Acupuncture-movement therapy for acute lumbar sprain: a randomized controlled clinical trial

Lin Ruizhu, Zhu Ning, Liu Jian, Li Xinjian, Wang Yue, Zhang Jie, Xi Chaolei

Lin Ruizhu, Zhu Ning, Liu Jian, Wang Yue, Zhang Jie, Xi Chaolei, Department of Rehabilitation Medicine, General Hospital of Ningxia Medical University, Yinchuan 750004, China

Li Xinjian, Medical School of Acupuncture, Fujian University of Traditional Chinese Medicine, Fuzhou 350108, China

Supported by Study the mechanism based on the p38MAPK signal pathway mediated by Cautery moxibustion therapy of Hui medicine treatment IDD (The National Natural Science Foundation of China, No. 81360567); Evaluation of different moxibustion doses for low back pain: a randomized controlled clinical trial of moxibustion therapy on CV4 (Ningxia Natural Science Foundation, No. NZ11208)

Correspondence to: Prof. Xu Jianfeng, Department of Orthopedics and Traumatology, General Hospital of Ningxia Medical University, Yinchuan 750004, China. Xujianfeng313@126.com; Prof. Wu Yongli, Department of Orthopedics and Traumatology, General Hospital of Ningxia Medical University, Yinchuan 750004, China. Wuyongli999@163.com

Telephone: +86-951-6743730
Accepted: March 18, 2015

Abstract

OBJECTIVE: Several studies have reported that acupuncture is effective for treatment of acute lumbar sprain, but they neglected to consider that acupuncture cannot remarkably improve lumbar activity. We performed a randomized controlled trial to evaluate the effect of acupuncture-movement therapy versus conventional acupuncture in the treatment of acute lumbar sprain.

METHODS: Sixty patients were randomized into four groups: the acupuncture-movement (AM) group, sham acupuncture-movement (SAM) group, conventional acupuncture (CA) group, and physical therapy (PT) group. Patients in the AM group were treated with acupuncture at Yintang (EX-HN 3) and exercise of the lumbar region during acupuncture. Patients in the SAM group were treated with sham acupuncture at Yintang (EX-HN 3) and exercise of the lumbar region during sham acupuncture. Conventional acupuncture was performed in the CA group, and physical therapy was applied in the PT group. Each treatment lasted for 20 min. Patients were assessed before and after treatment using a visual analogue scale (VAS) and the Roland Morris Questionnaire (RMQ).

RESULTS: The VAS and RMQ scores in the AM group were significantly lower after than before treatment (P < 0.01). The AM group reported lower RMQ scores in after-treatment and 24 h after treatment and lower VAS score in 24 h after treatment in comparison with those of the CA, SAM, and PT groups (P < 0.05).

CONCLUSION: Acupuncture-movement therapy is effective for treating acute lumbar sprain with a persistent pain-relief and remarkable improvement of lumbar activity. Movement, that is, lumbar exercise during acupuncture, enhances the effect of acupuncture.

© 2016 JTCM. Open access under CC BY-NC-ND license.

Key words: Acupuncture; Movement; Exercise; Lumbar sprain; Randomized controlled trial

INTRODUCTION

Acute lumbar sprain refers to an acute injury of the lumbar muscles, fasciae, ligaments, or intervertebral...
February 15, 2016

Acupuncture-movement therapy is a new treatment technique for some locomotor and nervous system diseases. Acupuncture and movement promote and influence each other in the course of treatment. The doctor usually punctures acupoints distal to the lumbar region, and the patient is asked to exercise his or her waist while retaining the needles. The immediate analgesic effect of the acupuncture lays the foundation for lumbar exercise, while the exercise enhances the long-term effect of the acupuncture in relieving pain and improving lumbar activity. We performed a randomized controlled trial to evaluate the effect of acupuncture-movement therapy for treatment of acute lumbar sprain.

METHODS

Study design
This randomized, single-assessor-blinded clinical trial was carried out in the General Hospital of Ningxia Medical University in China from May 2012 to January 2014. In total, 60 patients were observed. A computer-generated random number table was used. The 60 patients were randomized into 4 groups: the acupuncture-movement (AM) group, sham acupuncture-movement (SAM) group, conventional acupuncture (CA) group, and physical therapy (PT) group. The trial statistician, who was not involved in the treatment administration or outcome collection, generated the schedule for the random allocation sequence, which was held in a secure cabinet only accessible to himself. To investigate whether the treatment preference had any influence on outcomes, each patient was asked which treatment he or she would prefer to receive before randomization. Due to the nature of the interventions, it was not possible to blind the doctor who provided the treatments. This study was approved by the Ethics Committee of the General Hospital of Ningxia Medical University.

