

The Effect of Acupuncture Therapy on the Rehabilitation of Motorcycle Athletes' Knee Joint Injury

Xin Li^{1,2,*}, Haotian Ma²

¹Physical Education Department, Luxun Academy of Fine Arts, Dalian 116650, China

²Sports Institute, Liaoning Normal University, Dalian 116650, China

*Corresponding author

Abstract: To explore the rehabilitation effect of acupuncture on motorcycle athletes' knee injuries. Firstly, 60 city association motorcycle athletes with knee joint injuries were selected, and the control group and the experimental group were tested and compared by random grouping. The control group received a series of planned rehabilitation training followed by traditional Chinese massage to relax. The experimental group used acupuncture therapy plan for rehabilitation after rehabilitation training. After the control group and the experimental group have completed the test, the data is measured to compare the knee joint function score (Lyholm) grade differences and pain scores at several different time nodes and observe and analyze them. The Lysholm score and pain score of the control group at different time nodes are both Lower than the experimental group, the difference was statistically significant ($P < 0.05$). Data experiments prove that acupuncture therapy is more effective for knee joint injury rehabilitation, and is better than general traditional Chinese massage therapy. For motorcycle athletes' knee joint injury rehabilitation, acupuncture therapy combined with rehabilitation training can significantly reduce athlete's knee joint pain, reduce the number of athletes' injuries, speed up knee joint injury recovery, increase joint mobility, and improve rehabilitation efficacy.

Keywords: acupuncture therapy, knee sports injury, motorcycle sports

Sports injuries will greatly shorten the professional life of motorcycle athletes. When athletes suffer from sports injuries in their knee joints, they do not immediately recover and continue to carry out high-intensity training and competitions. It will gradually produce joint compression and wear, which may eventually cause environmental damage in the articular cartilage. The lytic enzymes in the synovium, the joint membrane and joint capsule of the knee joint are very difficult to repair once they are damaged. In serious cases, it will even interrupt the athlete's entire sports career. Therefore, it is critical for athletes to pay attention to sports injuries and to treat them in time. This can not only effectively reduce the number of subsequent sports injuries, but also help improve the athlete's competition level, physical fitness level and physical recovery. Sports injury rehabilitation is divided into Chinese medicine and Western medicine. When treating athletes' knee injuries in Western medicine, most of the methods are conservative treatments. Anti-inflammatory and anti-inflammatory drugs are given, or related drugs are injected into the joint cavity. In severe cases, precision surgery is performed. With the increasing awareness of people's health care, try not to adopt the surgical mode and drug treatment of Western medicine, which will have an irreversible impact on the body. Therefore, traditional Chinese medicine rehabilitation methods such as massage and the use of acupuncture to treat sports injuries are becoming more common. Acupuncture therapy is an effective method of rehabilitation in traditional Chinese medicine. It has been used for a long time. It has the characteristics of curing and preventing diseases, dredging the meridians, simple, effective, safe, and efficient. Therefore, acupuncture therapy of traditional Chinese medicine is recommended for knee joint injury rehabilitation, and the effect is excellent. Through investigation and statistics, it is understood that motorcyclists suffer more knee injuries due to excessive training and competition. Therefore, acupuncture therapy of traditional Chinese medicine should be generally introduced to enable athletes to effectively prevent and reduce the occurrence of such injuries during training and competition. This article mainly focuses on the injury of motorcycle athletes' knee joints, the main reasons, and the comparative analysis of acupuncture treatment methods and traditional treatment methods.

