

Research on Training Strategies of Ankle Joint Strength in Track and Field Sprint

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Abstract: As a key type of track and field events, the track and field sprint itself has the distinguishing features of instantaneous and high-speed. Under this premise, if athletes want to have excellent results in track and field sprint, they must rely on their ankle joint strength, just because the ankle joint occupies more than 60% of the sprint strength from legs. If athletes can have strong ankle joints, they will have faster speed from rear legs and less frictional resistance. Therefore, in the daily training of the sprint in track and field events, the key is to exercise ankle joints and improve the speed of track and field sprint by enhancing the ankle joint strength.

1. Introduction

Fundamentally speaking, the strength quality of human body composes the indispensable core quality of athletes. If athletes themselves have a relatively strong strength quality, it will be conducive to overcome diverse sports obstacles and finally ensure better sports results. Specially, when it comes to the daily training of track and field sprint, it is particularly necessary to have all-round strength training on the ankle joint of human body. At the same time, whether athletes' ankle joint can reach a higher level of strength will directly determine the overall training effectiveness of track and field sprint.

2. Basic Characteristics of Human's Ankle Joint Strength

Human's ankle joint includes lateral malleolus, medial malleolus, distal tibia and talus. Among the above-mentioned ankle joint components, the medial malleolus as the distal extension should belong to a critical point of strength. Moreover, the distal tibia and the articular surface are closely joined together, thus extending to the inside tibia of human body. The lateral malleolus mainly composes the extending fibula of human body, and human's lateral malleolus includes the human talus inside the ankle mortise. It can be seen that the key parts of human's ankle joint should be the special human parts such as the distal tibia and the talus surface, so a more complex basic structure of the ankle joint is presents as a whole.

If human wants to complete the basic operation of a specific sprint, it only can be realized by relying on the strength of the ankle joint itself. As a key and core force-bearing part in the sprint, the ankle joint strength will directly affect the overall effect and speed of sprint. If the ankle joint can achieve a stronger overall strength, the related human functions can be fully utilized. Under this premise, the ankle joint magnifies the overall sports effect of human function. At present, it seems that the core training of track and field athletes must be participated every day includes the training of ankle joint, just because there is an intrinsic link between ankle joint strength and the athlete's result of sprint.

3. Factors Affecting Track and Field Sprint

3.1 Characteristics of Track and Field Sprint

Among the various existing track and field events, the track and field sprint occupies the key

position. In terms of the basic characteristics of sprint, the track and field sprint mainly relies on the instantaneous forefoot movement of the human body, thus realizing the high-speed movement of the human body itself. On the basis of maintaining the balance of the body, the athlete should be able to complete the limited sprint distance in the shortest time. At present, the track and field sprint can be generally divided into one-hundred-meter sprint, two-hundred-meter sprint and four hundred-meter sprint according to the different sprint distance. At the same time, for women and men sprinters, the differences should be reflected from the time requirements and speed requirements respectively.

Due to the influence of the sports itself, sprinters especially need to pay attention to their running speed and body power. Sprint is largely related to the body instinct, and athletes should try to stimulate this instinct from all aspects. Only by doing a full-scale mobilization of the body power and body instinct can athletes successfully complete the sprint and other sprint sports with higher degree of difficulties, and then obtain excellent sprint results in a shorter period of time.

Moreover, as an extreme high-intensity event, the track and field sprint also tests the speed, tolerance and other motion indicators of human body. For the human body in high speed state, heart organs, skeletal muscles and other various internal organs will be deprived of oxygen. To this end, athletes need to overcome a variety of sprint obstacles, thereby obtaining the necessary source of kinetic energy. In addition, track and field athletes participating in the sprint should also pay special attention to the factors of strength quality, and ensure that they can achieve better sensitivity and coordination. Athletes can successfully complete such extreme sports only by overcoming the inertia error.

3.2 Relevant Factors that can affect the Result of Track and Field Sprint

The first type of element is the function of human heart. Some track and field athletes themselves have a large amount of blood supply to the heart, so such athletes will break out a strong instantaneous power of sports, which is mainly because the function of human heart is directly related to the speed of sprint. On the contrary, if the human body does not have a strong heart function, which is similar to that the engine cannot provide the necessary power to the car for running, so the human body will not be able to endure the sprint training and competition with higher instantaneous strength and even some accidents may occur under this circumstance.

