95% CI -1.7 to 5.2; $P=0.318$). Therefore, it cannot be considered that the combined treatment is superior to either moxibustion or wuqinxi exercises alone in improving the MPQ score of participants with cervical spondylosis.

Table 1 Demographic and baseline characteristics of participants

	MG	WG	MW	CG		
Characteristic	n=24	n=24	n=25	n=25	Statistics	P-Value
Age-yr	20.8±3.3	22.9±6.5	23.4±6.1	21.4±2.6	H=2.615	0.455
Gender (male/female)	9/15	7/17	8/17	10/15	$\chi^2=0.798$	0.85
Body-mass index	20.7±2.4	20.1±1.9	20.8±3.2	20.4±3.1	H=0.794	0.851
Occupational status (full or part time workers/students)	2/22	6/18	8/17	6/19	$\chi^2=4.181$	0.234
McGill	16.8±5.3	18.9±7.8	17.7±4.6	16.4±4.8	F=0.945	0.422
NDI(%)	19.1±6.9	18.8±7.6	18.2±7.2	18.2±7.5	F=0.083	0.969
SAS	40.9±6.9	43.1±7.7	41.6±8	38.8±6.1	F=1.504	0.219
SDS	42.8±7.4	42.5±7.8	41.4±8.2	39.9±8.1	F=0.687	0.562

Abbreviations: MG, moxibustion group; WG, wuqinxi group; MW, combination group; CG, control group.

Table 2 MPQ scores of the four groups pre- and post-intervention

Groups	Pre-intervention	Post-intervention	t-Value	P-Value
MG(n=24)	16.8±5.3	6.9±3.9 ^{#*}	7.794	<0.001
WG(n=24)	18.9±7.8	7.6±3.6 ^{#*}	8.174	<0.001
MW(n=25)	17.7±4.6	4.6±2.7 [#]	12.588	<0.001
CG(n=25)	16.4±4.8	16.4±4.3 [*]	-0.04	0.969
F-Value	0.945	48.187		
P-Value	0.422	<0.001		

Notes [#]Compared with the CG, $P<0.05$; ^{*}Compared with the MW, $P<0.05$;

Abbreviations: MPQ, simple McGill Pain Questionnaire; MG, moxibustion group; WG, wuqinxi group; MW, combination group; CG, control group.

Table 3 MPQ differences between pre- and post-intervention

Groups	MPQ difference	Between Group Mean 95% CI			
		MW vs MG	P-Value	MW vs WG	P-Value
MG(n=24)	10.0±6.3	3.1(0.2 to 6.4)	0.065	1.7(-1.7 to 5.2)	0.318
WG(n=24)	11.3±6.8				
MW(n=25)	13.1±5.2				
CG(n=25)	-0.2±3.0				

Abbreviations: MPQ, simple McGill Pain Questionnaire; MG, moxibustion group; WG, wuqinxi group; MW, combination group; CG, control group.

Secondary outcomes

A comparison of the NDI, SAS, and SDS scores of the four groups and the differences between their pre- and post-intervention values is shown in Table 4. After the intervention, the NDI, SAS, and SDS scores of the MG, WG, and MW decreased ($P<0.01$ for all comparisons), whereas the NDI, SAS, and SDS scores of the CG did not change significantly ($P>0.05$ for all comparisons). In comparison with the MG and WG, the changes in the NDI, SAS, and SDS scores of the MW were not statistically significantly different ($P>0.05$ for all comparisons), which indicated that the combined therapy was no better than either moxibustion or wuqinxi exercise alone in improving participants' NDI, SAS, and SDS scores.

Table 4 NDI, SAS, and SDS scores and differences between pre- and post-intervention

	MG	WG	MW	CG	Between Group Mean 95% CI			
	(n=24)	(n=24)	(n=25)	(n=25)	MW vs MG	P-Value	MW vs WG	P-Value
NDI								
pre-	19.1±6.9	18.8±7.6	18.2±7.4	18.2±7.5	1.71(-2.42-5.84)	0.409	3.25(-0.77-7.30)	0.11
post-	9.8±7.3	11.1±6.3	7.3±4.5	15.9±8.1				
t-Value	6.003	5.266	8.047	1.6				
P-Value	<0.001	<0.001	<0.001	0.123				
SAS								
pre-	40.9±6.9	43.1±7.7	41.6±8.1	38.8±6.1	2.71(-0.91-6.33)	0.139	2.30(-2.18-6.77)	0.308
post-	36.7±6.5	38.5±9.8	34.6±7.1	37.4±8.0				
t-Value	3.303	2.51	5.432	1.259				
P-Value	0.003	<0.001	<0.001	0.22				
SDS								
pre-	42.8±7.4	42.5±7.8	41.4±8.2	39.9±8.1	-0.87(-4.47-2.74)	0.63	1.78(-2.14-5.69)	0.366
post-	36.1±6.3	38.4±7.9	35.6±8.3	36.8±8.5				
t-Value	5.844	2.956	4.314	1.936				
P-Value	<0.001	0.007	<0.001	0.065				

Abbreviations: MG, moxibustion group; WG, wuqinxi group; MW, combination group; CG, control group.