Patients
Patients received information about the study from newspapers and posters at the General Hospital of Ningxia Medical University and from the Internet in their communities. The treatment process was explained to each patient to ensure an understanding of the study. After signing a consent form, the patients were enrolled in the trial. The criteria for diagnosis and therapeutic effects for Traditional Chinese Medicine (TCM) diseases and syndromes issued by the State Administration of TCM were adopted for treatment and evaluation in this trial.

Inclusion criteria
The inclusion criteria were as follows: age of 20 to 60 years, ≤ 3-day course of acute lumbar sprain, visual analog scale (VAS) score of ≥ 4 (moderate to severe pain), no spinal surgery, no acupuncture treatment for acute lumbar sprain in the previous month, and no treatment since the onset of the acute lumbar sprain.

Exclusion criteria
The exclusion criteria were as follows: infectious diseases, tuberculosis, and rheumatic diseases; other serious diseases such as mental disorders, cancer, stroke, and myocardial infarction as well as cardiac pacemaker implantation; radicular pain indicative of nerve root compression; diagnosis of severe spinal canal stenosis, spondylolisthesis, or fibromyalgia; pregnancy; and physical or laboratory examination findings indicative of unsuitability for our study.

Patients were instructed to undergo acupuncture and physical therapy for pain control. The use of nonsteroidal anti-inflammatory drugs and other therapies were monitored and recorded by the researchers, and these patients were analyzed separately.

Interventions
Acupuncture therapy and sham acupuncture therapy Acupuncture and sham acupuncture were carried out by certified acupuncture doctors with ≥ 5 years of clinical experience in the General Hospital of Ningxia Medical University. Yintang (EX-HN 3) was selected for treatment in the AM, CA and SAM groups. In the AM and CA group, the acupuncture point was routinely disinfected and a disposable stainless steel needle (0.30 × 25 mm; Huatuo Acupuncture, Suzhou, China) was inserted horizontally. The needle was retained for 20 min after arrival of Qi and then removed.

In the SAM group, the acupuncture point was routinely disinfected and pressed with a semi-blunt needle fitted within a guide tube. The tube containing the needle was fixed onto the forehead with adhesive plaster. After 20 min, the tube and needle were removed.
Exercise
The doctor prescribed the exercise program (lumbar flexion, stretching, and rotation) according to the condition of each individual patient. After the needle had been inserted in Yintang (EX-HN 3), the patient was asked to stand up. The doctor stood behind the patient with two hands supporting the patient’s low back and asked him or her to exercise the lumbar region from small to large amplitude and from slow to fast speed, within the limit of his or her endurance. When the patient felt the lumbar muscles relax enough for active movement, he or she was encouraged to perform bending, stretching, and rotating exercises. The lumbar exercises lasted for 20 min until the acupuncture or sham acupuncture therapy was finished.

Physical therapy
Transcutaneous electrical nerve stimulation (TENS) was carried out by a certified physical therapist with ≥ 5 years’ clinical experience in the General Hospital of Ningxia Medical University. The patients in the PT group were asked to lie on the treatment bed in a comfortable prone position. The treatment room was kept quiet and the temperature controlled at 25 °C to 29 °C. A six-channel portable TENS instrument (model TS-6000; DANMETER A/S, Denmark) was used for treatment (medium-frequency sinusoidal waves, TENS form, 30-Ma intensity, and 50-µs pulse length) with 10-× 5-cm surface disposable electrodes placed on the painful spot of the lumbar region. All patients received treatment at the same time. Immediately after and 24 h after treatment, the patients were asked to stand up. The doctor stood behind the patient with two hands supporting the patient’s low back and asked him or her to exercise the lumbar region from small to large amplitude and from slow to fast speed, within the limit of his or her endurance. When the patient felt the lumbar muscles relax enough for active movement, he or she was encouraged to perform bending, stretching, and rotating exercises. The lumbar exercises lasted for 20 min until the acupuncture or sham acupuncture therapy was finished.

