

Causes and Prevention Measures of Muscle Strain in Track and Field Athletes

Zhe Yin *

Guangxi Normal University, Guangxi, 541001, China

* Corresponding Author Email: binglin@ldy.edu.rs

Abstract. The incidence of muscle strain is mainly due to the athletes' exercise intensity is large, and the symptoms of muscle strain often appear. According to the combination of the data in this paper, the incidence of muscle strain is high due to the high intensity of athletics and the large physiological load, and the muscle strain is still increasing gradually. Muscle strain will not only affect the athletes' training and competition results, the improper handling will affect the recovery of injured muscle function, and serious disability can be left behind. This paper mainly combines the incidence rate, main occurrence items and main causes of muscle strain caused by universities and athletes, as well as athletes' physical fitness, physical condition, training plan and other issues, to prevent and intervene in muscle strain, so as to reduce the probability of muscle strain of athletes and strengthen coaches' training arrangements and training plans. And to further ensure the health of athletes.

Keywords: Prevention; High exercise intensity; Intervention; Universal phenomenon.

1. Introduction

Track and field events occupy an important position in competitive sports. On the one hand, it is the foundation of all sports events and one of the common competitive sports events in the society at this stage. On the other hand, in all stages of the school, athletics is an important event that every student and every teacher will learn, and it is also a considerable concern in international sports. With the development of track and field events, more and more people participate in track and field events, and the competitive level is constantly improved, and the phenomenon of muscle strain has become common. In daily training, in order to protect the physical health of athletes and not affect the training of athletes, it is necessary to analyze the main causes of muscle strain and make effective prevention to reduce the incidence of muscle strain, so as to strengthen the safety protection of athletes, and improve the level of sports. Therefore, this article mainly analyzes the causes of muscle strain from the perspective of athletes and summarizes the prevention and treatment measures for muscle strain [1].

2. Epidemiological Characteristics and Influence of Muscle Strain in Track and Field Athletes

A questionnaire survey was conducted to investigate and analyze the muscle injury of college students, including 514 college students with an average age of 20 ± 2 years. The results showed that the muscle injury rate of sports college students was as high as 82.50%, and the injury rate of sports training majors was the highest, reaching 89.90%. The injury rate of sports majors was significantly higher than that of non-sports majors. And among many sports, the muscle injury rate of track and field continues to increase to the first; According to the survey in the types of muscle injury, the number of muscle strain is the largest, the main causes of sports injury are physical fatigue, insufficient preparation activities, technical movement errors, improper training methods, and other reasons [2].

Another survey included 265 college students in Heilongjiang Province. There were 153 men and 112 women, with an average age of 20.6 years. The results showed that muscle strain ranked second, accounting for 32.4%. The main cause of sports strain injury was insufficient preparation, accounting

for 32.4%; 19.6% were in poor physical condition; Excessive burden on parts of the body accounted for 12%, among other reasons [3].

2-year prospective study monitoring college athletes competing in track and field long jump, triple jump, high jump and pole vault revealed that the most common type of injury was muscle strain or muscle breakage (21.1%) [4].

It can be seen that among the types of muscle injury, the probability of muscle strain is very high, and the probability of muscle strain in track and field is the highest. Considering the majority of HSIs occur during sprint acceleration and high-to-maximal velocity running, it seems logical that biomechanics should be considered as a potential contributing factor influencing mechanical strain and thus injury development [5].

Muscle strain will not only affect the athletes' training and competition results, improper handling will affect the recovery of injured muscle function, and serious disability can be left behind. muscle strain is one of the most common muscle injuries in high-performance athletes and contributes to substantial player downtime because of its high mean time to return to sport and occurrence during critical periods in the competitive season^{1–3} [6]. It will have a great impact on many aspects of the athlete. At this stage, more and more people need to master more basic ways to prevent muscle strain, and take intervention measures to reduce the incidence of muscle strain [7].

