

Original Article

The effect of warm needle moxibustion on lumbar disc herniation

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Abstract: Objective: To investigate the effect of warm needle moxibustion on patients with lumbar disc herniation (LDH). Methods: A total of 100 patients with lumbar disc herniation treated in our hospital were recruited as the study cohort and randomly assigned into a control group and an observation group. The patients in the control group underwent routine acupuncture treatment, while those in the observation group underwent warm needle moxibustion treatment. The observed indexes, including the clinical efficacy, the visual analogue scale (VAS) scores, the Japanese Orthopedic Association (JOA) scores, the Oswestry disability index (ODI) scores, and the serum inflammatory factor levels were compared between the control group and the observation group. Results: The total cure rate in the observation group was significantly higher than it was in the control group (76.0% vs 92%, $P=0.029$). Compared with the patients in the control group after the treatment, the patients' VAS and ODI scores in the observation group were significantly lower, but their JOA scores were significantly higher, and the differences were statistically significant (all $P<0.001$). Moreover, the serum IL-6 and tumor necrosis factor α (TNF- α) levels in the observation group were remarkably lower than the corresponding levels in the control group (all $P<0.001$). Conclusions: Warm needle moxibustion has a significant effect on patients with lumbar disc herniation, because it helps to relieve the pain and other symptoms and reduces the serum inflammatory factor levels.

Keywords: Warm needle moxibustion, lumbar disc herniation, therapeutic effect

Introduction

Lumbar disc herniation (LDH) refers to a protrusion of the lumbar disc from the normal position that occurs due to different etiologies [1, 2]. The clinical symptoms of lumbar disc herniation include leg or back pain, a weakness in the lower extremities, and paresthesia. It seriously affects patients' physical and psychological health [3]. One epidemiological investigation showed that the incidence of lumbar disc herniation is about 5 per 1000 adults every year [4]. At present, the available treatment methods for lumbar disc herniation are mainly surgical and nonsurgical therapies [5, 6]. However, surgical treatment may bring fears of post-operative failure syndrome in patients [7]. In recent years, complementary medicine has been often advocated to meet the increasing demand for nonpharmacological therapies, including massage, traction, physiotherapy,

bedrest, and on the like [8]. Acupuncture, a complementary medicine treatment, is increasingly popular in developed and developing countries [9]. Moxibustion is considered a modality of traditional acupuncture that can better achieve the effect of relieving symptoms [10]. Warm needle moxibustion that combines moxibustion and acupuncture has become increasingly popular due to its significant clinical efficacy and safety [11]. It was reported that warm needle moxibustion is widely used in the pain therapy for conditions such as osteoarthritis, rheumatoid arthritis and knee osteoarthritis [12]. Further studies showed that warm needle moxibustion can cause a release of anti-inflammatory agents [13]. However, there are few clinical trials on warm needle moxibustion in lumbar disc herniation therapy, and the research results on evidence-based medical evaluation remain controversial [14]. In this context, the aim of this study is to evaluate

the efficacy of warm needle moxibustion for lumbar disc herniation. The results of this study will provide an experimental foundation for guidelines in treatment of lumbar disc herniation.

Materials and methods

The study cohort

A total of 100 patients with lumbar disc herniation treated at the Department of Traditional Chinese Medicine, Shanghai Jiaotong University Sixth People's Hospital from January 2017 to December 2019 were recruited as the study cohort. The inclusion criteria were: 1. Patients who met the diagnostic criteria for lumbar disc herniation [2] and who had clinical symptoms such as radiating pain, low back pain, weakness, or paresthesia in the lower extremities. 2. Patients who ranged in age from 18 to 65 years old. 3. Patients who had no significant indications for surgery. 4. Patients who volunteered to participate in the study. The exclusion criteria were: 1. Patients who were hypersensitive to acupuncture therapy. 2. Patients also suffering from congenital abnormalities, compression fractures, spondylolysis, neoplasms, or spondylolisthesis. 3. Patients also suffering from infections, coagulation disorders, or cognitive impairment. 4. Patients with a history of spinal surgery. 5. Patients with poor treatment compliance or incomplete clinical data.

This study was approved by the Ethics Committee of Shanghai Jiaotong University Sixth People's Hospital, and the patients or their families gave written informed consent.

The patients were randomly divided into the observation group (n=50) and the control group (n=50). The patients in the control group were treated with routine acupuncture treatment. The methods were as follows: Stainless steel and sterilized acupotomy needles were used, and the acupuncture points included Dachangshu, Shenshu, Huaitiao, Xuehai, Weizhong, and Yanglingquan. Ipsilateral acupoints were placed in the lower limbs and the bilateral acupoints were placed in the waist. The needles were kept in the acupoints for 30 min. The acupuncture needle treatment was performed once a day in two courses for a total of 20 days. The patients in the observation

group were treated with warm needle moxibustion treatment. The methods were as follows: The acupoints and common practices were similar to those in the control group. The difference was that warming moxibustion in the traditional acupuncture point was conducted. Each point was treated once for 15 min. During the process of moxibustion, the patients would feel mild hyperemia in the local region without burning pain. The patients underwent the treatment once a day in two courses for a total of 20 days.