Safety monitoring
The vital signs of each patient were checked before treatment. During treatment, the condition of each patient was carefully observed. Nausea, vomiting, fatigue, dizziness, pallor, hematoma, and any other adverse events related to acupuncture were recorded in detail.

Evaluation
The primary outcome in this trial was pain intensity. Before the treatment, the patients were instructed to adopt the posture that produced the most severe pain and to indicate this severity of pain on the VAS. The researchers recorded the VAS scores and postures of the patients. After treatment, the patients were asked to determine their VAS score while adopting the most painful posture as before. The VAS scores 24 h after treatment were also obtained from the patients via telephone and recorded by the researchers.

The secondary outcome in this trial was motion limitation caused by the lumbar sprain. The motion limitation was assessed by the RMQ (range, 0-24 points, with 24 indicating the most severe limitation). The RMQ comprises 24 questions, and each has two possible responses. The RMQ scores were assessed before treatment, immediately after treatment, and 24 h after treatment.

Statistical analysis
The data were analyzed with the Statistical Package for Social Sciences software (version 16.0; SPSS, Inc., Chicago, IL, USA). A P value of < 0.05 was deemed statistically significant. The measurement data were expressed as mean ± standard deviation (x ± s). The VAS and RMQ scores were assessed by analysis of variance as between-group factors, and the three evaluations (before treatment, immediately after treatment, and 24 h after treatment) were assessed as within-group factors. The χ² test or Wilcoxon test was used for categorical variables.

RESULTS
A total of 71 patients with acute lumbar sprain passed the outpatient screening. Eleven patients were excluded either because they did not consent to the study or because they had been previously treated by acupuncture and moxibustion. Sixty patients who met the inclusion criteria were randomized into four groups. The 60 patients comprised 39 men and 21 women aged 22 to 58 years. The baseline age, sex, duration of acute lumbar sprain, VAS scores, and RMQ scores are shown in Table 1. No significant differences were noted among the

<table>
<thead>
<tr>
<th>Items</th>
<th>AM group</th>
<th>SAM group</th>
<th>CA group</th>
<th>PT group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>34.7±4.6</td>
<td>36.2±3.2</td>
<td>36.0±4.9</td>
<td>33.9±5.2</td>
</tr>
<tr>
<td>Male [n (%)]</td>
<td>9 (62.48)</td>
<td>10 (71.42)</td>
<td>9 (69.23)</td>
<td>8 (61.53)</td>
</tr>
<tr>
<td>Female [n (%)]</td>
<td>5 (37.52)</td>
<td>4 (28.58)</td>
<td>4 (30.77)</td>
<td>5 (38.47)</td>
</tr>
<tr>
<td>Duration (h)</td>
<td>25.7±5.7</td>
<td>27.8±4.3</td>
<td>27.2±5.2</td>
<td>24.8±6.8</td>
</tr>
<tr>
<td>VAS (scores)</td>
<td>74.9±9.8</td>
<td>69.3±10.5</td>
<td>72.6±11.5</td>
<td>69.0±12.6</td>
</tr>
<tr>
<td>RMQ (scores)</td>
<td>15.4±3.4</td>
<td>15.8±3.2</td>
<td>13.4±2.2</td>
<td>14.5±2.6</td>
</tr>
</tbody>
</table>

Notes: AM: acupuncture-movement [acupuncture at Yintang (EX-HN 3) and exercise of the lumbar region during acupuncture, 20 min]; SAM: sham acupuncture-movement [sham acupuncture at Yintang (EX-HN 3) and exercise of the lumbar region during sham acupuncture, 20 min]; CA: conventional acupuncture [acupuncture at Yintang (EX-HN 3), 20 min]; PT: physical therapy (transcutaneous electrical nerve stimulation, 20 min); VAS: visual analog scale; RMQ: Roland Morris Questionnaire.
four groups. The mean baseline VAS score was 72.0 ± 5.7, indicating that our study included patients with moderate and severe pain intensity associated with acute lumbar sprain.

