

Clinical Study of Shentong Zhuyu Decoction Combined with Massage Therapy in the Treatment of Exertional Chronic Lumbar Muscle Strain

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Abstract [Objectives] To explore the effects of Shentong Zhuyu decoction combined with massage therapy in the treatment of exertional chronic lumbar muscle strain. [Methods] Sixty-four cases of exertional chronic lumbar muscle strain were randomly divided into two groups (32 cases each group). The patients in the control group only took celecoxib capsules, and those in the treatment group additionally took Shentong Zhuyu decoction combined with massage therapy. TCM syndrome score, lumbar function, hemorrhheology index and clinical effect were compared between the two groups before and after treatment. [Results] After treatment, the TCM syndrome scores of lumbar distension/dull pain, tingling-like lumbago, adverse lateral turn, body weight loss, dark purple tongue, slow or astringent pulse, and Oswestry disability index (ODI) score in the treatment group were lower than those in the control group, and the levels of plasma viscosity, red blood cell aggregation index, platelet aggregation rate (PAG) and fibrinogen (Fib) were lower than those in the control group, showing statistical significance ($P < 0.05$). The overall clinical effect distribution of the treatment group was better than that of the control group, and the difference was statistically significant ($P < 0.05$). [Conclusions] Shentong Zhuyu decoction combined with massage therapy can effectively relieve the symptoms of patients with lumbago and improve the lumbar mobility function and hemorrhheology, with obvious therapeutic effects in the treatment of exertional chronic lumbar muscle strain.

Key words Chronic lumbar muscle strain, Exertional, Massage, Shentong Zhuyu decoction

1 Introduction

Chronic lumbar muscle strain^[1], a common chronic disease causing lumbago in orthopedics, mainly refers to the chronic injury of muscles, fascia, ligaments and other tissues in the lumbosacral region, which will lead to local inflammation and functional degeneration, resulting in diffuse pain in the lumbosacral region and thus seriously affecting patients' quality of life^[2]. At present, drugs and nerve electrical stimulation and other psychotherapeutic methods are mainly adopted in Western medicine for the treatment of chronic lumbar muscle strain. Although these methods can relieve the pain quickly, they can not eradicate the disease, or block the progression of the disease and further prevent complications, easily leading to disease relapse after drug withdrawal. Meantime, the long-term use of non-steroidal anti-inflammatory drugs (NSAIDs) and glucocorticoids is easy to trigger peptic ulcer, dizziness, headache, osteoporosis, femoral head necrosis and other adverse reactions^[3–4]. Traditional Chinese medicine (TCM), which has unique advantages in the treatment of chronic lumbar muscle strain, devotes particular care to syndrome differentiation and treatment, and regards the nature of disease as a decisive factor in determining the treatment plan. Long Xiangyu^[5] classified chronic lumbar muscle strain into exertional type, physical type and structural type according to the disease deficiency and excess, clinical symptoms and signs, and whether there are spinal shape changes, in which exertional type is mainly caused by continuous antagonistic tension of psoas muscle due to physical labor

and poor sitting posture. Massage is a common method to treat diseases in TCM, which can promote local circulation of qi and blood, relieve spasm, ease or eliminate pain^[6]. Shentong Zhuyu decoction is an ancient prescription for activating blood circulation, removing blood stasis and relieving pain, and tonifying liver and kidney, with certain therapeutic effect in the treatment of lumbago^[7]. At present, although there are a lot of reports on the treatment of chronic lumbar muscle strain with various TCM therapies such as massage and acupuncture, the reports on the treatment of chronic lumbar muscle strain combined with Shentong Zhuyu decoction are rarely seen. This paper explored the effects of Shentong Zhuyu decoction combined with massage therapy on improving pain and lumbar function of the patients suffered by exertional chronic lumbar muscle strain, in order to provide a reference for improving the quality of life of patients with exertional chronic lumbar muscle strain.

2 Data and methods

2.1 General data Sixty-four patients with exertional chronic lumbar muscle strain who received treatment in Shangluo Hospital of Traditional Chinese Medicine from January 1, 2019 to June, 2020 were selected as the study objects. The patients were divided into two groups (32 cases each group) by random number table grouping method. In the control group, there were 17 males and 15 females aged 32–65 years with an average of (48.41 ± 7.89) years, and their course of disease ranged from 13 to 35 months, with an average of (23.53 ± 5.81) months. The treatment group was composed of 19 males and 13 females aged 35–66 years with an average of (49.97 ± 6.85) years, and their course of disease was 16–37 months, with an average of (25.66 ± 5.17) months. There was no significant difference in the above baseline data between the two groups ($P > 0.05$), and the data of the two groups

Received: December 15, 2023 Accepted: March 6, 2024

Supported by General Program of National Natural Science Foundation of China (31470075).