3. The Cause of Muscle Strain in Track and Field Athletes

3.1. Insufficient Preparatory Activities

Depending on the sport, the way to prepare for the activity is very different; The intensity, structure, speed and rhythm of each sports event are different, and it is not only necessary to carry out basic preparation activities, but also to carry out their own special preparation activities [8]. The main purpose is to enhance the nerve and muscle excitement of athletes, so as to enhance the function of various organs, ligaments and joints, effectively prevent the occurrence of sports injuries, and ensure the smooth progress of track and field training [9]. For example, sprinting is more intense and requires a strong load, so more attention should be paid to preparation activities [4]. Track and field training is a gradual process, if not fully prepared, athletes are likely to strain in the competition; Track and field athletes and coaches should fully realize the significance of preparation activities, and then improve their professional level and training effect [9].

3.2. Physical Condition and Quality

3.2.1. Physical Condition.

A large degree of muscle strain is caused by physical fatigue caused by unreasonable training schedules. On the one hand, the training is not systematic, the means are single, the content is monotonous, so that the athlete's excitement is low, not only cannot achieve a good training effect, but also easily make the athlete muscle strain. On the one hand, the training intensity in the recovery period is relatively high. After stopping the training for a period of time, the training intensity in the recovery period will decrease the function level of the body, so that the muscle cannot withstand the requirements it needs to achieve, resulting in muscle strain [8]. And in the process of exercise, if the force is concentrated in a certain part for a long time, it will lead to increased local force and greater burden on the part, resulting in sports injuries. Make the body tired, local burden is too heavy and cause sports strain and various injuries. Exercise beyond the tolerable range, prone to muscle strain and other sports injuries [9].

3.2.2. Not High Physical Fitness.

Under normal circumstances, the physical fitness, special, technical and other training content of sports projects, due to the low level of physical fitness, muscle strains and various sports injuries will occur. People who do not have adequate physical training have poor muscle elasticity and basic

strength, slow response during exercise, and insufficient flexibility of joint parts of the body, which will cause muscle strain and serious injury due to the level of the body itself [9].

3.3. Technical Error

The athletes in track and field events in the process of sports, some athletes due to the error of technical movements lead to muscle strain. Taking sprinters as an example, since sprinting is a high-intensity extreme sport, it requires the athlete to complete the entire technical action by coordinating the muscles of the whole body in the process of running. Therefore, if the technical action is not reasonable and coordinated, it is easy to appear muscle strain. We also found and proved this view in the actual process of training: that is, the more reasonable the technical movement, the more in line with the sports biomechanics of athletes, the less likely to be injured; On the contrary, the more unreasonable the technical action, the more inconsistent with the sports biomechanics of the athlete, it is easy to get injured [10].

3.4. Appropriate Training Plan

According to the investigation of 150 second-level track and field athletes, the training plan is blind and unscientific mainly due to insufficient research on the kinematics of the coaches. Not only is there a lack of medical supervision throughout the training process, but the decision of the training plan is often divorced from the actual situation of the athlete. Some coaches have a training plan for the whole group, and a small number of one training plan, so we can see that the training plan is unscientific. The coach did not judge the training plan of about one year according to the training rules and the actual situation of the athletes. Instead of arranging training and competition in a systematic way, they rushed to success. Compress the training schedule and do transcendental training. According to the data, compared with foreign athletes of the same age, especially teenagers, the annual training times and training amounts exceed 1/3 of foreign players. As a result, the foundation of the players is not solid, and it is difficult to adapt to long-term high-intensity training and frequent competitions. Training is not systematic, rush to success, resulting in muscle strain [11].

3.5. Other Reasons

There are a variety of reasons for muscle strain, but in addition to the four main causes of muscle strain, there are a number of other causes. For example, the season and time of day can also cause muscle strains. According to the survey, the number of muscle strains in the first year of freshmen is the highest, and the number of muscle strains in the first semester of the first academic year is more, and the majority of muscle strains in the spring and summer. On the one hand, because the college entrance examination review for a long time without training, after entering the school in order to better results, training intensity led to muscle strain; On the one hand, due to the improvement of muscle capacity in summer training, in the autumn competition, physical strength and emotions are high, and the low temperature affects the elasticity and extensibility of muscles, which is one of the reasons for muscle strain [8].