The second type of element is the rhythm sensation of human motion. Rhythm sensation should be indispensable for track and field sprint, and track and field athletes with good rhythm sensation tend to obtain better results of sprint. In order to obtain a good sense of body rhythm, athletes need to pay more attention to the regular strength training of thighs and shanks in the daily training of track and field. Only in this way can athletes have better body balance and enhance their sense of rhythm in track and field sprint. For example, if the pace and step size of the sprint can be controlled flexibly, a better sprint rhythm sensation of athletes can be guaranteed, thus overcoming some training actions of sprint with poor coordination.

The third type of element is the strength of human joints. In addition to the influence of the above factors, track and field sprint may also be significantly affected by the strength of human joints. Under the influence of human joints, the hip joint and the ankle joint occupy a larger proportion of influence. It can be seen that if athletes can focus on training the ankle joint and the hip joint in daily training, they can obtain better joint flexibility and avoid physical injury due to some external obstacles. Among them, the ankle joint itself constitutes the key connection part of human body, so the acuity and strength of the ankle joint will bring a non-negligible influence.

4. Importance Role of Ankle Joint Strength in Track and Field Sprint

If the human body is in a specific state of motion, in order to successfully complete all kinds of related actions, it is necessary to overcome the external resistance of motion by the synergistic force from human body's each part, and this kind of human strength can be called the strength quality. For all kinds of athletics, the strength quality of human body has occupied the core position. The track and field sprint needs to achieve a large body power to obtain the advantage of sprint sport's

instantaneity. Specifically in practice, the ankle joint strength in the whole process of track and field sprint is reflected as the following significant effects:

The first is to enhance the motion power of human body. In essence, track and field sprint needs to reach the maximum strength of human body and exert the strongest human endurance objectively. In addition, track and field sprint also requires the human body to have a faster response speed and a stronger sensitivity. The ankle joint connects the leg and the foot, which should belong to the distal joint of human body. It can be seen that if the ankle joint of human body can break out a strong athletic force, it is conducive to enhance the explosive power on the whole and assist the athlete to successfully complete the sprint.

The second is to quicken the speed of sprint. There is a direct link between the speed of track and field sprint and the force of ankle joint itself, which is reflected as an intrinsic relevance. This is mainly because that the ankle joint directly used to contact the ground can support the entire upper body and determine whether the athlete can achieve a faster speed of print. If athletes have strong and powerful ankle joints, they can maintain the stability of body while highlighting the unique advantages in the sprint.

The third is to maintain the balance of the body. The ankle joint serves as an indispensable body support to help maintaining body balance. During the sprint, athletes will remain in the state of leaning forward. In this state, the ankle joint will have a non-negligible strength to maintain the balance. Because of this, the ankle joint can support the entire body balance, so as to avoid the imbalance of the athlete's each part of body, as well as avoid the accident of falling.

5. Exploring and Analyzing Specific Training Strategies

From the current situation, it can be seen that the training of track and field still shows some defects or loopholes, and the root cause should be the single training mode and training method of track and field. For example, in terms of body strength training, most schools currently are still limited to traditional track and field training methods such as single-foot jumping, straddle jumping, hurdle crossing and step jumping. Moreover, most schools are still limited to rigid training methods for ankle joint training, so they need to update the existing track and field training modes in all directions. Specifically in practice, it should focus on the following training strategies improvements about strengthening the ankle joint strength comprehensively:

5.1 About Step Jumping Training

If the ankle joint of human body can be exercised by jumping regularly, it can significantly enhance the strength of the ankle joint itself. To this end, the track and field training at this stage in schools particularly needs to focus on step jumping training. Specifically, the premise of step jumping training is to choose the step with about 10 cm heights, and carry out daily training of step jumping according to the basic idea of step by step. Moreover, teachers should guide students to complete the jump by using the acting force of their own ankle joint and knee, and ensure that their feet can reach a tight state. Aiming at the whole process of step jumping training specifically, it should ensure that the jump is completed quickly while maintaining that the forefoot is first touched to the ground. In this process, teachers should correct some wrong jump postures and landing postures of students in time.

