

# Application Effect of Chinese Medicine Rehabilitation in the Treatment of Adolescent Ankle Sports Injuries

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**Abstract:** *Objective:* To analyze the clinical effect of traditional Chinese medicine rehabilitation in treating adolescent ankle sports injuries. *Methods:* From December 2020 to December 2022, adolescent patients with ankle joint sports injuries admitted to our hospital were selected as observation objects, and 67 patients were divided into a control group ( $n = 33$ , routine rehabilitation treatment) and an experimental group ( $n = 34$ , traditional Chinese medicine rehabilitation treatment) according to the computer grouping method. Compare the treatment results. *Results:* (i) The treatment received in the experimental group had an efficacy of 94.11%, which was higher than that of the control group (75.75%), and statistical significance was established ( $P < 0.05$ ). (ii) Before treatment, there was no difference in ankle joint pain, ankle joint activity, and ankle joint function scores between the control group and the experimental group ( $P > 0.05$ ); after treatment, the ankle joint pain, ankle joint activity, and ankle joint function scores in the experimental group were significantly higher than those in the control group ( $P < 0.05$ ). (iii) The experimental group had higher scores on physiological function, physiological function, physical pain, general health status, energy, social function, emotional function, and mental health compared to the control group ( $P < 0.05$ ). *Conclusion:* Traditional Chinese medicine rehabilitation is effective in treating ankle injuries caused by sports in adolescents and improve their quality of life. Therefore, it should be popularized.

**Keywords:** Chinese medicine rehabilitation; Teenagers; Ankle joints; Sports injuries

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## 1. Introduction

Exercise can not only enhance physical fitness, but also improve physical health. Sports injuries usually occur due to poor physical fitness or improper exercise methods<sup>[1]</sup>. In the case of teenagers, they are often physically healthy and can perform strenuous exercise and recover quickly. However, they are also prone to sports injuries like joint injuries and abrasions, among which ankle joint injuries are relatively common<sup>[2]</sup>. The ankle joint is a very important weight-bearing joint of the lower limbs. The flexibility and stability of the ankle joint plays an important role in performing daily activities. If the ankle joint is damaged and not treated in time, it may affect daily life and work<sup>[3]</sup>. This study mainly analyzes the clinical efficacy of traditional Chinese medicine (TCM)

rehabilitation in the treatment of ankle sports injuries among adolescents.

## 2. Research materials and methods

### 2.1. General information

Sixty-seven adolescent patients with ankle sports injuries admitted to our hospital from December 2020 to December 2022 were selected as research subjects. The patients were divided into a control group and an experimental group through the computer grouping method. In the control group, there were 20 males and 13 females, aged between 14 and 19 years old, with an average of  $16.50 \pm 2.48$  years old. In the experimental group, there were 22 males and 12 females, aged between 14 and 18 years old, with an average of  $16.00 \pm 2.45$  years old. There were no significant differences in the general data of both groups ( $P > 0.05$ ).

### 2.2. Methods

#### 2.2.1. Control group

The control group underwent routine rehabilitation, which was composed of several components.

(1) Range of motion training:

(i) Ankle joint active flexion and extension training was performed, in which the patients lied on the hospital bed and straightened the dorsum of their foot upwards slowly. This motion was repeated three times, 5 minutes each time. The duration of training can be adjusted according to the patients' condition.

(ii) Varus and valgus training was performed, in which the patient sat on the hospital bed and the injured varus and valgus was turned to the maximum. This motion was done slowly three times a day, for 5 minutes each time. The duration of training can be adjusted based on the patients' condition.

(2) Peripheral muscle strength training

Peripheral muscle strength training was conducted utilizing a weight-bearing technique. In this exercise, each patient was instructed to lift a sandbag weighing approximately 10 kg with both their left and right hands. After lifting the sandbag, they would maintain this position for approximately 1 minute, constituting one repetition. This exercise was repeated 20 times, and this routine was performed three times a day.

(3) Ankle body control training

The balance-board training was adopted, which involved instructing the patient to start by standing on the balance board with their legs extended. They would then gradually shift to a standing position with a  $30^\circ$  ankle flexion. This method ensured that the patient could maintain their balance while tilting in different directions without falling off the balance board. The entire treatment course lasted for a total of 3 months.

#### 2.2.2. Experimental group

In the experimental group, traditional Chinese medicine (TCM) rehabilitation was employed, consisting of several methods.