Observed indexes

The therapeutic effect was compared between the two groups. The clinical efficacy was evaluated according to the following standard [15]: *Cured* meant that the patients were able to work and live normally, with their clinical symptoms relieved completely and their waists and lower extremities moved normally. *Effective* meant that the patients had light lumbago occasionally, but light work and activities were possible. *Invalid* meant that there was no significant improvement in the clinical symptoms or they worsened. Total cure rate = (Number of effectivity and cure)/total number × 100%.

The VAS scores were used to evaluate the pain intensity. It was determined by having the patients place a mark on a line ranging from 0 to 10. A score of zero indicated painless; scores of less than 3 indicated slight pain which the patients could endure; scores of 4-6 suggested that the patient's sleep was affected but the pain was still bearable; scores of 7-10 indicated that the pain was unbearable and affected the patients' appetite and sleep.

The Japanese Orthopaedic Association (JOA) scores were applied for the evaluation of low back pain and the functions of the lumbar regions in patients. The JOA scores include: subjective symptoms, clinical signs, restricted activities, and bladder function. The total possible JOA score is 29. Higher scores indicate better conditions.

The Oswestry disability index (ODI) scores were used to assess the dysfunction of the lower extremities in the patients before and after the treatment. The ODI scores include ten items such as pain intensity, performance state, walking, standing, and so on. The total possible

Table 1. Comparison of the basic information between the two groups

Group	Observation group (n=50)	Control group (n=50)	t/ χ^2 value	P value
Male/Female (n)	23/27	20/30	0.367	0.545
Age (year)	54.6 \pm 5.4	55.1 \pm 5.8		
BMI (kg/m ²)	22.1 \pm 1.5	21.9 \pm 1.7		
Diabetes (n)	8	10	0.271	0.603
Hypertension (n)	9	7	0.298	0.544
Hyperlipidemia (n)	6	8	0.332	0.565
Course of disease (months)	35.7 \pm 4.6	36.2 \pm 5.1		
Site of lesion				
L2/L3	11	12	0.166	0.983
L3/L4	12	13		
L4/L5	17	16		
L5/S1	10	9		

Note: BMI: Body mass index; L2/L3: Intervertebral disc between lumbar 2 and lumbar 3; L3/L4: Intervertebral disc between lumbar 3 and lumbar 4; L4/L5: Intervertebral disc between lumbar 4 and lumbar 5. L5/S1: Intervertebral disc between lumbar 5 and sacrum 1.

Table 2. Comparison of the clinical efficacy in the control and observation groups [n (%)]

Group	Cases	Invalid	Effectivity	Cure	Total cure rate (%)
Control group	50	4 (8.0)	34 (68.0)	12 (24.0)	46 (92.0)
Observation group	50	12 (24.0)	29 (58.0)	9 (18.0)	39 (76.0)
χ^2 value					4.762
P value					0.029

score for each item is 5. The final score was calculated according to the following formula: Scores = practical score/50 \times 100%. Higher scores indicate worse conditions.

The serum IL-6 and TNF- α levels were compared between the two groups. Before and after the treatment, 5 mL of venous blood was drawn from every patient who had fasted, and the serum was separated using centrifugation at 3000 r/min for 10 min. Enzyme-linked immunosorbent assays (ELISA) were used to measure the serum IL-6 and TNF- α levels according to the IL-6 and TNF- α kits' instructions (R&D science, USA).

Statistical analysis

SPSS version 23.0 was used to analyze the data included in this study, and the figures were created using GraphPad Prism software 5.0 (GraphPad Software, Inc., La Jolla, CA,

USA). The measurement data were presented as the mean \pm standard deviation. Paired t tests were used for the comparisons of the data before and after the treatment, and independent t tests were used to compare the data between the control and observation groups. The enumeration data was presented as the number of cases or as a percentage, Chi square tests were used to compare the control group and the observation group. $P < 0.05$ indicated statistical significance.

Results

Basic information

As seen in **Table 1**, no significant differences were found in terms of age, gender, BMI, diabetes, hypertension, hyperlipidemia, course of the disease, or site of the lesion between the observation group and the control group (all $P > 0.05$).

Comparison of the clinical

efficacy

As shown in **Table 2**, the total cure rate in the control group was 92% (46/50), and it was 78% in the observation group. The clinical efficacy in the observation group was significantly higher than it was in the control group, and the differences were significant ($P = 0.029$).