The number and duration of pain episodes in each group during 4 weeks after the intervention are shown in Table 5. After a normality test, it was found that the data had a skewed distribution. We used the Kruskal–Wallis test to compare differences between groups and the Bonferroni test for multiple comparisons. The results showed that the frequency and duration of pain over 4 weeks were significantly lower in the MG, WG, and MW than in the CG ($P<0.01$ for all comparisons). However, no obvious advantage was found in the MW in comparison with the MG and WG ($P>0.05$ for all comparisons). A comparison of the MPQ scores of the four groups at 4 weeks after the intervention is shown in Table 6. The MPQ scores at follow-up did not conform to a normal distribution, and the Kruskal–Wallis test was therefore used. The Bonferroni test was used for multiple comparisons. The results showed that the MPQ score of the MW was significantly lower than that of the MG (difference of 3.6, 95% CI 1.3–6.0; $P=0.018$),

but there was no statistically significant difference in comparison with the WG (difference of 2.5, 95% CI 0.0–4.5; $P=0.239$).

Table 5 The number and duration of pain episodes during 4 weeks

Groups	Number	Duration (h)
	M(P25,P75)	M(P25,P75)
MG(n=24)	4.5(2,9.5) [#]	1(0.5,2) [#]
WG(n=24)	5(2.3,13) [#]	1(0.5,2) [#]
MW(n=25)	3(2,11) [#]	1(0.5,3) [#]
CG(n=25)	15(10,23) [*]	2.5(1,5.5) [*]
H-Value	21.626	11.056
P-Value	$P<0.001$	0.011

Notes [#]Compared with the CG, $P<0.05$; ^{*}Compared with the MW, $P<0.05$;

Abbreviations: MG, moxibustion group; WG, wuqinxi group; MW,combination group; CG, control group.

Table 6 MPQ scores at 4 weeks after the intervention

Groups	M(P25,P75)	Between Group Mean 95% CI	
		MW vs MG	MW vs WG
MG(n=24)	8.8(5.6, 13.3)	3.6(1.3-6.0)	2.5(0.0-4.5)
WG(n=24)	8.0(5.3, 9.9)		
MW(n=25)	5.0(3.5, 8.0)		
H-Value	9.255		
P-Value	0.01	0.018	0.239

Abbreviations: MPQ, simple McGill Pain Questionnaire; MG, moxibustion group; WG, wuqinxi group; MW,combination group; CG, control group.

Discussion

Motor therapy is an important method for relieving neck pain in cervical spondylosis. Among many methods used for the treatment of cervical spondylosis, exercise is the most effective in enabling participants to master the practice and to perform self-conditioning, self-treatment, and self-rehabilitation.

A large number of studies have shown that exercise therapy has a good effect in the treatment of chronic neck pain. For example, progressive shoulder and neck exercises can improve the strength of the superficial and deep neck muscles of participants with chronic neck pain and can enhance muscle function.[18] As the shoulder and neck muscles are strengthened, the probability of chronic neck pain can be reduced.[19] Neck and shoulder resistance exercises can relieve neck pain and increase the range of motion of cervical joints. Moreover, resistance exercises have certain advantages in improving neck flexor endurance and shoulder abductor strength.[20] Wuqinxi is a traditional Chinese form of qigong therapy that has the advantages of progressive and resistance exercises.[21] During the exercises, participants are required to make slow, smooth movements and combine movement with breathing meditation. Participants can exercise the bones and muscles of the whole body by imitating the strength of a tiger, the vitality of a deer, the stability of a bear, the flexibility of a monkey, and the stretching of a crane. In the process of imitating each animal, the emphasis is different. For example, in the process of imitating a deer trainees need to focus on the neck and shoulder muscles, while participants can stretch neck and shoulder muscles such as the trapezius and levator scapulae according to their own circumstances during the exercises so as to relieve muscle tension and pain. Yao et al conducted a wuqinxi intervention in patients with chronic lower back pain and found that wuqinxi could significantly relieve the participants' lower back pain and that the effect was better than that of general fitness exercises. [14] Because participants were required to concentrate on their breathing during the exercises, the intervention was a combination of breathing meditation and exercises, which also helped participants to relieve pain.[22, 23] At present, many doctors believe that degenerative changes in the cervical spine, a dynamic imbalance in the cervical spine, strain in the cervical and shoulder muscles, and chronic inflammation are among the main causes of pain in cervical spondylosis.[1, 24, 25] Studies have found that long-term exercise in the form of wuqinxi can increase the elasticity of skeletal muscle, promote local blood circulation, and accelerate metabolism in inflammatory cells and the absorption of tissue fluid, which thus reduces muscle strain and inflammatory responses, and it can also relieve pain.[26-28] Wuqinxi exercises can also increase the endurance of muscle fibers and better maintain the stability of joints during exercise, which is also an important requirement for reducing pain.[15] This study also found that wuqinxi exercises reduced participants' NDI scores and alleviated their anxiety and depression symptoms, which is consistent with the findings of many previous studies.[29-31] We suspect that this may have been associated with participants' breathing meditation during the wuqinxi exercises, because it has been proved that meditation can relieve anxiety and depression symptoms in participants and improve their sleep quality.[32, 33]

