

# Effect of 12-week Intensive Training on More Downward Limb Explosive Power of Adolescent Taekwondo Athletes

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**Abstract: Objective:** To explore the influence of enhanced training on the explosive force of more downward limbs of young taekwondo athletes, and to provide a reference for scientific training of young taekwondo athletes. **Methods:** Twenty-four young male taekwondo athletes were randomly divided into two groups: the intensive training group (12 people) and the control group (12 people). The subjects in the intensive training group received 60 minutes of intensive physical training three times a week. In contrast, the issues in the control group did not receive extra physical training except regular training. **Results:** Before and after intervention, it was found that the standing long jump and standing triple jump in the intensive training group were significantly higher than those before intervention ( $P < 0.05$ ), and the standing triple jump in the intensive training group was significantly higher than that in the control group ( $P < 0.05$ ). **Conclusion:** After 12 weeks of intensive training intervention, the more downward limb explosive force quality of athletes have been significantly improved, so 12 weeks of intensive training can be used as a training means for more downward limb explosive force quality of young Taekwondo athletes.

**Keywords:** Enhanced training; Taekwondo athletes; Explosive force

## Preface

Taekwondo is a high-intensity aggressive competition, which is competitive and ornamental. Attack technology to more downward limb explosive force-based, but also requires athletes to have a better ability to move quickly, to ensure that there is enough space to achieve the effectiveness of attack and defense<sup>[1]</sup>. Taekwondo has been the dominant Olympic event in China for a long time, but there is a big gap between Chinese male Taekwondo athletes and the world-class level<sup>[2]</sup>. Therefore, improving the physical quality and physical ability of Taekwondo athletes has become an urgent problem to be solved. Taekwondo is mainly based on more downward limb explosive force and sensitive quality, and enhanced training has a particular influence on more downward limb explosive force. Enhanced training is a kind of training method with fast speed and high intensity. Muscle contraction stores muscle elastic potential energy by stretching first and activating muscle for Stretch-Shortening Cycle (SSC), and increases maximum strength through neuromuscular leading recruitment output<sup>[3]</sup>. At present, there is a lack of empirical research on Taekwondo by using this method at home and abroad. This study explores the influence of 12-week intensive training on the explosive force of the more downward limbs of Taekwondo athletes. It provides reliable evidence for the application of intensive training in Taekwondo athletes' training, and at the same time, provides effective intervention means for Taekwondo athletes to improve their explosive force.

## 1. Research Objects and Methods

### 1.1 Subjects of Study

This study takes Taekwondo athletes aged 14-16 in Yichang Sports School as the research object.

### 1.2 Research Methodology

#### 1.2.1 Exercise Prescription

Exercise content and intensity: The selection of exercise content and intensity refers to the NASM-PES Sports Performance Training Guide of the American National Society of Sports Medicine and previous research experience<sup>[4]</sup>. Participants in the intensive training group were given 60 minutes of intensive physical exercise three times a week (including 10 minutes of preparatory activities and 10 minutes of relaxation activities). The 12-week training of the experimental group was divided into three stages, each lasting 4 weeks, and then advanced to

the next stage. During the intervention period, the subjects in the control group did not carry out intensive training, but another technical training was utterly consistent.

Exercise frequency and exercise cycle: From March to July, 2022, every Monday, Wednesday, and Friday from 4:30 pm to 5:30 pm, each exercise lasts for 60 minutes, including warm-up exercise for 10 minutes and relaxation exercise for 10 minutes, lasting for 12 weeks.

Venue: Taekwondo Physical Training Hall of Yichang Sports School.

### 1.2.2 Test Indicators and Test Instruments

On the day before intervention and the second day after intervention, the explosive force of the more downward limbs of the two groups were tested.