At the same time, the daily training of step jumping should pay special attention to avoid injuring the joint of human body. This is because that the step jumping training involves difficult landing movements and jumping movements, so if they fail to use the correct posture to complete the above operation, it is easy to sprain the ankle joint or cause other injuries. In order to avoid the above-mentioned injuries, it is necessary to choose some less difficult jumping movements at first, and then gradually transit to more difficult step jumping movements. In addition, teachers and students should also focus on the step jumping training with the exchange of two legs, or try to change the existing step height. It is necessary to maintain a long-term training on step jumping, so that the ankle joint strength can be significantly enhanced.

5.2 About Load-bearing Jumping Training

The load-bearing jumping training of joint should mainly include two kinds of training measures: toe-raise with straight knee and double-feet jumping with straight knee. In addition, it also includes the training of one-legged in-situ jumping in one minute. For the ankle joint, if it wants to gradually strengthen the performance of the joint, it is necessary to rely on the special training operation of the jumping with straight knee. For the load-bearing exercise, it is best to limit to about 80 times of load-bearing operation with straight knee, and the female load bearing is limited to 40 KG while the male load bearing is limited to 60 KG. At the same time, about this type of training, it can also try to combine with 400-meter or 200-meter sprint training to achieve the dual effect of enhancing endurance and exercising ankle joint.

In addition, the load-bearing limit for the load-bearing toe-raise in daily practice also must be limited scientifically, which is best to choose 50 KG load-bearing limit for girls and 80 KG load-bearing limit for boys. Specifically, during the operation, teachers should guide students to place the forefoot in the corresponding part of the barbell piece, and then repeat the above operation about twenty times. If the original load can be properly increased, a better load-bearing training effectiveness can be obtained.

5.3 About Backward Running Training

In the scope of track and field training, the forefoot running training with the heel not touching the ground can be usually called as the backward running. For students who participate in the backward running training, they can feel the comfortable and dexterous elastic force of human body, so as to significantly enhance their physical fitness. Therefore, at present, it seems that more students like the backward running training. Moreover, the backward running should also be included in the scope of warm-up exercise for track and field, and then the effective warm-up operation can be completed by using this method. Specifically, for the training of ankle joint of human body, if the operation and practice related to backward running can be conducted frequently, the good effect of coordinating the body and enhancing the flexibility and acuity of human body can be achieved.

The focus of backward running training should be to gradually increase the force that the leg muscles can achieve, and to assist in completing the related operations of warm-up stretching. For the backward running, it can also appropriately add a variety of other linear motions, curvilinear motions or sideways rotation motions if necessary, and then integrate the jump training in them. On this basis, it is necessary to maintain a large swing of the arm for the backward running training to ensure that the toes are always facing forward. At the same time, the participating trainers should also maintain the state of relaxation and head-up, thus achieving the shaping of graceful postures.

6. Summary

In recent years, track and field sprint training has received more and more attention, and the training contents and training modes related to the sprint have also shown a trend of diversification. Track and field sprint training covers more training points of sprint relatively, the core element of which is to enhance the strength of ankle joints. Through enhancing the daily training, athletes will gradually have stronger ankle joints and increase their ankle joint strength significantly. Therefore, in practice, it is necessary to take the training of ankle joint strength as a key content in track and field sprint, thereby achieving a good training effect of comprehensively enhancing the ankle joint strength.

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References

- [1] Ge Zheng. Research on Strength Training and Recovery Means of Teenage Sprinters, *Sports World (Scholarly)*, 2017(02): 61+60.
- [2] Meng Lingna. Brief Analysis on the Importance and Training Methods of Ankle Joint Strength in Track and Field Sprint, *Sports*, 2016(02): 19-20.
- [3] Yu Shitao. Brief Discussion on the Training Method of Ankle Joint Strength of Sprinters, *Athletics*, 2013(07):50.
- [4] Zhu Chun, Li Miao. Brief Discussion on the Position and Function of Anti-resistance Running in the Special Strength Training of Sprint, *Science & Technology Information (Academic Research)*, 2017(36): 241-242.
- [5] Yang Xiaolan. The Importance of Ankle Joint Strength in Buffering Each Touching the Ground in the Dash and the Training of Ankle Joint Strength, *Journal of Chengdu University (Natural Science)*, 2011(03): 57-59.