Comparison of the VAS scores

As shown in **Figure 1**, there was no significantly statistical difference in the VAS scores before the treatment in the two groups. The VAS scores after the treatment in the two groups were significantly lower than they were before the treatment and there were statistically significant differences (all $P < 0.001$). After the treatment, the VAS scores in the observation group were significantly lower compared with the scores in the control group, and significant differences were seen ($P < 0.001$).

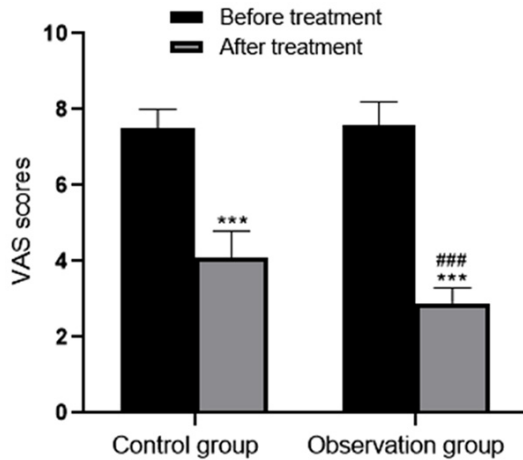


Figure 1. Comparison of VAS scores between the two groups. Compared with before the treatment, *** indicated $P<0.001$; compared with the control group after the treatment, ### indicated $P<0.001$. VAS: Visual analog scale.

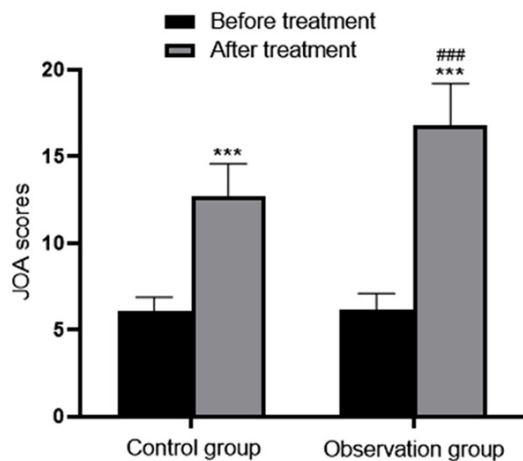


Figure 2. Comparison of the JOA scores between the two groups. Compared with before the treatment, *** indicated $P<0.001$; compared with the control group after the treatment, ### indicated $P<0.001$. JOA: Japanese Orthopaedic Association.

Comparison of the JOA scores

As seen in **Figure 2**, no statistically significant differences in the JOA scores were observed before the treatment in the two groups. The JOA scores after the treatment in the two groups were significantly higher than they were before the treatment, and the difference was significant (all $P<0.001$). The JOA scores after the treatment in the observation group were significantly higher than the JOA scores in the

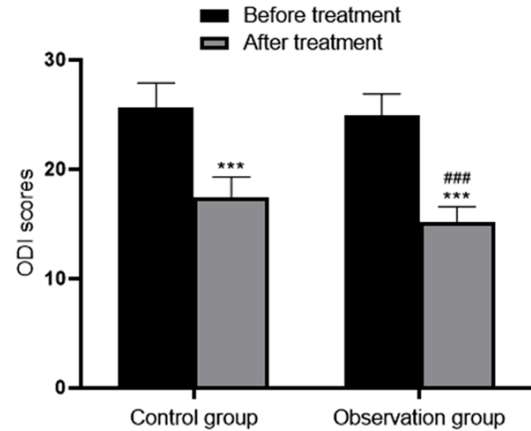


Figure 3. Comparison of the ODI scores between the two groups. Compared with before the treatment, *** indicated $P<0.001$; compared with the control group after the treatment, ### indicated $P<0.001$. ODI: Oswestry disability index.

control group, and difference was significant ($P<0.001$).

Comparison of the ODI scores

As shown in **Figure 3**, there was no significant difference in the ODI score before the treatment in the control and observation groups. The ODI scores after the treatment in the two groups were remarkably lower than they were before the treatment, and the differences were significant (all $P<0.001$). After the treatment, ODI scores in the observation group were remarkably lower in contrast to the ODI scores in the control group, and the differences were significant ($P<0.001$).

Comparison of the serum IL-6 and TNF- α levels

As shown in **Table 3**, there were insignificant differences in the IL-6 and TNF- α concentrations between the two groups before the treatment. After the treatment, lower serum IL-6 and TNF- α levels were found in the two groups, compared with the pre-treatment levels (all $P<0.001$). The serum IL-6 and TNF- α levels in the observation group were significantly lower than the levels in the control group and the differences were significant (all $P<0.001$).

