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Acupuncture Therapy on the Recovery of Badminton Players' Knee Joint Muscle Injury

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Abstract: *At present, a large number of data or research results have proved that after a cycle of electroacupuncture at specific acupoints and hand acupuncture at specific acupoints, etc., not only can increase the muscle strength on the acupuncture side, but also improve the non-acupuncture or The strength of the muscles on the untrained side. This is the cross migration of muscle strength training. This phenomenon can occur in the upper limb muscles of the human body, and it can also occur in the lower limb muscles. With the deepening of various studies, this phenomenon has been used in the clinical practice of rehabilitation treatment and has achieved good results. In this context, acupuncture therapy provides new rehabilitation ideas for the recovery of related muscle damage and strengthening of muscle strength in badminton, and it can also enrich traditional resistance training or drug rehabilitation treatment methods.*

Keywords: *acupuncture therapy, cross migration, muscle injury, recovery training*

The acupuncture therapy in this study is mainly electro-acupuncture and acupuncture at specific acupoints, with different effects. Acupuncture therapy has been applied in many fields, such as the application of hemiplegia after stroke. Huang Liping found in animal experiments that this treatment can promote the recovery of nerve function in rats with middle cerebral artery obstruction, and the effect is faster than the treatment of the affected side. It is also effective in orthopedic rehabilitation of unilateral limb injury, which provides a basis for acupuncture therapy to recover from muscle injury.

At present, a large number of studies have proved that acupuncture therapy has a significant effect on muscle recovery and there is a phenomenon of cross migration. This therapy is mainly used in the early stages of injury, and training and treatment such as electroacupuncture at specific acupoints and hand acupuncture at specific acupoints in a certain period Down. It has a certain enhancement effect on the muscle strength of the training side and the untrained side, which is the cross migration phenomenon of strength training. Cross migration can occur in both upper and lower limbs. This method can be used not only for large muscle groups, but also for small muscle groups of the hand. Different methods have different effects: it has been found that unilateral electric acupuncture and hand acupuncture at Zusanli and Xiajuxu(S39) points of the lower limbs can increase the strength of the ankle dorsiflexor muscles of both lower limbs at the same time, and stimulate the side ankle dorsiflexor muscles with electric acupuncture. 35%, the non-stimulated side can increase by 32%, and the effect of hand acupuncture is better, 46% and 49% respectively. From this study, the effect of acupuncture can be clearly seen, and the effect of electric acupuncture is different from that of hand acupuncture, which provides a theoretical basis for the rehabilitation of badminton injury-related muscles.

Whether it is domestic or foreign, badminton is more popular among people. With the development of society, sport is developing rapidly in our country, because the sports equipment is relatively simple and the rules are simple and easy to understand, and it requires participants to run. Playing badminton regularly can help people improve their cardiorespiratory function, strengthen their own muscle strength, and also help us develop our own coordination.

Badminton is a sport involving multiple joints. Wrist joints, elbow joints, shoulder joints, knee joints, etc. are common vulnerable joints. The United States National Injury Surveillance System 1997-2016 ball sports injury case records show that the number of patients suffering from badminton-related sports injuries totaled 33,000, of which lower limb injuries accounted for 44.4% of all injuries, and the rest were head and neck injuries (21.4%), upper limb injuries (24.3%), trunk (9.9%), and ankle joint injuries (42%) are the highest among the lower limbs, and most of them are acute injuries. In 2012, my country's Zhang Baijun and others investigated the injury characteristics of 387 badminton players (14-24 years old) participating in the national badminton team championships during the training competition within one

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year. The results showed that the high incidence of sports injuries was concentrated in the lower limbs, and the common injury sites were the knees and ankles. Followed by waist, shoulders, feet and wrists.

Let's take the lower limbs (mainly knee joints) as an example to test and compare the therapeutic effects of traditional resistance therapy and acupuncture therapy.

1. Objects and methods

1.1. Objects

Our school's badminton students aged 18-25 are the subjects of this experiment; Its height is 160.50-183.30 cm; weight is 49.60-79.80 kg; The injury period is 1-4 years; The special training period is 2-8 years. The selection criteria were clinically diagnosed as knee joint injury (patella strain, ligament, meniscus injury), and confirmed after our follow-up visit; limited to unilateral injury; subjective symptoms: knee joint pain, soreness and weakness, softness after increased exercise phenomenon such as soreness appeared; during rehabilitation training, no other symptoms appeared.

Twenty subjects were paired and divided into two groups according to the experimental requirements (to make the two sample values close), namely the resistance rehabilitation training group (referred to as the control group) and the acupuncture treatment training group (referred to as the experimental group).