Two patients in the PT group, one patient in the SAM group, and one patient in the CA group dropped out because they underwent additional treatments that were prohibited in our trial. One patient in the AM group dropped out because she fainted during the acupuncture treatment. One patient in the CA group dropped out because of deterioration of symptoms. The total dropout rate was 10%, and there was no statistical difference in the dropout rates among the four groups. The statistical analyses were carried out on the 54 patients who finished the whole trial and provided all required information (Figure 1).

**Adverse events**

One patient in the AM group fainted during the acupuncture treatment and spontaneously recovered after a short rest with no special treatment. No adverse reactions occurred in the other groups. Adverse events were monitored and recorded by the researchers at every visit.

**Pain intensity scores (VAS)**

Changes in the VAS scores after the treatment are shown in Table 2. In the within-group comparison, the mean VAS score in each of the four groups decreased immediately after and 24 h after treatment (P < 0.01). In the AM group, the VAS score was 75 ± 10 before treatment, 29 ± 4 immediately after treatment, and 15 ± 3 24 h after treatment (P < 0.01).

![Flow chart of the patients](image)

**Table 2 Comparison of VAS scores in the four groups (scores, \( \bar{x} \pm s \))**

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Before treatment</th>
<th>After-treatment</th>
<th>24 h after treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM</td>
<td>14</td>
<td>75 ±10</td>
<td>29 ±4</td>
<td>15 ±3</td>
</tr>
<tr>
<td>SAM</td>
<td>14</td>
<td>69 ±11</td>
<td>42 ±5</td>
<td>32 ±6</td>
</tr>
<tr>
<td>CA</td>
<td>13</td>
<td>73 ±11</td>
<td>31 ±6</td>
<td>25 ±4</td>
</tr>
<tr>
<td>PT</td>
<td>13</td>
<td>69 ±13</td>
<td>32 ±7</td>
<td>31 ±8</td>
</tr>
</tbody>
</table>

Notes: AM: the acupuncture-movement (acupuncture at Yintang (EX-HN 3) and exercise of the lumbar region during acupuncture, 20 min); SAM: sham acupuncture-movement (sham acupuncture at Yintang (EX-HN 3) and exercise of the lumbar region during sham acupuncture, 20 min); CA: conventional acupuncture [acupuncture at Yintang (EX-HN 3), 20 min]; PT: physical therapy(transcutaneous electrical nerve stimulation, 20 min); VAS: visual analog scale; RMQ: roland morris questionnaire; In the within-group comparison, the VAS scores before treatment were compared with those immediately after and 24 h after treatment in the four groups, \( ^* P < 0.01 \). In the between-group comparison, the VAS scores after treatment were compared in the AM, CA, and PT groups vs the SAM group, \( ^* P < 0.05 \); those 24 h after treatment were compared in the SAM, CA, and PT groups vs the AM group, \( ^* P < 0.05 \); and those 24 h after treatment were compared in the SAM and PT groups vs the CA group, \( ^* P < 0.05 \).
In the between-group comparison, the VAS score immediately after treatment in the AM group was higher than those in the other groups (P < 0.05). At 24 h after treatment, the VAS score in the AM group was lower than those in the other groups (P < 0.05), while that in the CA group was higher than those in the SAM and PT groups (P < 0.05).

**RMQ scores**

Changes in the RMQ scores after the treatment are shown in Table 3. The RMQ scores in the four groups decreased immediately after and 24 h after treatment. In the AM group, the RMQ scores before treatment were lower than those immediately after and 24 h after treatment (P < 0.01). The RMQ scores before treatment in the SAM, CA, and PT groups were lower than those immediately after treatment (P < 0.05). There was a significant difference in the RMQ scores immediately before and 24 h after treatment in the SAM, CA, and PT groups (P < 0.01).

In the between-group comparison, the RMQ scores immediately after and 24 h after treatment in the AM group were lower than those in the SAM, CA, and PT groups (P < 0.05). However, there was no significant difference in the RMQ scores immediately after and 24 h after treatment in the CA, SAM, and PT groups (P > 0.05).

**DISCUSSION**

In the present study, a significant reduction in the VAS and RMQ scores in the AM group was observed immediately after and 24 h after treatment. At 24 h after treatment, the VAS score in the AM group was lower than those in the SAM, CA, and PT groups. Immediately after and 24 h after treatment, the RMQ score in the AM group was lower than those in the SAM, CA, and PT groups. These results indicate that acupuncture-movement therapy can immediately improve lumbar activity and has a good long-term analgesic effect. It was more effective than sham acupuncture-movement, conventional acupuncture, and physical therapy for acute lumbar sprain in this study.