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were comparable.

2.2 Diagnostic criteria Met the relevant standards for exertional lumbago in *Practical Orthopedics*^[8]; related symptoms in line with exertional type, that is, self-reported lumbar swelling pain, dull pain, alleviated pain symptoms after changing position, rest or local hot compress, aggravated symptoms in case of fatigue, poor flexibility of lower back muscles; or obvious soreness and body sleepiness which would aggravate in rainy weather; or a tingling sensation in the waist at fixed site, which could not be pressed, with induration and inability to turn sides^[9].

2.3 Inclusion criteria Met the above diagnostic criteria; had not received any form of treatment in the last one month; had not used drugs for promoting blood circulation to remove blood stasis and NSAIDs in the past one month; non-allergic constitution; no coagulation system disease; agreed to the treatment plan and signed an informed agreement.

2.4 Exclusion criteria Combined with other bone lesions; Had severe cardiovascular and cerebrovascular diseases or functional diseases of liver and kidney; presence of cognitive dysfunction; combined with gastrointestinal, respiratory, urinary or systemic infectious diseases; pregnant or lactating women.

2.5 Therapeutic methods The patients in the control group took celecoxib capsules once a day (Pfizer, J20140072) at a dose of 200 mg/time. On the basis of taking celecoxib capsules, the patients in the treatment group also received massage therapy and took Shentong Zhuyu decoction. (i) Massage. First of all, the patients were squeezed and kneaded to gently relax the lumbar muscle tissue in a wide range for about 8 min until they felt the lumbar muscle was soft; subsequently, the patients were massaged along the governor meridian of the lumbar back and bladder from top to bottom by palm push and thumb push method for 5 min until the local skin was slightly hot and red; finally, the patients were pressed by point-pressing manipulation with Jiaji point and Ashi point at waist as the key points for about 10–15 min till they felt local sore swelling; for those with limited waist activity, lumbar oblique thrust could be used appropriately; and poking channels manipulation can be combined for those with strip-like changes in muscle. (ii) Shentong Zhuyu decoction. The main prescription consisted of 12 g of Radix Angelicae Sinensis, Carthami Flos, Radix Achyranthis Bidentatae and Persicae Semen, 8 g of Rhizoma Chuanxiong, Myrrha, Faeces Trogopterpi, Pheretima and Radix Glycyrrhizae, and 4 g of Radix Gentianae Macrophyllae, Rhizoma Cyperi, Rhizoma et Radix Notopterygii. Additionally, Atractlodis

Rhizoma could be added for those with slight fever, and Radix Astragali could be added for the faint. A dose of Shentong Zhuyu decoction should be decocted in 400 mL of water and taken twice in the morning and at night. The treatment lasted for 4 weeks, with 7 d as a course.

2.6 Observation indexes (i) Before and after treatment, the TCM syndrome of the two groups were evaluated according to the *Diagnostic and Therapeutic Criteria for TCM Syndromes*, including lumbar distension/dull pain, tingling-like lumbago, adverse lateral turn, body weight loss, dark purple tongue, slow or astringent pulse. The syndromes were recorded with 0, 2, 4 and 6 points from "none" to "severe", and the higher the score, the severer the syndrome^[10]. Oswestry disability index (ODI) was used to assess lumbar function in both groups^[11]. (ii) Cubital vein blood samples were collected from fasting patients in the two groups before and after treatment, to determine plasma viscosity, red blood cell aggregation index, platelet aggregation rate (PAG) and fibrinogen (Fib) levels. (iii) The patients were followed up for 12 months after treatment to statistically analyze the recurrence of disease in the two groups.

2.7 Therapeutic evaluation The clinical effects of the two groups were evaluated with reference to the literature; markedly effective, lumbago and back pain and other symptoms completely disappeared, waist activity returned to normal; improved, lumbago and back pain significantly relieved, waist function basically restored, but still with restrictions on activities; ineffective, no change in the symptoms of lumbago and back pain or movement function^[12]. The total number of valid cases was the difference between the total number of cases and the number of invalid cases.

