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Review

A Comparative Study of Compression Training and Conventional Resistance Training in the Development of Lower Limb Explosive Power in Adolescent Track and Field Athletes

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Abstract: The article takes 10 young track and field athletes from Xiangtan Sports School as the experimental subjects, carries out the application practice of pressurization training and conventional resistance training in the lower body strength training of young track and field athletes, and compares two different training methods The effect of the method on the lower limb explosive force of adolescent track and field athletes. The results showed that: (1) Both pressurization training and conventional resistance training had a positive effect on the development of lower limb explosive power of adolescent track and field athletes. After 12 weeks of training, the intervention group using pressurization training and the control group using conventional resistance training, The evaluation data of lower limb explosive power have all improved. (2) Pressurization training has a more significant effect on promoting the development of lower limb explosive power of young track and field athletes. The two groups of young track and field athletes with the same base of lower body explosive power, after 12 weeks of training, the evaluation data of the lower limb explosive power of athletes in the intervention group are all excellent. Compared with the control group, there was a significant difference between the two groups ($P < 0.05$). It can be seen that pressurization training has a better effect on promoting the development of lower limb explosive power of adolescent track and field athletes.

Keywords: pressurization training; track and field athletes; adolescent athletes; lower body power

1. Introduction

The full name of pressurized training is pressurized strength training, which refers to the application of special pressurized devices, such as: pneumatic cuffs, elastic bandages, pressurized belts, etc., to the upper or lower limbs of the trainee during strength training. A strength training method that applies external pressure to the proximal limbs [1] . Since when the compression device is used to apply external pressure to the proximal end of the trainee's upper limbs or lower limbs, the trainee's venous blood flow will be occluded and the arterial blood flow will be partially blocked at the same time, so only under a small training load and training intensity, It can significantly stimulate the growth of muscle and the improvement of muscle function [2] . Therefore, KAATSU training is often more effective than conventional strength training without external pressure. The explosive power of the lower limbs is an important factor affecting the performance of track and field athletes. In view of the unique advantages of pressurization training in strength training, this paper attempts to introduce

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pressurization training into the lower body strength of young track and field athletes. Effects of compression training and conventional resistance training on the development of lower limb explosive power in adolescent track and field athletes.

2. Experimental design

2.1. Experimental objects

The subjects of this experiment are track and field athletes from Xiangtan Sports School . The author is responsible for the sports training of track and field athletes in Xiangtan Sports School . There are 10 track and field athletes in the team . These 10 track and field athletes have received professional track and field training for 3-5 years, and their physiological age is between 1 Between the ages of 2 and 16 , all young track and field athletes participated in the experiment, and none of the 10 young track and field athletes who participated in the experiment had any lower limb injuries in the past year, and they were able to carry out strength training activities normally.

2.2. Experiment time

The experiment lasted 12 weeks.

2.3. Experimental indicators

This study mainly investigates the effects of pressurization training and conventional resistance training on the development of lower body explosive power of adolescent track and field athletes. , the evaluation index in the experiment is determined to be the lower limb explosive power index of young track and field athletes, namely: 30 meters running, standing long jump, standing vertical jump and touching the height [3] .

2.4. Experimental process

The operation flow of this experiment is shown in Figure 1 below.

2.5. Training program

During the control experiment, the 5 young track and field athletes in the control group were given routine resistance training, while the 5 young track and field athletes in the intervention group were given pressurization training with compression devices on the basis of routine resistance training. Except for the difference in the compression device, there were no differences in other training arrangements and training conditions between the two groups of young track and field athletes. The training program for the athletes is shown in Table 1.