Acupuncture-movement therapy is a new treatment method for some locomotor diseases and nervous system diseases. The effects of acupuncture and movement promote each other. Doctors usually puncture distal points and retain the needles while the patient performs active movement or passive activity to exercise the affected part. Many clinical studies and meta-analyses have confirmed the effects of acupuncture and exercise for some diseases. Patients first receive acupuncture treatment and then begin to exercise the affected part until the acupuncture treatment is finished.

In TCM, the main function of the meridians and collaterals is to transport Qi and blood. When Qi, blood, Yin, and Yang are not in balance, the meridian Qi will be stagnated or in disorder, leading to disease. Acupuncture can regulate the circulation of the meridian Qi and blood. Exercise is helpful for the flow of Qi and blood and for strengthened body resistance. Active movement or passive activity can also promote the flow of Qi and blood, enhancing the function of acupuncture treatment by conducting the needling sensation to the affected part.

Huang Di Nei Jing states that "Arrival of Qi produces the effect." The analgesic effect of acupuncture, especially the immediate effect, is widely recognized. Exercise therapy helps to improve its long-term pain-suppressing effect. Acupuncture therapy mainly acts on the sensory system, while exercise is related to the motor system. There is a close interrelationship and interaction between the sensory and motor systems. Acupuncture-movement therapy has been successfully used in medical practice because of the very important effect of movement in controlling sensory afferents. Additionally, movement activates the central pain-inhibiting system, which gives out descending impulses to potentiate descending inhibition. The pain threshold is increased by acupuncture treatment, and the pain is then immediately relieved, laying the foundation for movement of the affected body part. Active or passive movement enhances the
In TCM, acute lumbar sprain is characterized by low back and leg pain caused by a sudden force that damages the Governing Vessel and Bladder Meridian, resulting in stagnation of Qi and blood in the lumbar region. Acupuncture-movement therapy can immediately improve the lumbar activity and has a good long-term analgesic effect. The RMQ score in the AM group immediately after treatment was higher than those in the SAM, CA, and PT groups. This shows that acupuncture-movement therapy can improve lumbar activity because of the re-establishment of normal motor patterns, which in turn allows the lumbar vertebrae to maintain stability and provides immediate pain relief. The VAS scores were reduced in the four groups immediately after treatment, although the VAS score in the SAM group immediately after treatment was higher than those in the AM, CA, and PT groups. This means that acupuncture increases the pain threshold; thus, the pain is temporarily relieved. Shi acupuncture does not have a good analgesic effect. At 24 h after treatment, the VAS score in the AM group was lower than those in the SAM, CA, and PT groups.

The present study indicates that active movement is a decisive factor resulting in a good long-term analgesic effect. Exercising the lumbar region turns the abnormal activity model into a normal activity model of the lumbar muscles. This allows the lumbar vertebrae to maintain stability. Exercise is also an important factor in obtaining a good long-term analgesic effect. Exercise during acupuncture is helpful for promoting the flow of Qi of the Governing Vessel. Huang Di Nei Jing stated, "Pain is caused by obstruction of meridians. Pain disappears when the meridians are unobstructed." The present study has several limitations, such as the small sample size, finite treatment time, and insufficient blinding of the patients and assessor. Further studies with larger sample sizes and adequate blinding are needed.

If the course of acute lumbar sprain is > 3 days, Qi stagnation may cause blood stasis. This is why TCM holds that "Normal flow of Qi ensures normal circulation of blood, while stagnation of Qi leads to blood stasis." Bloodletting therapy should be adopted for treatment of blood stasis; this will be discussed in a future study. Only patients with acute lumbar sprain of a ≤ 3-day duration were enrolled in the present study. Acupuncture-movement therapy provides a synergistic effect of acupuncture and movement with a stronger stimulation. Because one patient in this study fainted, however, doctors should carefully observe the patient’s condition during treatment. Acupuncture-movement therapy is effective for acute lumbar sprain. Lumbar exercise during acupuncture enhances the effect of acupuncture by providing persistent pain relief and remarkable improvement of lumbar activity.

REFERENCES

Lin RZ et al. / Clinical Study