2.8 Statistical methods SPSS 22.0 software was used for data analysis. χ^2 test was used for comparative analysis of counting data; rank sum test was used for comparison between ordered categorical variables; and *t* test was used for measurement data conforming to normal distribution. $P < 0.05$ indicated significant difference.

3 Results and analysis

3.1 Comparison of TCM syndrome scores between the two groups Compared with before treatment, the TCM syndrome scores and ODI scores significantly decreased in both groups after treatment ($P < 0.05$). After treatment, the TCM syndrome scores and ODI scores in the treatment group were significantly lower than those in the control group, and the difference was statistically significant ($P < 0.05$, Table 1).

Table 1 Comparison of TCM syndrome scores and ODI scores between the two groups ($n = 32$, $\bar{x} \pm s$, point)

Group		Lumbar distension/dull pain	Tingling-like lumbago	Adverse lateral turn	Body weight loss	Dark purple tongue	Slow or astringent pulse	ODI scores
Control	Before treatment	4.44 ± 1.32	4.17 ± 1.35	3.88 ± 1.27	3.62 ± 1.05	3.26 ± 1.05	3.09 ± 0.88	35.14 ± 4.33
	After treatment	2.44 ± 0.80*	2.33 ± 0.75*	2.14 ± 0.68*	2.47 ± 0.73*	2.04 ± 0.55*	2.18 ± 0.62*	18.52 ± 4.01*
Treatment	Before treatment	4.62 ± 1.39	4.26 ± 1.38	3.69 ± 1.22	3.71 ± 1.14	3.13 ± 1.02	3.15 ± 0.85	34.26 ± 4.21
	After treatment	0.75 ± 0.22**	0.69 ± 0.21**	0.71 ± 0.23**	0.77 ± 0.20**	0.66 ± 0.20**	0.74 ± 0.17**	9.22 ± 2.39**

NOTE Compared with before treatment, * $P < 0.05$; compared with the control group after treatment, ** $P < 0.05$. The same below.

3.2 Comparison of hemorrheology between the two groups

Compared with before treatment, the plasma viscosity, red blood

cell aggregation index, PAG and Fib levels significantly decreased in both groups after treatment ($P < 0.05$). After treatment, the

above hemorrheological indexes in the treatment group were significantly lower than those in the control group, and the difference was

statistically significant ($P < 0.05$, Table 2).

Table 2 Comparison of hemorrheology between the two groups ($n = 32$, $\bar{x} \pm s$)

Group		Plasma viscosity // MPa/s	Red blood cell aggregation index	PAG // %	Fib // g/L
Control	Before treatment	2.27 ± 0.47	2.49 ± 0.13	62.35 ± 6.83	4.44 ± 0.57
	After treatment	1.86 ± 0.42 *	2.02 ± 0.11 *	53.21 ± 6.25 *	3.96 ± 0.51 *
Treatment	Before treatment	2.32 ± 0.45	2.52 ± 0.11	61.28 ± 6.79	4.52 ± 0.60
	After treatment	0.75 ± 0.22 **	1.52 ± 0.08 **	42.47 ± 6.11 **	3.38 ± 0.44 **

3.3 Comparison of therapeutic effect and recurrence rate between the two groups

There was significant difference in the distribution of overall clinical effect between the two groups ($P < 0.05$, Table 3). The follow-up results showed that 14 cases

(43.75%) in the control group had recurrence of the disease within 12 months, while only 3 cases (9.38%) in the treatment group had recurrence, and the difference between the two groups was statistically significant ($\chi^2 = 9.692$, $P < 0.05$).

Table 3 Comparison of therapeutic effect between the two groups ($n = 32$, %)

Group	Markedly effective	Improved	Ineffective	Total effective	Z	P
Control	10 (31.25)	16 (50.00)	6 (18.75)	26 (81.25)	3.522	0.000
Treatment	23 (71.88)	9 (28.12)	0 (0.00)	32 (100.00)		

4 Discussion

Chronic lumbar muscle strain, pathologically characterized by non-specific inflammatory response, edema and tissue fluid exudation of muscle fiber tissue^[13], is induced by long-term cumulative injury, long-term bending, poor posture of sitting and standing, and aseptic inflammation of lumbar fascia. Relevant data show that the prevalence rate of chronic lumbar muscle strain among Chinese residents is as high as 20% - 25%, and 80% of the patients have back and leg pain, with the recurrence rate close to 70%, which greatly affects the life and work of patients^[14]. At present, analgesic drugs and physical therapy are the main intervention methods against chronic lumbar muscle strain in Western medicine. Celecoxib is a classic selective cyclooxygenase (COX) inhibitor with good analgesic and anti-inflammatory effects and gastrointestinal safety, so it is widely used in orthopedic postoperative analgesia and various non-specific lumbago treatment^[15-16]. In the treatment of chronic lumbar muscle strain, although celecoxib has a good short-term effect in relieving pain symptoms of patients, it has poor long-term performance because it has not touched the root of the disease and patients are prone to recurrent illness^[16].