1. The Main Reasons and Analysis of Motorcycle Athletes' Knee Joint Injury

Motorcycle sports is a racing event, which may cause knee joint wear and meniscus damage. Because motorcycles are small in size, fast, and highly maneuverable, competitors are overly pursuing speed and driving skills, so there may be collisions with other vehicles or other accidental crashes in competitions and sports that may cause physical injuries to the motorcycle riders. In addition, riding sports technology is complex and changeable, requiring strong resilience to pass corners and surpass opponents. Due to the long-term riding position, athletes' knee joints will carry a large load for a long time. In order not to slow down during bending, athletes mostly use their knee joints to touch the ground to maintain balance, and the knee joints continue to rub the ground. Therefore, under great pressure, the flexion angle of the knee joint during training and competition does not change for a long time and other reasons will have an adverse effect on the knee joint. When the rider is riding, the lower limbs are the only system that generates power. Control the direction of the vehicle and the difficult riding posture to fix the knee joint for a long time. Continuous exertion of the knee joint will cause the knee joint to wear out and even cause knee pain. After research and comparison, it is found that athletes who ride for a long time or compete for a long time are more prone to knee sports injuries.

2. Comparison of Therapeutic Methods for Motorcycle Athletes' Knee Joint Injury

First, both the control group and the experimental group performed a series of knee rehabilitation training methods.

2.1. Static contraction training

The athlete is in a supine position, with both hands on both sides of the body, the legs continue to exert force to complete the contraction, the quadriceps is tightened, and the knee joint is straight and fixed. The process lasts for about 10 seconds, and then relax for about 4-5 seconds after the exercise is over, 10 times as a group, alternating left and right, a total of 3 sets of training, rest after the end, 2 times a day.

2.2. Knee joint stability

The athlete stretches and raises one leg, keeps the knee joint fixed, and slowly raises it. The range of the raised leg is $50^{\circ} \sim 60^{\circ}$, and it is fixed at the highest point for 1-2s. Slowly put it down once, each process is about 8 seconds, after the completion of the change of legs, each completed 10 times as a group, after the completion of the two groups, rest, 2 times a day.

2.3. Isotonic and isokinetic contraction of the quadriceps femoris of the lower extremities

The athlete grasps the objects on both sides with both hands, bends the knee joints and slowly squats down. When in a semi-squat position, they need to remain motionless for 3 to 5 seconds, and then slowly descend. When in a full squat position, stay still for 3 to 5 seconds. Actively feel the force exertion process at the position of the knee joint, slowly lock the knee joint to exert force and stand up, and complete the whole process as one movement. It takes 15-20 movements as a group, and rest for 1-2 minutes after one group. Do the two groups to end, twice a day.

2.4. Exercise the power function of the knee joint

Our legs slowly perform vertical take-off and landing cushioning exercises, and our legs quickly perform vertical take-off landing cushioning exercises. First, stand up with our legs, straighten our waist and chest, hold head with hands, and slowly squat down, with the center of gravity behind, when we squat to ninety degrees, the knee joints are locked and exerted slowly. After slowing down, take a one-minute rest and start fast practice. Rest after completion, two groups a day.

2.4.1. Control group

After completing the rehabilitation training, perform the massage and relaxation therapy of Chinese medicine: First put the athlete in a supine position, relax the leg muscles, especially the knee joint and surrounding muscle tissue, and then bend the knee joint to find massage points. Take acupuncture points such as Dubi, Xuehai, Liangqiu, inner knee eye, outer knee eye, etc. Carry out continuous massage to

relax in sequence, relax for 3 minutes, 2 times/d, 3 times as a treatment cycle, for 4 consecutive weeks.

2.4.2. Experimental group

Apply acupuncture therapy to cooperate with rehabilitation training. At the beginning of the acupuncture therapy, the athlete assumes a supine posture, so that the athlete keeps the knee joint as relaxed as possible. First relax the muscular tissues around the knee joints, then take points: Dubi, Yinlingquan, Yanglingquan, Zusanli, Sanyinjiao, Ashi, inner knee eye, outer knee eye, Yangguan acupoint on the outer side of the knee, Acupuncture at Yinxi, Xuehai, Liangqiu, Hedong and other acupoints on the inner side of the knee. First use short needling and transfusion, and then use lifting and interpolation at Zusanli and Sanyin, the remaining acupoints are flattened and relieved, and the remaining acupuncture points are used for intermittent acupuncture during the process of retaining needles to consolidate the rehabilitation of knee joint injuries. Keep the needle for about 20 minutes, transfer the needle 1-3 times in the middle, and adjust the acupoints appropriately according to the patient's tolerance. Once a day, 3 times is a course of treatment for four consecutive weeks.