4. Prevention of Muscle Strain in Track and Field Athletes

Fully develop and prepare preparation activities and special preparation activities. Before sports, we must be fully prepared for activities which can effectively reduce the occurrence of sports injuries. To prevent muscle and joint damage [4]. It is recommended to adjust the warm-up exercise as much as possible according to the sport, content and physical condition of the athlete [9].

The students who have just started training have a poor physical foundation, and because they have not received professional and high-intensity training, it is difficult for their physical condition to meet the requirements of school sports training. Therefore, this type of student in the process of sports training is more prone to sports injuries. Therefore, in the daily sports training, the coach should start

with the students' physical quality and physical skills, and scientifically analyze and formulate the students' training plans and programs [12].

The control of technical problems and rhythm in sports is not only reflected in the macro training plan, but also should run through the elaboration of every technical detail. Strengthen the technical guidance of sports movement technique teaching and practice so that students can fully grasp the key points of various sports techniques, follow the rule from easy to difficult, from simple to complex, and exercise step by step [13].

When the coach makes the training plan, it is necessary to comprehensively consider the factors such as the athlete's personal characteristics, ability level, technical shortcomings and training objectives, and the plan should include various training methods such as technology, strength and recovery, so as to ensure the comprehensiveness and systematics of the training content [13]. Scientific training methods in training time reduce the incidence of muscle strain. After the preparation, make sure to leave about five minutes between the preparation and the formal training. Before the high-intensity training begins, teachers should ensure that students through physical training, so that all parts of the body coordinate with each other, ready for physical training [8].

Develop scientific and reasonable training plans. In sports training, we should make scientific and reasonable training plan, and improve the physical quality and physical function of athletes through reasonable training intensity.

First of all, the coach should make a training plan according to the physical quality of the students and the training content of the day; It is necessary to ensure that the level of athletes can be improved and master the technical essentials, but also to avoid sports strains.

Secondly, coaches should guide the athletes' training process step by step, pay attention to the standardization and science of training, avoid single and collective training, and reduce the athletes' physical load. Short period of high-intensity training is easy to make students physically tired and increase the risk of strain and injury of athletes.

Finally, when the coach explains the new technique or movement to the athlete, according to the law of learning and cognition, he explains and demonstrates the easy first and the difficult later, so as to grasp the essentials of the movement faster and avoid the strain of eager success [12].

There are many reasons for muscle strain, and the prevention aspects are also various, such as training arrangements for athletes' own body temperature and climate. When the students are relatively quiet or the training temperature is low, the preparatory activities should be extended appropriately to ensure that the students' bodies are awakened, and the students' body fever and sweating are the standard [12]. During physical exercise and training, attention should be paid to the humidity, temperature and site conditions of the exercise and training environment to avoid sports injuries caused by external factors such as environmental conditions.

5. Intervention Measure

5.1. Imaging Aids Accurate Determination of Injury Site and Severity

Acute muscle strain is the most common type of muscle injury, if not timely and effective rehabilitation treatment, there will be a high probability of restraint. Therefore, an accurate diagnosis and a reasonable rehabilitation plan are essential. In most cases, an initial diagnosis of acute muscle strain can be made based on history and physical examination, but it is difficult to quantify visually the damage to the muscle and its accessory structures. Magnetic resonance imaging is an imaging method based on the principle of nuclear resonance, which has high temporal and spatial resolution, non-invasive, non-radiation and excellent soft tissue contrast, etc. It can be multi-plane, multi-sequence and multi-contrast imaging, and mainly can evaluate the scope and degree of damage. In recent years, with the progress of medical research, the new MRI technology also has great potential in the evaluation of acute muscle strain, providing the basis for the diagnosis and evaluation of the

disease at the microscopic, pathological and physiological levels. Conventional MRI is currently the most commonly used technique in the diagnosis of acute muscle strain. The target muscle received MR Multiplane acquisition, in which axial images helped to show the cross-sectional area of the injured muscle and the extent of bleeding around the muscle or fascia, while coronal images helped to assess the longitudinal extent of the injury. Combined application of both can determine the location and severity of injury [14].