(1) Chinese medicine fumigation and washing

This treatment involved a combination of medicinal ingredients, including *Sperantospermia* (30 g), *Acanthopanax Cortex* (15 g), *Notopterygium root* (15 g), safflower (15 g), *Angelica* (15 g), turmeric (15 g), *Angelica dahurica* (15 g), *Root of Veined Inula* (15 g), *Smilax glabra* Roxb (15 g), *Lignum Sappan* (15 g), *Achyranthes bidentata* (15 g), Sichuan pepper (9 g), and frankincense (6 g). The ankle joint was subjected to a hot compress with this Chinese medicine once a day, with each session lasting

20 minutes.

(2) Acupuncture and moxibustion

Patients were instructed to lie supine on the hospital bed, and specific acupoints on the affected side were targeted. Symmetrical and cross points were selected simultaneously. The acupoints chosen were Shangqiu, Taixi, Zhongfeng, Tailing, Shenmen, and Taiyuan. The needles were retained for 20 minutes using flat-tonifying and flat-reducing acupuncture techniques. This procedure was performed once a day.

(3) Massage

Massage techniques encompassed flexion and extension, rotation, tidying, and relaxation. Two sessions of massage were performed daily. The entire treatment course spanned a duration of 3 months.

## 2.3. Evaluation criteria and observation indicators

### 2.3.1. Evaluation criteria

Very effective: the symptoms of the disease completely disappeared, and the walking activities returned to normal; effective: the symptoms of the disease improved, and the patient could take care of himself/herself in daily life; Ineffective: the symptoms of the disease improved slightly, and he could not take care of himself in daily life [4].

### 2.3.2. Observation indicators

- (1) Joint score: Ankle joint pain, activity, and function were evaluated by the Kofoed score [5], with a total score of 100 points,
- (2) Quality of life score: The quality of life of the patients were evaluated through the SF-36 scale [6], which included physiological function, physical function, physical pain, general health, energy, social function, emotional function, and mental health. The scores ranged from 0 to 100, with higher scores indicating better quality of life.

## 2.4. Statistics

The data of this study were aggregated and processed with SPSS 22.0, including: (i) the count data were represented by percentages and analyzed using the  $\chi^2$  test; (ii) the measurement data were represented by mean  $\pm$  standard deviation and analyzed by the  $t$ -test.  $P < 0.05$  indicated statistical significance.

## 3. Results

### 3.1. Comparison of treatment effect of patients in each group

Compared with the total efficacy of 75.75% in the control group, the total efficacy of 94.11% in the experimental group was significantly higher, ( $P < 0.05$ ). Further details are shown in **Table 1**.

**Table 1.** Comparison of treatment effects of patients in each group ( $n$  [%])

Group	Very effective	Effective	Ineffective	Total efficacy
Control group	12 (36.37)	13 (39.39)	8 (24.25)	25 (75.75)
Experimental group	25 (73.52)	7 (20.59)	2 (6.89)	32 (94.11)
$\chi^2$				4.445
$P$				< 0.05

### 3.2. Comparison of joint scores of patients in each group

Before treatment, there was no difference in ankle joint pain, ankle joint activity, and ankle joint function scores between the control group and the experimental group ( $P > 0.05$ ); after treatment, the ankle joint pain, ankle joint activity, and ankle joint function scores in the experimental group were higher than those in the control group, with statistical significance ( $P < 0.05$ ). Further details are shown in **Table 2**.

**Table 2.** Comparison of joint scores of patients in each group (mean  $\pm$  standard deviation, points)

Group	Ankle pain		Ankle movement		Ankle function		Total	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Control group	15.06 $\pm$ 3.52	28.20 $\pm$ 4.31	9.13 $\pm$ 2.58	15.08 $\pm$ 3.56	8.86 $\pm$ 1.98	14.31 $\pm$ 3.42	33.05 $\pm$ 8.08	57.59 $\pm$ 11.29
Experimental group	15.03 $\pm$ 3.50	35.17 $\pm$ 4.87	9.15 $\pm$ 2.61	20.14 $\pm$ 3.98	8.85 $\pm$ 1.97	18.53 $\pm$ 3.73	33.03 $\pm$ 8.08	73.84 $\pm$ 16.93
<i>t</i>	0.035	6.197	0.032	5.479	0.021	4.829	0.010	4.608
<i>P</i>		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

### 3.3. Comparison of quality-of-life scores of patients in each group

The scores of physiological function, physiological function, physical pain, general health, energy, social function, emotional function, and mental health in the experimental group were higher than those of the control group, with statistical significance ( $P < 0.05$ ). Further details are shown in **Table 3**.