2.4.3. Experimental results

Observation indicators:

Comparing the grade differences of the knee joint function score (Lysholm) of the three time nodes before and after treatment between the two groups. Evaluation Criteria: Mainly measure and evaluate the knee joint function of patients, and quantitatively evaluate knee joint function based on different symptoms. The total score ranges from 0 to 100 points. The higher the score, the better the recovery effect of the treatment on the patient's knee joint function. See Table 1 In the experimental group, there were 30 cases, 16 males and 14 females, aged from 16 to 39 years old, with an average age of (28.17 ± 1.62) years old. The average medical history was (3.5 ± 1.21) days. There were 16 cases of injury to the right knee and 14 cases of the left knee.

In the control group, there were 30 cases, 14 males and 16 females, aged 15-38 years old, with an average of (26.53 ± 1.46) years old. The average medical history was (3.42 ± 1.17) days. There were 15 cases of right knee injury and 15 cases of left knee injury. The data of the two groups of patients were not statistically significant ($P > 0.05$). Lysholm scores at three time points during the rehabilitation process ($x \pm s$).

Table 1 Knee pain scores at different times before and after treatment in the two groups

Groups	Number of cases	Before treatment	After two weeks of treatment	After four weeks of treatment
Control group	30	54.65 \pm 5.62	62.57 \pm 6.83	70.43 \pm 10.28
Experimental group	30	54.71 \pm 4.92	73.50 \pm 7.26	84.71 \pm 11.47
t		1.567	0.856	0.445
p		> 0.05	< 0.05	< 0.01

The patient's knee joint pain was quantitatively evaluated. The total score ranged from 0 to 10 points. The lower the score, the better the patient's knee joint function recovery. See table 2 Pain score comparison between the two groups of patients according to time.

Table 2 Pain score comparison between the two groups of patients according to time ($x \pm s$, points)

Groups	Number of cases	Before treatment	After two weeks of treatment	After four weeks of treatment
Control group	30	5.63 \pm 1.42	5.05 \pm 1.05	3.09 \pm 0.88
Experimental group	30	5.50 \pm 1.16	3.31 \pm 1.02	2.81 \pm 0.99
t		-0.53	-9.17	-1.63
p		0.60	0.00	0.11

Patient satisfaction comparison: The control group [82.15% (46/56)] is lower than the experimental group patient satisfaction [95.17% (59/62)] ($X^2=5.91$, $P < 0.05$).

3. Discussion and analysis

Knee joint injuries have always plagued motorcycle athletes. Due to the sports characteristics of motorcycle competitive sports, athletes' technical habits, difficult overtaking postures and control of vehicle direction, the incidence of athletes' knee joint injuries remains high. Although traditional Chinese medicine physiotherapy and massage can effectively relieve some of the pain symptoms of the knee joint, its treatment time is long and the effect is not obvious, and it requires repeated treatment for many times. Muscle soreness after treatment will also cause the risk of athletes' physical decline after injury, which will affect the subsequent training, which has limitations. In the environment where every second counts in competitive sports training, acupuncture therapy is gradually emerging in Chinese. Studies have shown that acupuncture therapy can improve athletes' performance, prevent and treat injuries: at the same time, there is no discomfort in the muscles and joints after treatment. The study compares the combination of acupuncture therapy and rehabilitation training with traditional massage therapy. The Lysholm scores at different time nodes and the pain scores of the two groups of patients at different times are compared. It can be seen that the experimental group has better recovery than the control group, the pain reduction was also better than the control group, Therefore, it is proved that acupuncture therapy has a positive and irreplaceable rehabilitation effect on the knee joint rehabilitation of motorcycle athletes. The results show that acupuncture combined with rehabilitation exercise treatment program can significantly improve the recovery of motorcycle athletes from knee joint injury, and it is reflected in the knee joint function score and the degree of joint pain. Acupuncture therapy can effectively restore the strength of the athlete's knee joint, significantly reduce joint and muscle pain, and promote recovery, with significant effects. After four weeks of professional acupuncture treatment, most motorcycle athletes recovered to their original high level.

