

EFFECT OF WEIGHT TRAINING ON THE TRAINING OF BADMINTON ATHLETES



ORIGINAL ARTICLE
ARTIGO ORIGINAL
ARTÍCULO ORIGINAL

EFEITO DO TREINAMENTO DE PESO SOBRE O TREINAMENTO DE ATLETAS DE BADMINTON

EFFECTO DEL ENTRENAMIENTO DE PESO EN EL ENTRENAMIENTO DE ATLETAS DE BÁDMINTON

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ABSTRACT

Introduction: The proportion of tactical activities athletes perform through explosive strength is relatively high in the authentic game of badminton. And weight training has the effect of improving the explosive power of players. **Objective:** Study the effects of weight training incorporated with explosive strength training on badminton players. **Methods:** The article adopts a controlled experiment, in which the control group practices standardized explosive strength training in training activities. In contrast, the experimental group has the addition of weightlifting exercises using sandbags in its protocol. The experiment was performed completely according to the dedicated badminton teaching plan for freshmen, lasting eight weeks. **Results:** Before the intervention, the wrist joint speed in the experimental group was 11.76 km/h, and the final speed was 162.30 km/h. After the experiment, the joint velocity increased to 12.35 km/h, and the final velocity to 177.50 km/h. **Conclusion:** The addition of 10% weight training showed statistical benefits to explosive strength training, and its implementation in usual protocols is indicated to improve the indicators of explosive strength in athletes.

Level of evidence II; Therapeutic studies - investigation of treatment outcomes.

Keywords: Resistance Training; Badminton; Physical Education and Training.

RESUMO

Introdução: A proporção de atividades táticas realizadas pelos atletas através da força explosiva é relativamente alta no autêntico jogo de badminton. E o treinamento com pesos tem como efeito a melhoria do poder explosivo dos jogadores. **Objetivo:** Estudar os efeitos do treinamento de peso incorporado ao treinamento da força explosiva nos jogadores de badminton. **Métodos:** O artigo adota um experimento controlado, no qual o grupo de controle pratica um treinamento de força explosiva padronizado nas atividades de treinamento enquanto o grupo experimental tem em seu protocolo a adição do exercício de levantamento de pesos utilizando sacos de areia. O experimento foi realizado completamente de acordo com o plano de ensino de badminton dedicado para calouros, com duração 8 semanas. **Resultados:** Antes da intervenção, a velocidade articular do pulso no grupo experimental era de 11,76 km/h, e a velocidade final de 162,30 km/h. Após o experimento, a velocidade articular elevou-se para 12,35 km/h, e a final para 177,50 km/h. **Conclusão:** A adição de 10% de treinamento com pesos apresentou benefícios estatísticos ao treinamento de força explosiva, sendo indicada a sua implementação nos protocolos usuais para que os indicadores de força explosiva nos atletas possam ser melhorados. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Treinamento de Força; Badminton; Educação Física e Treinamento.

RESUMEN

Introducción: La proporción de actividades tácticas realizadas por los atletas mediante la fuerza explosiva es relativamente alta en el auténtico juego del bádminton. Y el entrenamiento con pesas tiene el efecto de mejorar la potencia explosiva de los jugadores. **Objetivo:** Estudiar los efectos del entrenamiento con pesas incorporado al entrenamiento de fuerza explosiva en jugadores de bádminton. **Métodos:** El artículo adopta un experimento controlado, en el que el grupo de control practica un entrenamiento de fuerza explosiva estandarizado en las actividades de entrenamiento, mientras que el grupo experimental tiene en su protocolo la adición del ejercicio de levantamiento de pesas con sacos de arena. El experimento se llevó a cabo siguiendo íntegramente el plan de enseñanza dedicado al bádminton para estudiantes de primer año, con una duración de 8 semanas. **Resultados:** Antes de la intervención, la velocidad articular de la muñeca en el grupo experimental era de 11,76 km/h, y la velocidad final fue de 162,30 km/h. Tras el experimento, la velocidad conjunta aumentó a 12,35 km/h, y la velocidad final a 177,50 km/h. **Conclusión:** La adición de un 10% de entrenamiento con pesas mostró beneficios estadísticos en el entrenamiento de la fuerza explosiva, y su implementación en los protocolos habituales está indicada para poder mejorar los indicadores de fuerza explosiva en los atletas. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptor: Entrenamiento de Fuerza; Badminton; Educación y Entrenamiento Físico.



