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Progress of combined therapy for knee joint injury in athletes

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Abstract: *In this experiment, by observing the combination therapy of traditional Chinese medicine acupuncture therapy and modern isokinetic muscle strength training, the treatment effect of knee joint injury of athletes was grouped experiments and data analysis, the purpose is to seek scientific and effective treatment of knee joint injury methods, for knee joint injury athletes to provide a new direction of treatment.*

Keywords: *Knee joint injury; Chinese acupuncture; Isokinetic muscle strength training; Lysholm Knee Rating Scale*

Through the study of the characteristics of knee injury of athletes, and according to the analysis of the characteristics of knee injury, knee patellar tendinitis, meniscus injury, knee bursitis as the main treatment of knee injury research objects. Taking the rehabilitation treatment of patients with knee joint injury as the key research direction, the aim is to ensure the physical and mental health of athletes and the normal development of training and daily learning life. Knee injury is a very common disease, often accompanied by the change of weather temperature and the soft and hard degree of the field in the training process of acute injury, and athletes after years of training and high intensity competition fatigue, leading to chronic sports injury of the knee [1]. Due to the special physiological position of the knee joint, it is not easy to be cured after the injury, which has long troubled the training and life of athletes and seriously shortened the career time of athletes.

This study is committed to the combination of traditional Chinese medicine acupuncture therapy and modern isokinetic muscle strength training for treatment and rehabilitation, and to provide the data of the treatment plan for athletes with knee injuries.

1. Experimental subjects and methods

1.1. Subjects

A total of 18 retired athletes from Liaoning National Olympic Athletics Club with knee joint injury were selected as the experimental subjects. Inclusion criteria were those with more than 1-3 years of injury, more than 4-7 years of special training in this project, no major knee surgery within 3 months, and were detected by professional team doctors and diagnosed with knee injury after revisit to the hospital. Patients with knee patellar tendinitis, meniscus injury and knee bursitis injury were selected as the main treatment subjects.

Subjective symptoms: (1)The knee joint pain is significant in the press have affected intense pain, early and Angle on exercise intensity and activity of motion in 95-135 degrees between the apparent and radioactive pain pain, after a good warm-up and muscle activation joints reduce or disappear after the training, but as the end of the training and exercise stop brake after a period of time, burn pain again, with the development of the injury, on walking and jogging down the stairs when produce significant pain, and there is the phenomenon of the weak leg playing soft. (2) Knee resistance test test: the examiners will hand wrapped in the patient's knee leg ankle, or use elastic band bang to the ankle joint, by the patient's leg forward to do the knee extension action, and give a certain resistance, so that the patient's knee joint from the initial flexion gradually straighten, pain is knee injury.(3)There is swelling around the knee joint, there is obvious pressure pain at the patella, and the knee area of the affected side is significantly higher than that of the other side, which indicates the knee joint injury. (4) Feeling of wear and tear of the knee joint, the patient stood on the wall with both legs, and lifted the affected side leg to do the action of "drawing a circle and scraping the ground" in situ. The feeling of friction and pain

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is the knee joint injury. (5) Squat on one leg. The subjects were asked to squat on one leg. When squatting to the low position, knee weakness and pain would appear.

1.2. Experimental method

Subjects were divided into three groups, A, B and C, with 6 people in each group, for 5 consecutive weeks of systematic treatment. Patients in these three groups were divided according to their respective groups and received different methods of systematic treatment. The detailed treatment methods are shown in Table 1. Before and after treatment, all patients' pain sensation, range of motion of knee joint, 10cm thigh circumference above patellar and isokinetic test results of flexion and extensor muscle strength were analyzed. Subsection comparison was conducted according to the treatment test data of knee joint injury in different time periods within 5 weeks. After the end of the experiment, the index data measured before and after treatment by different methods in group A, B and C were compared and analyzed.

Table 1 The detailed treatment methods

group	treatment	Specific means
A	Cupping therapy	The selection method was traditional acupuncture and electroacupuncture for experimental group A, acupuncture, acupuncture Zusanli and Xiaju xu, and Biguan, Xuehai, Shiguan, Xiexi, Fu Rabbit, Dubi, Heting, Shugan and other commonly used acupoints affected. After acupuncture, low-frequency current (current intensity 2-3mA, frequency 5Hz) and moxibustion or infrared lamp for heating assistance, once a day, for 25 minutes, 6 times a week, for 5 consecutive weeks [2].
B	Isokinetic muscle strength training therapy	The knee joint resistance rehabilitation training method was used to increase the muscle strength on the IsoMed2000 isokinetic muscle strength instrument training system. Test speed for slow (60 °/s), medium speed (120 °/s), fast (180 °/s) three. The patient is seated in the test chair, using the seat belt to secure the patient's upper and waist. The test consisted of slow and medium speed muscle strength test [3]. Each kind of test for 1 group, according to the patient before the test for light resistance flexion and extension of the knee warm-up action. After fully warming up, take a rest to ensure full knee flexion and extension. In slow and medium speed tests, knee flexion and extension were performed for 3 times in each group, and knee flexion and extension were performed for 12 times in fast test. The interval of each group of tests was more than 45s, once every 2 days and 3 times a week for constant speed training, for five consecutive weeks
C	Combination therapy	Electroacupuncture and isokinetic training were combined, and 25 minutes of acupuncture and isokinetic muscle strength training were intermingled. At least 3 times of acupuncture and at least 3 times of isokinetic training were guaranteed every week, and one day of adjustment and rest on weekends were given for five consecutive weeks.