Through the analysis of the results of rehabilitation treatment of 60 cases of municipal association motorcycle athletes with knee joint injuries: The comprehensive treatment of acupuncture combined with rehabilitation exercises is more effective in treating athletes' knee injuries than traditional massage therapy. Acupuncture is very helpful to the recovery of athletes' knee joints, prolongs the athlete's career time, and improves the knee joint exercise ability. Compared with traditional physical therapy and massage, acupuncture therapy can effectively speed up the speed and cycle of knee joint rehabilitation of motorcycle athletes, improve the functional score of motorcycle athletes' knee joint recovery, and will not delay the normal training plan. It proves that acupuncture therapy has very good curative effect and use value. Acupuncture therapy is highly praised by a large number of athletes because of its convenient use, short treatment time, safety and effectiveness, and it is worthy of vigorous promotion and application in daily training injury rehabilitation by athletes.

References

- [1] ROGÉRIO. TEIXEIRA. SILVA, CRISTIANO.FROTA.DE SOUZA LA. *Intraarticular Synovial Hemangioma of the Knee: An Unusual Cause of Chronic Pain in a Sportsman. Clinical Journal of Sport Medicine*,2007,17(6):504-506.
- [2] Li Jing. *Clinical rehabilitation of sports knee injury. Journal of Wuhan Institute of Physical Education*,2004(05):67-68
- [3] SCATTONESILVAR, NAKAGAWATH, FERREI-RAAL, et al. *Lower limb strength and flexibility in athletes with and without patellar tendinopathy. Phys Ther Sport*,2016,20:19-25.
- [4] Xu Bin. *Treatment and Rehabilitation of Athletes' Knee Joint Injury. Anhui Sports Science and Technology*,2012,33(02):53-54
- [5] Jiang Haiyan,Yu Fajing. *Rehabilitation programs for common knee joint sports injuries after surgery—General (Part 2). Chinese Journal of Sports Medicine*,2002(05):527-532.
- [6] Lin Qiang, Chen Anliang, Cheng Kai, Yu Changjun, Zhou Yige, Wang Xiaojun, Yang Ting, Yuan Bing, Li Xueping, Bi Haiping. *Effects of acupuncture on motor function, balance function and activities of daily living in stroke patients. China Rehabilitation Medicine Magazine*,2015,30(09):898-901+906
- [7] Mei Yingxue, Yan Shuying, Qiao Hui, Yao Hui, Guo Qing, Yu Zhi. *Effects of multimodal analgesia on pain and functional rehabilitation of patients after artificial total knee arthroplasty. Journal of Ningxia Medical University*, 2016,38(09):1032-1034+1039.
- [8] Huang Lechun, Hu Huimin, Liang Yuxiang. *A review of the knee joint function score scale. Chinese Medical Science*,2016,6(13):50-53.
- [9] DABBSNC, BLACKCD, GARNERJC. *Effects of whole body vibration on muscle contractile properties in exercise induced muscle damaged females. J Electromyogr Kinesiol*,2016,30:119-125.DOI:10.1016/j.jelekin.2016.06.008

[10] MORIHISAR, ESKEWJ, MCNAMARAA, *etal.* Dry needling in subjects with muscular trigger points in the lower quarter: a systematic review. *Int J Sports Phys Ther*,2016,11(1):1-14.

[11] Yao Min, Wang Qin, Mao Huifang, Xu Qingxin, Sun Li, Xing Jian. The clinical efficacy of warm needling moxibustion combined with rehabilitation training in the treatment of athletes' knee traumatic synovitis. *Chinese Journal of Orthopaedics and Traumatology*,2020,28(12):26-29+35.