INTRODUCTION

Weight bearing training is a common training method. It mainly focuses on anaerobic exercise, and improves its muscle capacity through high-intensity anaerobic exercise.¹ In the actual combat process of badminton, the proportion of technical actions completed by athletes through explosive force is relatively high. The explosive power of athletes is directly related to their muscle level.² The explosive power of badminton players can be effectively improved through high-intensity weight training. Therefore, in-depth study of the specific impact of weight bearing training on athletes' explosive power can provide direct help for athletes' daily training links, and can also provide main reference for coaches to develop training plans.³

METHOD

Research method

Search for information and determine the experimental scheme: after defining the research theme, the author consulted a large number of online materials and offline library research materials, analyzed the physiological and kinematic problems of badminton players' explosive force, and found the solution of weight bearing training.⁴ Through my own practice and pre experiment on some athletes, it is concluded that weight bearing training can improve the explosive power of athletes.⁵ Therefore, the author took this as the goal to further consult the data, and designed an experimental program. Through communication with physical education teachers and athletes, the author modified and adjusted the existing program, and finally obtained the experimental program.⁶

Experimental process

Clarification of experimental objects: In terms of the selection of the experimental group and the control group, 20 research objects were selected from the students of a college physical education institute in the form of registration. The study and all the participants were reviewed and approved by Ethics Committee of Hunan International Economics University (NO.HNITEU19Z017). These students are all freshmen majoring in badminton, and their scores belong to the middle reaches of the class, with little difference between them. The 20 subjects were randomly divided into the experimental group and the control group. The basic information of their height, weight and training years, as shown in Table 1, were all greater than 0.05, indicating that there was no significant difference.

Implementation of the experimental plan: The article adopts the form of control experiment, in which the control group adopts the common explosive force training form, and the whole process does not produce other changes; The experimental group, on the basis of the explosive force training of the control group, increased the weight bearing exercise by binding sandbags. The whole training process was carried out according to the special teaching plan for badminton in the freshman year. Three physical training sessions were held every week. Each training session lasted for one hour. The experiment lasted for 8 weeks. In addition to whether to bear weight, the design of other courses and the exercise load in the experimental group and the control group were completely consistent, preventing the interference of unrelated variables.

Table 1. Personnel of experimental group and control group.

	Experience group	Control group	P value
Age	19.409±0.694	19.608±1.115	0.4499
Height	178.736±1.081	179.822±1.229	0.2388
Weight	65.923±1.692	65.325±1.685	0.2523
Training years	5.796±0.407	6.079±0.815	0.6408

Measurement of observation indicators: The test effect of explosive force training of badminton players is carried out from two aspects. On the one hand, it is to test their explosive force, mainly including push ups, badminton throw far, straight turn back running, left and right touching, low center of gravity quadrangle running and other tests. It is a combination of actions that badminton players often use on the court. The optimization of special items shows that the athletes' badminton sports strength is improved. On the other hand, starting from the killing speed, the wrist joint speed, elbow joint speed, shoulder joint speed and the combined killing speed were selected as the observation objects to discuss the change of speed in the killing process, so as to analyze the most effective and intuitive role of explosive force training in badminton. Before and after the experiment, the two groups of athletes were measured respectively, In order to ensure the accuracy of the experimental results, all the measurements were carried out indoors to prevent interference from the outdoor environment. Sort out and analyze the obtained data results.

RESULTS

The influence of weight bearing training on badminton players' explosive performance

As shown in Table 2, before the start of the experiment, the test of explosive force of the experimental group and the control group was conducted. Among them, the number of push ups in the experimental group was (40.122 ± 3.202) pieces/min, the distance of badminton throwing was (6.312 ± 1.208) m, the time of straight back running was (9.090 ± 0.348) s, the time of left and right side touching was (28.261 ± 1.609) s, and the time of low center of gravity quadrangle running was (17.000 ± 0.902) s. In the control group, the number of push ups was (39.982 ± 3.587)/min, the distance of badminton throwing was (6.425 ± 1.116) m, the time of straight turn back running was (9.204 ± 0.208) s, the time of left and right side touching was (29.414 ± 1.364) s, and the time of low center of gravity quadrangle running was (16.813 ± 1.961) s.