Discussion

Lumbar disc herniation is prevalent worldwide and is characterized by a slipped, prolapsed, or

Table 3. Comparison of the IL-6 and TNF- α concentrations in the two groups

Group	IL-6 ($\mu\text{g/L}$)		TNF- α ($\mu\text{g/mL}$)	
	Before treatment	After treatment	Before treatment	After treatment
Control group	139.2 \pm 12.7	112.6 \pm 8.5	1.9 \pm 0.6	1.5 \pm 0.4
Observation group	138.8 \pm 13.5	103.4 \pm 7.9	1.7 \pm 0.5	1.0 \pm 0.2
t value	0.153	5.606	1.811	6.325
P value	0.879	<0.001	0.073	<0.001

ruptured disc. Patients with lumbar disc herniation usually suffer from low back pain and sciatica. It is also one of the most important causes of disability, for it seriously affects patients' life quality and normal work abilities [16]. In recent years, many scholars have focused on finding effective therapies [17]. It was reported that in contrast to conservative treatments, surgery usually did not increase the rate of patients' returning to work [18]. At present, the conservative therapies for lumbar disc herniation are varied. Manipulation, traction, massage, and other conservative treatments can promote the self-healing of intervertebral discs in patients with lumbar disc herniation, but the results are not satisfactory [19]. Acupuncture, an ancient treatment method, is increasingly accepted by patients due to its low risk and effectiveness [20]. According to traditional Chinese medicine, it is thought that lumbar disc herniation is caused by blood stasis and cold dampness, and the stagnation or incompatibility lead to pain in patients [21]. Traditional Chinese medicine treatments for lumbar disc herniation are based on removing stasis, promoting circulation and activating the collaterals. In this study, the method of warm needle moxibustion was selected to treat lumbar disc herniation. We found that warm needle moxibustion is more effective, a finding similar to the finding in a study reported by Wang et al. [22]. Warm needle moxibustion consists of two parts: the acupuncture part and the moxibustion part. Studies show that acupuncture can inhibit the sensory input in the central system resulting in relieving the pain of the leg and back and moxibustion can enhance the effect by regulating the functions of the meridians and visceral organs [14]. Some studies have found that warm needle moxibustion achieves a satisfactory effect in other diseases, such as cold numb limbs, diarrhea, joint pain, and so on [23, 24]. As we can

see, acupuncture effectively promotes the blood circulation, and moxibustion may be helpful for improving the yang and warming the channel. The combination of warm needle moxibustion showed a synergistic effect in the patients with lumbar disc herniation.

In order to further identify the effect of warm needle moxibustion on lumbar disc herniation, this

study selected VAS scores, JOA scores, and ODI scores as the observed indexes for the evaluation of clinical effectiveness. VAS scores, JOA scores, and ODI scores are widely used in clinical trials regarding lumbar disc herniation [25]. It was reported that VAS scores are commonly used to subjectively assess patients' pain [26]. JOA scores are mainly used to evaluate the functional recovery of the lumbar vertebra, and ODI is applied to examine the functional recovery of the lower limbs. The results of this study revealed that the VAS scores and the ODI scores in the observation group were significantly lower than they were in the control group but the JOA scores in the observation group were significantly increased, which further indicated that warm needle moxibustion has a significant advantage in the treatment of lumbar disc herniation. Previous studies also showed similar results [12].

The present study showed that some inflammatory factors were released due to the abnormality of the internal structure and the metabolic function in the intervertebral discs such as degeneration and endplate injuries [27]. The inflammatory response was deemed to be the main mechanism for lumbar disc herniation [28]. IL-6 and TNF- α were considered important pro-inflammatory factors. It was reported that the expression of TNF- α not only induced the release of the inflammatory factors, but it also acted on the nervous tissues of the lower limbs to cause deep pain [29]. And the serum IL-6 levels were positively associated with the severity of the conditions of lumbar disc herniation [30]. In this study, the results showed that the IL-6 and TNF- α levels in the observation group were significantly lower than they were in the control group, which indicates that warm needle moxibustion is effective at reducing the inflammatory response in patients with lumbar disc herniation. Previous studies report-

ed that moxibustion has an anti-inflammation effect [31]. The infrared rays from moxibustion can regulate the immune function [32]. In addition, it was also reported that moxibustion can increase the phagocytosis ability of the cells and eliminate the inflammation surrounding the nerves [33].

In conclusion, warm needle moxibustion treatment for patients with lumbar disc herniation has a better therapeutic effect, alleviates the symptoms of lumbago, improves the function of the lower extremities and reduces serum IL-6 and TNF- α levels. Thus, it is worthy of clinically extensive application. However, the following limitations exist in this research: a small sample size, the fact that it was a single-center study, the absence of long-term follow-up results, the lack of a specific mechanism of action for warm needle moxibustion, and not reporting the results of the effect of warm needle moxibustion on lumbar disc herniation in different conditions. In the future, randomized, controlled, multicenter, large sample-size studies are required for further validation.

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Disclosure of conflict of interest

None.

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