5.2. Elastic Band Fixation

If the symptoms of muscle strain are relatively mild, the injured part can be fixed with an elastic band after the injury occurs. Usually, the discomfort of the injured person will be significantly reduced after wrapping the injured part with a elastic band, and the normal motor function will not be affected after proper rest. If the symptoms after the strain are more severe, it is also necessary to perform first aid treatment according to the principles of "RJCE". If the strain is very serious and there is suspected muscle fiber breakage, the movement should be stopped immediately, and the injured part should be sent to the hospital for treatment as soon as possible after pressure dressing [15].

5.3. Proprioceptive Neuromuscular Enhancement Therapy (PNF)

PNF is an exercise therapy method based on human development and neurophysiology, which was initially used to treat polio patients and then applied to the treatment of various neuromuscular paralysis patients and is recognized at home and abroad as a kind of exercise therapy for the treatment of neuromuscular system diseases with good effect. After 7 days of muscle strain, perform flexibility exercises. PNF is the most effective method of muscle flexibility training. The stronger the stimulation of muscle tendon organs by using the principle of stretch reflex in isometric contraction mode, the stronger the inhibitory effect of autonomic nerve on stretch reflex. PNF training adopts the centripetal contraction-stretch mode. The coach and instructor give the athletes resistance in the direction of hip extension. The intensity is selected as the adaptive intensity of the athletes, and the angular speed is required to be constant. The full Angle stimulation is given to the hamstring muscle contraction, and the static stretching of the hip is extended to the extended position. The newly formed muscle fibers and capillaries in the muscle get good nutrition supply [15].

5.4. Wrist and ankle acupuncture combined with acupuncture A Shi point

At present, the traditional Chinese medicine treatment for this disease mainly includes wrist and ankle acupuncture and acupoint acupuncture. A clinical study randomized 180 patients with muscle strain. In the treatment group, 100 patients were treated with acupoint acupuncture and then wrist and ankle acupuncture. First look for the most painful point (A Shi point) near the affected side, then after local skin disinfection, select the appropriate needle according to the depth of the injured muscle, and directly prick the pain point center. After obtaining qi, perform small amplitude lifting and twisting for 1 minute. Then select acupoints according to the injury site, take the shoulder side of the affected side of the upper 4, upper 5, upward acupuncture; Take double lower 5 and lower 6 at the waist and needle upward; Take the affected side of the knee 3, 4 lower, upward acupuncture; Each part has its own treatment plan, select acupuncture points according to the wrist and ankle acupuncture point selection method; Disinfect the skin before treatment. Then choose 30 ~ 32 30 ~ 40 MM long stainless-steel needle. The needle body is about 300 angles from the skin surface. Gently turn the needle handle to quickly prick the person under the skin. Then lay the needle body flat. Tip to lesion site. Gently push the needle along the subcutaneous surface. It is better to see the needle protrusion on the body surface. When you push the needle. The doctor's finger should not feel resistance, if the patient has other bad feelings: the needle should be withdrawn to the subcutaneous re-puncture. Needle retention 30 mm. There is usually no need to perform acupuncture during the retention period, and the scraping technique has an enhanced analgesic effect on some patients. In the control group, 80 patients were treated with body acupuncture alone, once a day, 3 days as a course of treatment. The results showed that both groups were effective, and the cure rate (after treatment, pain and local

tenderness disappeared, swelling subsided, function recovered, daily training as usual, normal medium and high intensity training can be performed) in the treatment group was better than that in the control group ($P < 0.05$), and the course of treatment was significantly shortened [16].

6. Conclusion

The number of people with muscle injury in track and field events continues to increase, and there are many reasons for muscle strain. In order to reduce the incidence of muscle strain, protect the safety of athletes and improve the sports level, it is necessary to fully prevent muscle strain and make reasonable arrangements for training plan and time, which can not only improve the competitive level, but also protect the health of athletes. If muscle strain occurs, scientific intervention measures should be adopted in time to avoid strengthening the condition and affecting the athlete's body and training. In emergency treatment and rehabilitation treatment, scientific objective index instrument should be used to track and monitor injury rehabilitation. At present, the current evidence-based evidence and quality of intervention strategies for muscle strain in track and field athletes are still insufficient, and further research is needed to conduct more large-scale, multi-center and prospective studies in the future.

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