2.6. Mathematical statistics method

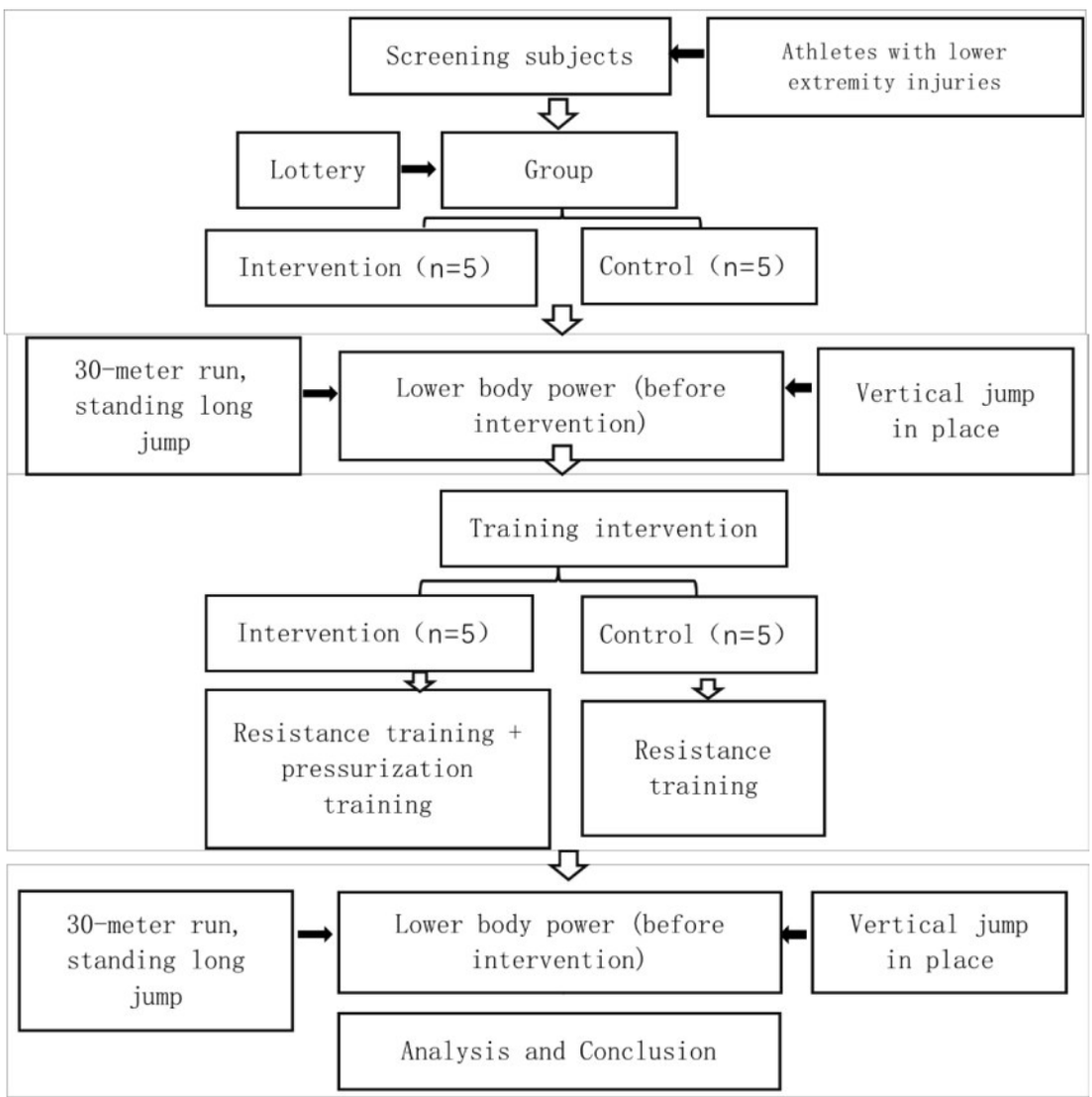
Using the independent T test in SPSS , the evaluation data of the lower limb explosive power of the two groups of young track and field athletes were statistically compared.

3. Experimental results

3.1. Before the experiment, the test data and comparison of the lower limb strength of the two groups of young track and field athletes

Before the experiment, the screening of the lower limb injuries of the two groups of athletes was completed to ensure that the two groups of young track and field athletes did not have lower limb injuries and would not interfere with the experimental results due to physical function problems. The evaluation and comparison were carried out to avoid the large gap in the explosive power of the lower limbs of the two groups of athletes, and the conditions for comparison were not met. The results of the evaluation and comparison are shown in Table 2 . It can be seen from the table : (1) the average score of the 30-meter run of the five young track and field athletes in the intervention group was 5.38 seconds , and the average score of the 30-meter run of the five young track and field athletes in the control group was 5.37 seconds seconds, the mean values were very similar, and the results of the independent T test showed that there was no significant difference between the 30 -meter running