In this study, we also set up a moxibustion group because moxibustion is a common Chinese medicinal treatment for pain via the clinical treatment of blockages of qi and blood, which are important causes of pain. Traditional Chinese medicine believes that moxibustion can stimulate the meridians and dredge qi and blood so as to achieve pain relief. Modern medical studies have found that moxibustion can promote local blood circulation, reduce the release of inflammatory factors,[34, 35] and relieve pain caused by inflammation. In a meta-analysis of the use of thunder-fire moxibustion for treating cervical spondylosis, in comparison with other therapies the efficacy of thunder-fire moxibustion was statistically significantly

higher and the total effectiveness rate increased (odds ratio = 2.48, 95% CI 1.80–3.41; $P < 0.001$). [36] Clinical randomized controlled trials have also confirmed that moxibustion can relieve chronic cervical pain and that with an increase in the frequency and duration of moxibustion the effect also increases.[37] This is basically consistent with the results of our research. Moreover, this study has shown that moxibustion can also relieve anxiety and depression in patients with cervical spondylosis, which may be associated with pain relief.[38]

It is puzzling that, although the difference between the MPQ scores before and after treatment in the MW (13.1 ± 5.2) was greater than those in the MG (10.0 ± 6.3) and WG (11.3 ± 6.8), there was no statistically significant difference between these results. The reasons for this were examined in depth. From our analysis, the following reasons may have accounted for this problem. Firstly, the sample may have been too small. The sample should be enlarged and a multicenter randomized controlled trial should be carried out in future studies. Secondly, the treatment period may have been too long for the MW. Many participants were young, and their work did not allow them to spend too much time on treatment. Although each treatment was carried out under the supervision of therapists, we cannot guarantee that the participants in the MW completed each treatment thoroughly.

Conclusions

The results of this study showed that wuqinxi exercises or moxibustion therapy alone could alleviate the symptoms of neck pain in participants with cervical spondylosis and that the effects of these two treatments could be maintained for at least 1 month. Considering the time and economic cost involved, wuqinxi, as a self-exercise method, is more suitable for long-term practice at home for patients with neck pain. This study focused on the effectiveness of wuqinxi and moxibustion in relieving neck pain symptoms in participants with cervical spondylosis, and the specific therapeutic effects of these treatments should be further investigated in a multicenter large-sample randomized controlled trial.

Abbreviations

MPQ: simple McGill Pain Questionnaire; NDI: Neck Disability Index; SAS: Self-rating Anxiety Scale ; SDS: Self-rating Depression Scale; VAS: Visual Analog Scale

Declarations

Ethics approval and consent to participate

The study was approved (2019KL-022) by the Ethics Committee of Chengdu University of Traditional Chinese Medicine. Each author certifies that all investigations were conducted in conformity with ethical principles. Written informed consent was obtained from all participants included in this study.

Consent for publication

Not applicable.

Availability of data and materials

The datasets supporting the conclusions of this article are included within the article. The raw data can be requested from the corresponding author.

Competing interests

The authors report no conflicts of interest for this work.

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Authors' contributions

SY and MX performed conception and design of the study. TZ, YH, HZ, and ZF participated in the recruitment and data collection. XY and MX performed analysis of data. SY and MX performed revising the study critically. All authors read and approved the final manuscript.

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Figures

Figure 1

Flow chart of the study.

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