1.3. Data acquisition

After 5 weeks, all the test and treatment were completed, and the treatment outcome data were collated and compared by groups.

(1) ThIGHs circumference measurement. The subject stands upright on the ground with feet open and shoulder-width apart. The exameter marks 10cm and 20cm from the upper edge of the patella along the longitudinal axis of the thigh. The circumference of these two points is measured with a standard tape measure and recorded.

(2) Analysis of joint swelling, range of motion, tenderness index and Lyshoim knee joint rating scale [3]. The researchers compared the degree of joint swelling after five weeks, and asked the subjects to do the maximum amount of squatting and "circle" and other movements to compare the pre-treatment data. Pressure from light to heavy and pain was recorded.

(3) Isokinetic muscle strength test. The isokinetic instrument was used for fast, slow and slow test to judge the maximum muscle strength before and after the injury of the quadriceps femoris and to analyze the shape of the treatment cycle torque curve. It is important to emphasize that the number of test repeats

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for centrifugal contraction should be dependent on the patient's condition. Once the load bearing centrifugal contraction is repeated too much, it is easy to cause fatigue muscle pain or muscle strain spasm and affect the original rehabilitation plan [5].

After each value is recorded, the results are presented in a table.

1.4. Research Results

Table 2 Comparison of chi-square data of pain index scores of three groups of athletes before and after the experiment (unit: points)

The overall test value of the week I in the week of the week of the week of the week of the week of the week of the week of the week of the week of the week of the week of the week of the week of the week of the week Forward Back Forward Back Forward Back Forward Back Forward Back Forward Back Forward Back Forward Back
Group A 10, 8, 8, 6, 6, 5, 5, 4, 4, 2 Group B 10 8 8 7 7 6 6 5 5 4 C>A>B Group C: 10, 8, 8, 6, 6, 4, 4, 1, 1

After five weeks of treatment and testing, the data of pain indicators were obtained: group C, >, group A, >, group C, the combination of acupuncture therapy and isokinetic training had the best effect, and the pain of subjects in group C was alleviated most obviously. The specific reason is that after acupuncture treatment in the early stage, the joint inflammation subsided, but the muscle strength around the knee joint increased slowly, and the joint muscle strength increased slowly and led to insufficient stability. The decrease trend of pain sensation was not obvious at the end of treatment. In this data analysis, the effect of group B was slightly worse than that of group C and group A. The reason was that inflammation was not effectively alleviated after injury, and some tested athletes still had edema at the end of the third week, so the decreasing trend of pain was not obvious.

Table 3 Comparison of indicators of thigh circumference at 10cm on patella before and after the experiment (unit: cm)

Overall test value before and after treatment
A group of 50.47 + / - 6.59 50.47 + / - 6.47 Group B: 53.00±5.04 55.90±4.47C >B>A Group C + / - 5.59 52.30 56.30 5.90 mm

According to Table 3, it can be concluded that the two treatment methods in Group B and C have significant influence on the peripatellar thigh diameter of 10cm, and the effect is better than that in Group A. Three groups of experiment on, before the trial no significant differences between the three groups of data were statistically analyzed before and after the treatment, the results show that the strength training group, acupuncture group and combined therapy group of subjects to some extent improve after treatment and improvement, but there are some differences between three groups of acupuncture group of basic no change, the reason is that traditional acupuncture group is not the muscles of the rehabilitative training, so does not have obvious change. It can be shown that in the rehabilitation program, the appropriate increase of muscle exercises can effectively improve the shape of muscle and increase the mass of muscle. Many literature reviews and practical experiences on knee rehabilitation show that knee rehabilitation training can enhance the stability of knee joint by strengthening the muscle groups around the knee joint and achieving muscle balance.