evaluation data of the two groups of young track and field athletes (P= 0.810 > 0.05); (2) 5 young track and field athletes in the intervention group The average standing long jump test score of the five young track and field athletes in the control group was 2.46 meters , which was also almost the same, and there was no significant difference in the results of the independent T test (P= 0.713 > 0 .05); (3) The average test score of five young track and field athletes in the intervention group was 2.62 meters, while the average test score of the five young track and field athletes in the control group was 2 . 63 meters, although the evaluation mean of the intervention group was slightly lower than that of the control group, the difference was small, and there was no significant difference in the independent T test (P =0.752 ≻ 0.05). Based on the analysis of the above three aspects, it can be seen that there is no significant difference between the evaluation data of the lower limb explosive power of the two groups of young track and field athletes before the experiment, indicating that the lower limb explosive power of the two groups of young track and field athletes is basically the same and comparable.



3.2. After the experiment, the evaluation data and comparison of the lower limb strength of the two groups of young track and field athletes

12 weeks of pressurization training for the young track and field athletes in the intervention group , and 12 weeks of routine resistance training in the control group, the explosive power of their lower limbs was evaluated and compared again. The results are shown in Table 3 . As can be seen:

The average scores of the 5 young track and field athletes in the intervention group were improved compared with those before receiving 12 weeks of pressurization training in various lower limb explosive power evaluations . In the control group, the average scores of the five adolescent track and field athletes measured in

various lower body explosive power tests also improved compared with those before receiving 12 weeks of routine resistance training. This shows that both conventional resistance training and compression training using compression devices on the basis of conventional resistance training have a positive impact on the development of lower limb explosive power in adolescent track and field athletes;

Table 1. Lower body strength training program for two groups of young track and field athletes

Training Phase	Training Method	Number of Training Sets	reps/distance/Time Perset	Intermittent Time	Training Load
1- 2 weeks (adaptation phase)	sideways jump	2 teams	30 meters per group	1 5 seconds	①Both groups of young athletes adopted a load intensity of 50 % 1RM . ②The compression value of the intervention group was 150 mm Hg . ③The control group did not pressurize.
	weighted half squat	3 groups	8-12 reps per set	30 seconds _	
	left and right pedal jump	2 teams	30 meters per group	1 5 seconds	
	straight leg deadlift	3 groups	8-12 reps per set	30 seconds _	
	lunge walk	2 teams	30 meters per group	1 5 seconds	
3 - 8 weeks (Strengthening stage)	vertical jump	2 teams	30 meters per group	30 seconds _	
	weighted half squat	4 groups	12 - 15 reps per set	30 seconds _	
	quick steps in place	2 teams	30 seconds per set	30 seconds _	
	straight leg deadlift	4 groups	12 - 15 reps per set	30 seconds _	
	sprint run	2 teams	60 meters per group	40 seconds _	
	double swing skipping rope	2 teams	60 seconds per set	60 seconds _	
9-12 weeks (consolidation phase)	weighted squat jump	4 groups	8-10 reps per set	60 seconds _	
	squat	5 groups	10 - 12 reps per set	60 seconds _	
	single leg deadlift	4 groups	8-10 reps per set	60 seconds _	
	static half squat	5 groups	30 seconds per set	60 seconds _	
	leapfrog	2 teams	1 2 -1 5 reps per set	60 seconds _	
	switchback run	2 teams	30 meters per group	40 seconds _	

Table 2. The lower limb strength evaluation data and comparison results of the two groups of young track and field athletes before the experiment

Evaluation Index	Intervention Group ($n = 5$)	Control Group ($n = 5$)	*P* value
30 meters run/second	5.38 ± 0.19 _	5.37 ± 0.23 _	0.810 _
standing long jump/m	2.44 ± 0.11 _	2.46 ± 0.13 _	0.713 _
In situ vertical jump height/m	2.62 ± 0.07 _	2.63 ± 0.08 _	0.752 _

The average increase in the evaluation of the lower limb explosive power indicators of the 5 young track and field athletes in the intervention group was more significant than that in the control group. Among them , the average value of the 30 - meter running test of the five young track and field athletes in the intervention group

increased by 0.19 seconds , the average value of the standing long jump test was 0.09 meters , and the average value of the in situ vertical jump was 0.07 meters ; while in the control group , the average increase in the evaluation of the above - mentioned lower limb explosive power indexes of the 5 young track and field athletes was significantly smaller than that in the intervention group. The average improvement range was only 0.06 seconds, and the improvement ranges of standing long jump and standing vertical jump were 0.03 meters and 0.02 meters respectively, which were also lower than the intervention group;