1.2. Methods

1.2.1. Experimental group

(1) The subjects performed static training every day. The specific methods and requirements: the upper body is upright, the feet are shoulder-width apart, the toes and knees are facing forward, the hips are bent, the knees are bent, the hips are squatted, and the hips are seated back. Squat, fix the knee joint at an angle, pay attention to the knee joint not to exceed the toes too much, and keep this posture, the torso is naturally straight, do not force the chest and abdomen, relax the neck, keep your head straight, breathe freely, palms facing forward, raise your arms forward and your fingertips upward, and you can bend your elbow slightly. If you feel that you can't hold on, you can take a short rest and lift it again after 1-2 minutes. The first practice is 5 minutes each time, and then 1 minute is added every day, gradually increasing to 15-20 minutes each time, practice 1 or 2 times a day, in the morning or after the end of the training, a total of 6 weeks of practice.

(2) Acupuncture treatment for the experimental group, acupuncture Zusanli and Xiajuxu(S39) on the right side, and then pass low-frequency current (frequency 5Hz, current intensity 2-3mA); once a day, do 5 times a week, do 4 consecutively week.

1.2.2. Control group

(1) Same as the experimental group.

(2) Formulate the anti-group training program according to the specific conditions of each subject. The anti-group training of the lower limbs is carried out with the help of a cam machine, the weight is adjusted according to the specific conditions of the subjects, the appropriate number of times is selected for each group, and each group can rest for 1 minute. After one week, if you feel that your muscle strength has increased, you can increase the amount of training and practice for 6 weeks.

1.3. The data collection

(1) Measurement of thigh circumference, according to the method reported by Romero, the subject stands upright, with his feet shoulder-width apart, and marks 10 cm and 20 cm from the upper edge of the patella along the longitudinal axis of the thigh, using a measuring tape. Measure its circumference at these two levels, 3-4 times each, and record when the result does not change much.

(2) During the in-situ vertical jump test, the subjects are required to dip their hands in paint, face the wall with their sides, stand 15 cm away from the wall, determine the highest point that has not taken off, and then try their best to jump up and close to the wall as much as possible. Use the middle finger to mark the highest point on the wall at the highest point of the jump with the middle finger. The subjects take turns to perform 3 rounds to get the best result. In the standing long jump test, you should stand on the jumper line and do not overline, stand naturally, jump forward with your best effort, and touch the

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ground with your feet. The measurement method is the vertical connection between the landing location and the jumper line, which is the measurement length. Players take turns for 3 rounds and get the best result.

After recording each value, use a table to show the result.

1.4. Research result

The research results are shown in Table 1, table 2 and table 3.

Table 1 Changes of various indicators of diseased limbs

Index	Groups	Before training	After training	Rate of change	P
In-situ vertical jump (m)	Group	1	1.039±0.034	0.039±0.034	<0.05
	Group	1	1.025±0.039	0.025±0.039	>0.05
Standing Long Jump (meters)	Group	1	1.019±0.014	0.019±0.014	<0.05
	Group	1	0.996±0.019	- 0.003±0.019	>0.05

Table 2 Morphological changes of affected limbs (leg circumference)

Index	Groups	Before training	After training	Rate of change	P
20 cm above patella	Group	1	1.156±0.017	0.155±0.017	<0.01
	Group	1	1.097±0.014	0.097±0.016	<0.05
10 cm above patella	Group	1	1.014±0.013	0.014±0.013	>0.05
	Group	1	1.005±0.008	0.005±0.009	>0.05

Table 3 Changes of various indicators of healthy limbs

Index	Groups	Before training	After training	Rate of change	P
Thigh circumference (10 cm suprapatellar)	Group	1	1.003±0.015	0.003±0.015	>0.05
	Group	1	0.998±0.041	0.001±0.041	>0.05
Thigh circumference (20 cm suprapatellar)	Group	1	1.008±0.019	0.008±0.019	>0.05
	Group	1	1.002±0.014	0.002±0.014	>0.05

2. Discuss the analysis

Through the analysis of the results of this experiment (increased latitude of the thigh, increased distance of the high jump and long jump), it can be seen that the muscle strength of the lower limbs has increased, including the quadriceps, sartorius, tensor fascia lata, calf triceps and other muscles. The enhancement of the muscle strength of the musculature around the knee joint can greatly improve the strength output of the knee joint, and improve the sports performance of athletes, so as to achieve the purpose of injury prevention and control. From the results, we can see that the two treatment methods have improved effects on the injured muscles of the lower limbs of athletes. The results of this study show (Tables 1, 2, and 3) that acupuncture therapy can effectively improve the muscle strength of the injured limbs. The limbs increased by 17.3% (P>0.01), and the healthy limbs increased by 15.7% (P<0.01). However, conventional resistance rehabilitation training is not obvious in improving the muscle strength of the healthy and affected limbs (P>0.05) [i]. And there is the phenomenon of cross migration. After the affected limb is stimulated, the contralateral healthy limb has obvious muscle strength enhancement. Therefore, acupuncture therapy can be used in the early stage after injury to other parts of the athlete to enhance the muscle strength of the braking side body and maintain the athlete's performance, so this method should be promoted.

3. Result

The effect of acupuncture therapy on muscle recovery is better than traditional treatment methods and there is a phenomenon of cross migration, which provides an idea for improving sports performance without reducing sports skills during the athlete's injury stage.

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