**Table 3.** Comparison of quality of life scores of patients in each group ( $\bar{x} \pm s$ , points)

Group	Physiological function	Physiological function	Body pain	General health	Energy	Social function	Emotional function	Mental Health
Control group	74.15 $\pm$ 6.69	73.98 $\pm$ 7.58	74.27 $\pm$ 6.90	74.55 $\pm$ 6.97	74.19 $\pm$ 6.73	73.89 $\pm$ 7.36	72.63 $\pm$ 7.01	74.23 $\pm$ 6.85
Experimental group	82.36 $\pm$ 8.31	83.06 $\pm$ 8.83	83.66 $\pm$ 8.97	82.67 $\pm$ 5.49	82.54 $\pm$ 8.42	82.80 $\pm$ 8.58	82.78 $\pm$ 8.53	83.05 $\pm$ 8.79
<i>t</i>	4.446	4.510	4.792	5.306	4.476	4.556	5.312	4.572
<i>P</i>	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

## 4. Discussion

The ankle joint is a complex and highly flexible joint in the human body, making it susceptible to injuries [7]. Ankle joint injuries are among the most common sports-related injuries. When left untreated, such injuries often result in recurrent swelling and pain [8]. Additionally, scar tissue forms at the site of the ankle joint injury, leading to localized myofascial inflammation, a condition known as myofasciitis. Myofasciitis can be caused by various factors such as trauma, overuse, or exposure to cold and damp conditions, which disrupt local blood circulation and contribute to the recurrence of swelling and pain [9].

Routine rehabilitation focuses on training the patient's standing and weight-bearing functions. Improper training can increase the risk of re-injury to the ankle joint and exacerbate the patient's pain. Chinese medicine divides ankle joint sports injuries into the range of tendon injuries. Chinese medicine treatment involves physiotherapy techniques and medications, accounting for 70% and 30%, respectively. This therapy can reduce bruising and pain, shorten the course of treatment, and improve the patients' quality of life [10,11]. Chinese medicine rehabilitation has unique advantages in the treatment of adolescent ankle sports injuries, and has achieved good results [12]. In the study, the effects of conventional rehabilitation therapy (control group) and traditional Chinese medicine rehabilitation therapy (experimental group) were compared in the treatment

of adolescent ankle sports injuries. The results showed that the efficacy of the treatment received in the experimental group was higher than that of the control group. Ankle joint function score is higher than that of the control group, and the quality-of-life score of the experimental group is higher than that of the control group. Chinese medicine fumigation involves fumigating the affected area by applying hot compress with medicine on the body, so that the medicine diffuses into the body through the skin and mucous membranes. This promotes the dredging of interstitial tissues, harmony of veins, smooth flow of qi and blood, and achieve the purpose of treatment <sup>[13,14]</sup>. Sperantospermia has the functions of expelling evil wind, removing dampness, relaxing tendons, promoting blood circulation, and relieving pain. Acanthopanax cortex has the functions of dispelling wind-dampness, strengthening muscles and bones, promoting blood circulation and removing blood stasis. Notopterygium Root has the function of dispelling cold, dispelling wind-dampness, and tonifying the joints. Safflower promotes blood circulation, removes blood stasis, and relieves pain. Angelica has a pain-relieving effect, and it promotes blood circulation and removes blood stasis. Turmeric has the effect of breaking blood stasis and regulating qi, and pain relief. *Angelica dahurica* has the effects of dispelling wind and coldness, relieving pain, activating blood and expelling pus, eliminating dampness and arresting leucorrhea. Root of Veined Inula has the effects of expelling wind-dampness, tonifying meridians. *Smilax glabra Roxb* has the effect of clearing heat and promoting diuresis, and tonifying joints. *Achyranthes bidentata* promotes blood circulation, smoothen menstruation, and expels wind-dampness. Sichuan pepper has the effect of warming the middle, relieving pain, relieving itching, and expelling wind-dampness. Frankincense has the effect of regulating qi, promoting blood circulation and relieving pain. Herbal acupoint plasters has the effects of promoting blood circulation, removing blood stasis, reducing swelling, and relieving pain caused by ankle joint injuries.

In Chinese medicine theory, acupuncture involves inserting needles into the skin at specific angles and stimulating particular body areas through techniques like turning, lifting, and inserting to achieve therapeutic goals <sup>[15]</sup>. Massage, on the other hand, is a physical therapy that can regulate blood vessels and internal organs. Chinese medicine rehabilitation treatment utilizes traditional Chinese medicine approaches such as fumigation, acupuncture, and massage to unblock meridians, enhance blood circulation, remove blood stasis, facilitate the repair of ankle joints and associated soft tissues, reduce swelling, and alleviate pain, among other benefits.

In conclusion, Chinese medicine rehabilitation has a good effect in treating ankle sports injuries in adolescents, and it can effectively improve the quality of life. Therefore, this approach should be popularized.

## Disclosure statement

The author declares no conflict of interest.

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