Before the 12 -week training experiment, the explosive power of the lower limbs of the two groups of young track and field athletes was basically the same. However, after receiving 12 weeks of training intervention, the evaluation values of various lower limb explosive power indexes of young track and field athletes in the intervention group were higher than those in the control group, and there were significant differences between the two groups ($P< 0.05$). Based on the above analysis, it can be seen that conventional resistance training and pressurization training using pressurization devices on the basis of conventional resistance training are both helpful to improve the explosive power of the lower limbs of young track and field athletes. The effect of explosive force is more significant and ideal.

Table 3. The lower limb strength evaluation data and comparison results of the two groups of young track and field athletes after the experiment

Evaluation Index	Intervention group ($n = 5$)	Control group ($n = 5$)	*P* value
30 meters run/second	5.19 ± 0.13 _	5.31 ± 0.22 _	0.019 _
standing long jump/m	2.53 ± 0.08 _	2.49 ± 0.14 _	0.025 _
In situ vertical jump height/m	2.69 ± 0.07 _	2.65 ± 0.10 _	0.037 _

4. Analysis and discussion

Comprehensive statistics and comparative analysis of the evaluation data of the lower limb explosive power of the two groups of young track and field athletes before and after the experiment shows that both conventional resistance training and pressurization training have a positive impact on the development of the lower limb explosive power of young track and field athletes, and the comparison between the two training methods , Compression training has more advantages in developing the explosive power of the lower limbs of young track and field athletes. According to analysis, this is mainly because:

The reason why conventional resistance training can improve the explosive power of the lower limbs of young track and field athletes is that various training methods and training methods in conventional resistance training, such as: weight-bearing half squat, weight-bearing half squat jump, leapfrog, etc. It can stimulate the muscles of the lower limbs of young track and field athletes and promote the development of muscle strength of the muscles of the lower limbs [4,5] . Therefore, routine resistance training can have a positive impact on the development of lower body explosive power of young track and field athletes, and has the effect of developing athletes' lower body explosive power.

The reason why pressurization training can improve the explosive power of the lower limbs of young track and field athletes, and the effect of improving the explosive power of the lower limbs of athletes is better than that of conventional resistance training is because pressurization training is based on the use of pneumatic cuffs on the basis of conventional resistance training A strength training method in which compression devices such as elastic bandages exert external pressure on the proximal end of the athlete's upper and lower limbs. Therefore, in the pressurization training system, there are not only weight-bearing half-squats, weight-bearing half-squat jumps, leapfrogs and other methods and means that can stimulate the development of muscle strength of the lower limb muscles of young track and field athletes, but also have the effect of improving the explosive power of the athletes' lower limbs. Moreover, the external pressure exerted by the pressurization device on the athlete during training can also significantly reduce the oxygen content in the athlete's blood, allowing more metabolites to accumulate in the athlete's body during training. The more accumulated metabolites, the stronger the metabolic stimulation transmitted to the athlete's nervous system, and the nervous system will mobilize more muscle fibers to participate in sports [6] , thus making the effect of strength development better. Therefore,

pressurization training not only has the same effect of promoting the development of lower body explosive power of young track and field athletes, but this promotion effect is more significant than conventional resistance training.

5. Conclusions and recommendations

According to the comprehensive analysis of the full text, both pressurization training and conventional resistance training have a positive impact on the development of lower limb explosive power of young track and field athletes, and can promote the improvement of the level of lower body explosive power of athletes. The effect of development is more significant, and it is a feasible method to develop the explosive power of the lower limbs of young track and field athletes. However, coaches should pay attention to the explosive training of the lower limbs of young track and field athletes based on pressurization training. Products with cracking performance and wear resistance. At the same time, during the binding process, attention should be paid to wrap the pressure device evenly around the parts of the body that need to be pressurized. Risk of injury.

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Wrote the literature review and checked the article, M.S.; collected data, processed empirical data, presented empirical results, wrote the main part of the paper and proposed research conclusions, H.C. All of the authors read and agreed to the published the final manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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