Table 4 Comparison of knee flexor function before and after isospeed IsoMed2000 training

Test indicators	Before the training	Percentage of healthy side (%)	After the training	Percentage of healthy side (%)	Net increase after training	Percentage increase (%)
PT (60 °/ s) *N, m* N N, m	39.1 + / - 12.76	69.82	50.3 + 21.86	89.82	11.2	28.64
Pt (120 °/s) *N, m*	34.3 + / - 12.36	65.96	46.5 + / - 18.42	89.42	12.2	35.57
PT (180 °/ s) *N, m*	29.6 + 18.81	71.15	34 1 + 15.52	81.97	10.82	15.21

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Table 5 Comparison of knee extensor function of affected side before and after isomod 2000 training

Test indicators	Before the training	Percentage of healthy side (%)	After the training	Percentage of healthy side (%)	Net increase after training	Percentage increase (%)
PT (60 °/ s) *N, m* N, m	72.8 + / - 24.52	66.78	103.0 + / -26.01	94.49	30.2	41.48
PT (120 °/ s) *N, m*	57.3 + 20.14	66.63	81.4 + 25.87	94.65	24.1	42.06
PT (180 °/ s) *N, m*	46.8 + 15.13	66.86	65, 0-17.39	92.86	18.2	33.89

As shown in Table 4 and 5, the changes in the function of the extensor knee muscles were more significant than those of the flexor muscles. After 5 weeks of isokinetic centripetal training, the strength of knee flexor muscle and extensor muscle increased significantly. The extensor is more important than the flexor. It shows that after knee joint injury, although it is in the early stage of injury, the recovery will be faster if given appropriate muscle strength training around the joint in the early stage [6].

The Lysholm Knee Score Scale, which consists of eight items including knee pain, joint lateness, support instability, peripheral swelling, limping, climbing up and down stairs, use of supports, and squatting. The better the knee function is, the higher the score is between 0 and 100. Lysholm scores between 95 and 100 indicate cure. One score of the two was 84-94, indicating significant effect. Both of the two scores were 65 to 83 points, indicating that they were effective. A score of less than 65 is not valid. Effective rate =(cured + effective + effective)/ total number of cases 100% [7].

Table 6 comparison based on the Lysholm Knee Score Scale

group	Before the treatment	After treatment
A	69.30 + / - 5.35	89.94 + / - 3.44
B	67.24 + / - 5.34	84.43 + / - 2.23
C	65.89 + / - 4.89	93.12 + / - 1.12

Finally, according to the data feedback, after five weeks of treatment, the Lysholm knee score of the three groups was C>A>B.

2. Discussion and analysis

Athletes' knee joint injury is different from other joint injury, the reason is that the movement technique is in the wrong state for a long time or is subjected to the braking with the ground, which leads to the local excessive use of the knee joint, long-term fatigue state and antagonistic wear and tear. When athletes have knee pain and other symptoms of knee sports injury, it is often the knee joint has been in the stage of overuse. It is not only a long recovery period, but also a series of sequelae will be caused once there is an inappropriate rehabilitation method, which will affect the career of athletes. Rehabilitation training plays an important role in the treatment of meniscus injury, synovitis and patellar tendinitis injury. Quadriceps femoris of the knee joint is one of the largest and most powerful muscles in the human body, which plays a role in stabilizing the knee joint and supporting the lower limbs. Based on the above analysis, we can understand that strengthening the muscles around the knee joint (such as the quadriceps) can greatly reduce the probability of knee injury and prevent the occurrence of injuries.

Therefore, no matter through traditional acupuncture or the use of modern science and technology in the treatment of the knee joint, the treatment should be carried out by improving the strength around the knee joint. Once the purpose of improving the strength is left, any treatment means will treat the symptoms rather than the root cause and cannot fundamentally solve the injury problem. However, the anti-inflammatory treatment that only focuses on improving muscle and joint strength without acupuncture to dredge the meridians, detumescence and analgesia will be counterproductive, and the recovery effect is slow and can not reach a better treatment effect.

3. Conclusion

The combination of acupuncture and moxibustion and isokinetic therapy with IsoMed2000 isokinetic myotinometer training, 5 weeks acupuncture therapy and 5 weeks isokinetic resistance training can improve the injury treatment and muscle growth. When athletes have sports injuries, ordinary resistance training is greatly limited, which causes great difficulties for athletes to complete the rehabilitation

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movement and the Angle of activity. However, the acupuncture and moxibustion effect can perfectly alleviate and improve this problem. For the boring fatigue of resistance training, acupuncture therapy can provide a lot of passive repair time for athletes to promote injury recovery, which lays a foundation for the following active resistance rehabilitation training. Therefore, for the treatment and rehabilitation training of knee joint injury, the combination of traditional acupuncture and isokinetic muscle strength training should be actively promoted. This method is simple and easy to operate by team doctors and rehabilitation teachers, and it is easy for athletes to accept psychologically and physically. In the stage of treatment and recovery after injury, they will not worry about greatly reducing their motor skills due to muscle strength decline, and it provides a direction for improving sports performance.

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