The test contents of more downward limb explosive power mainly include: standing long jump, standing triple jump, and weight-bearing barbell half squat. Standing long jump test method: 1. Stand behind the starting line, bend your knees and prepare, try your best to jump forward, aiming at the distance, and help and maintain balance with the help of swing arms; 2. Measure the distance between the heel of one foot closer to the starting line in the starting line as an effective score; 3. Jump 3 times with a tape measure to get the best score. Standing triple jump test method: 1. The subjects stand behind the jumping line with their feet in situ, and the forefoot can't leave the ground during the pre-swing action; 2. After taking off with both feet in situ, the subject can land with either foot (the first jump), land with the other foot (the second jump) when striding, and finally land with both feet to complete the jumping action (the third jump); 3. Jump 3 times and measure with a tape measure to get the best score. Half squat test method of weight-bearing barbell: 1. The feet are slightly wider than the shoulders, the knees are slightly bent, the abdomen is tightened, the chest is slightly raised, and the entire spine maintains a normal physiological curvature; 2. When squatting, first bend the hips (hips back), then bend the knees, keep the torso tight and slightly forward, look forward, keep the barbell directly above the arch of the foot, knees towards the 2nd and 3rd toes, squat At the lowest point, the knee joint can slightly exceed the toes, and then return to the original path and stand up; 3. Test 3 times to take the maximum weight of the barbell half squat.

## 2. Result

From Table, we can see that the comparison before and after intervention found that the standing long jump and standing triple jump in the intensive training group after intervention were significantly higher than those before intervention ( $P < 0.05$ ), and there was no significant difference in each index in the control group before and after intervention. From Table, it can be seen that the comparison of different time points between groups shows that there is no statistical significance between various indexes before intervention, but after intervention, the standing triple jump in the intensive training group is significantly higher than that in the control group ( $P < 0.05$ ).

## 3. Discussion

Taekwondo's more downward limb explosive force is the maximum energy of more downward limb muscles in the shortest time, and it is the ability to combine strength quality and speed of the more downward limbs under the coordination of different muscles. Taekwondo strength training process emphasizes the maximum strength, explosive force, and rapid strength of comprehensive training, according to the characteristics of muscle strength to improve targeted<sup>[1]</sup>. Enhanced training quickly releases the energy stored in muscles to form explosive force through the working principle of muscle elongation first and then shortening. This process converts the elastic potential energy of muscles into kinetic energy to support the completion of various movements<sup>[5]</sup>. Taekwondo athletes mainly rely on leg attacks to get scores in the competition process. In competitive competitions, athletes usually keep their heels slightly raised when facing opponents, and their knees bend to keep their bodies floating up and down in a small range. When attacking, they rely on the explosive force formed by releasing elastic potential energy to attack their opponents' influential scoring positions. Therefore, Taekwondo athletes' standing long jump, standing triple jump, and weight-bearing barbell half squat results can fully reflect the explosive force of the more downward limbs of Taekwondo athletes.

This study shows that 12 weeks of enhanced physical training can significantly improve the performance of standing long jump and standing triple jump of young Taekwondo athletes ( $P < 0.05$ ), but the version of weight-bearing barbell half squat has not reached a significant level, which is similar to the research results of other scholars. After 9 weeks of intensive training for 40 table tennis students at the Jilin Institute of Physical Education, Liu Jiachen's standing long jump scores increased from 2.623 to 2.689, and their standing triple jump scores risen from 7.655 to 7.849, both of which reached a significant level ( $P < 0.05$ )<sup>[6]</sup>. Deng Yunan used 16 weeks of enhanced strength training. The results showed that the standing triple jump performance of the subjects increased from 8.01 before intervention to 8.07 after intervention, with a significant increase of  $P < 0.05$ . The weight-bearing barbell half squat did not reach a significant level. Still, the weight-bearing barbell half squat reached a considerable level after routine physical training in the control group.

The improvement of standing long jump and standing triple jump is mainly due to the enhancement training to promote the neurons in

the motor center of the brain. The whole training method needs to recruit a large number of neurons to achieve the ideal effect, so that muscles can better receive neurotransmitters, and can produce and store more muscle energy in a short time, and release muscle energy at an appropriate time. Through relevant exercises, the movements are connected smoothly, the buffer process is shortened, and the force exertion speed is faster. At the same time, the more downward limb muscle group of the experimenter concession work ability to improve, produce the corresponding inhibition effect, thus improving the more downward limb ability and exercise power, because the above reasons perfect the standing triple jump movement, thus improving the training effect.

#### 4. Conclusion

After 12 weeks of intensive training intervention, the more downward limb explosive force of athletes have been significantly improved, so 12 weeks of intensive training can be used as a training means for more downward limb explosive force of young Taekwondo athletes.

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