TCM classifies chronic lumbar muscle strain into the categories of "arthralgia" and "lumbago", and holds that although this disease is caused by long-term labor, long-term bending and improper posture, its formation is also closely related to liver and kidney deficiency, spleen and stomach disorders, and exogenous pathogenic wind. *General Treatise on the Cause and Symptoms of Diseases* mentioned that "the kidney governs the waist, and pathogenic wind will invade into the body with cold air when the kidney channel is deficient, causing lumbago." The descriptions in *Plain Questions* indicate that TCM believes that the problem of muscles in arthralgia syndrome is closely related to kidney, spleen and stomach, and its differential treatment should pay attention to the conditioning of liver, kidney, spleen and stomach. As the main type of muscle pain, chronic lumbar muscle strain is featured by such clinical symptoms as cold accumulation in the channels, qi-

stagnation and blood stasis, meridian blockage, and should be treated clinically based on the principle of dispelling cold and dredging collaterals, promoting blood stasis and nourishing meridians, aiming to enhance the physique of patients. Massage therapy, also known as massage, is an external therapy for stimulating the lesion, releasing adhesion, relieving muscle spasm, dredging local meridians, and eliminating blood stasis by hand or other limb parts, so as to eliminate local lesions^[17]. In addition, it can regulate the neuro-endocrino-immune network and play an indirect role in the treatment of diseases^[18]. More and more studies have confirmed that massage therapy has marked effects in alleviating low back pain and improving local dysfunction^[19], and its immediate analgesic effect is mainly reflected in correcting abnormal changes in pain regulation areas of brain tissue and triggering functional changes in corresponding cognitive areas^[20]. Shentong Zhuyu decoction originated from the *Correction on Errors in Medical Classics*. In this prescription, Radix Angelicae Sinensis, Carthami Flos, Persicae Semen and Rhizoma Chuanxiong are good medicine for promoting blood circulation and removing blood stasis, and can dredge and reach the meridians; Radix Achyranthis Bidentatae plays the role of promoting blood circulation and removing blood stasis, strengthening waist and tonifying kidney, and ensuring proper downward flow of the blood; Myrrha, Faeces Trogopterpi and Pheretima have the effects of removing blood stasis and reducing swelling, and inducing menstruation to relieve menalgia; Rhizoma Cyperi is mainly responsible for promoting blood circulation and regulating qi; Radix Gentianae Macrophyllae and Rhizoma et Radix Notopterygii are included for dispelling wind and eliminating dampness; all components are harmonized with licorice, playing the role of removing blood stasis, promoting qi circulation and removing obstruction in the collateral, promoting menstruation and strengthening the waist, and relieving swelling and pain together^[21-22]. Modern pharmacological research confirms that in addition to good analgesic effect, Shentong Zhuyu decoction also has reliable anti-inflammatory and anti-allergic effects, and can en-

hance the body immunity while reducing non-specific immune reaction and allergic reactions^[23].

The results showed that the TCM syndrome scores and ODI scores of the treatment group were significantly lower than those of the control group, indicating that Shentong Zhuyu decoction combined with massage therapy can effectively improve the TCM syndrome and lumbar function of patients with chronic lumbar muscle strain. The levels of plasma viscosity, red blood cell aggregation index, PAG and Fib in the treatment group were significantly lower than those in the control group, proving that Shentong Zhuyu decoction combined with massage therapy can better regulate the hemorrheology of patients^[24–25] and improve the body microcirculation. The overall clinical efficacy distribution of the treatment group was better than that of the control group, and the disease recurrence rate after 12 months of follow-up was significantly lower than that of the control group, demonstrating that Shentong Zhuyu decoction combined with massage therapy has definite short and long term effect on the treatment of exertional chronic lumbar muscle strain, and can effectively prevent and reduce the recurrence of the disease.

In summary, Shentong Zhuyu decoction combined with massage therapy can effectively relieve the lumbago symptoms in patients with chronic lumbar muscle strain, improve the lumbar mobility function, and regulate the hemorrheology, thus preventing the recurrence of the disease.

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