As shown in Table 3, the results of the special test on explosive force of the experimental group and the control group after the experiment. Among them, the number of push ups in the experimental group was (48.552 ± 4.064)/min, the distance of badminton throwing was (7.072 ± 4.028) m, the straight-line turn back running (s) was 8.674 ± 0.378 s, the left and right side touching (s) was 23.114 ± 1.364 s, and the low gravity quadrangle running (s) was 15.895 ± 1.074 s. In the control group, the number of push ups was

Table 2. Special test of explosive force of the experimental group and the control group before the experiment.

Special test items	Experience group	Control group	P value
Push ups (piece/min)	40.122±3.202	39.982±3.587	0.3364
Badminton throw (m)	6.312±1.208	6.425±1.116	0.5743
Straight turn back run (s)	9.090±0.348	9.204±0.208	0.0667
Left and right edge touching (s)	28.261±1.609	29.414±1.364	0.2574
Low center of gravity quadrangle (s)	17.000±0.902	16.813±1.961	0.0992

Table 3. Special test on explosive force of experimental group and control group after the experiment.

Special test items	Experience group	Control group	P value
Push ups (piece/min)	48.552±4.064	44.461±3.921	0.0408
Badminton throw (m)	7.072±4.028	6.680±3.964	0.0326
Straight turn back run (s)	8.674±0.378	9.175±1.180	0.0378
Left and right edge touching (s)	23.114±1.364	29.313±1.436	0.1246
Low center of gravity quadrangle (s)	15.895±1.074	16.743±1.264	0.0462

(44.461 ± 3.921)/min, the distance of badminton throwing was (6.680 ± 3.964) m, the time of straight turn back running was (9.175 ± 1.180) s, the time of left and right side touching was (29.313 ± 1.436) s, and the time of low center of gravity quadrangle running was (16.743 ± 1.264) s. Through the comparison of experimental data and Table 2, it can be seen that: ① After the experiment, the optimization amount of the experimental group in push ups, badminton throw far, straight back running, left and right side touching, low center of gravity quadrangle running and other indicators is significantly higher than the control group. Correspondingly, in badminton competitions, the speed will be faster, more flexible, and more explosive. ② It can be seen from the comparison before and after the experiment in the group that the data of the experimental group has been significantly optimized. Although the control group has been optimized, the effect is not obvious, but the push up time and badminton distance have been improved. This shows that the explosive force training method currently used can not keep up with the actual needs of athletes, and the effect is very small, so it needs to be further improved.

Effect of weight bearing training on badminton players' killing speed

As shown in Table 4, the speed of each joint and kill speed of the experimental group and the control group during forehand kill before the experiment. In the experimental group, the wrist joint speed was (11.765 ± 0.823) km/h, the elbow joint speed was (12.189 ± 0.472) km/h, the shoulder joint speed was (2.568 ± 0.418) km/h, and the kill speed was (162.309 ± 6.639) km/h. In the control group, the wrist joint speed was (11.785 ± 0.780) km/h, the elbow joint speed was (12.321 ± 0.625) km/h, the shoulder joint speed was (2.564 ± 0.525) km/h, and the kill speed was (167.681 ± 5.682) km/h. From the perspective of data comparison, it can also eliminate the human interference caused by the difference between the two results, ensuring the effectiveness of the experimental results.

Table 5 shows the relevant test indicators of the experimental group and the control group when the forehand kill is performed after the experiment. In the experimental group, the wrist joint speed was (12.352 ± 0.535) km/h, the elbow joint speed was (13.365 ± 0.717) km/h, the shoulder joint speed was (2.776 ± 0.448) km/h, and the kill speed was (177.506 ± 8.299) km/h. In the control group, the wrist joint speed was (12.163 ± 0.689) km/h, the elbow joint speed was (12.636 ± 0.789) km/h, the shoulder joint speed was (2.613 ± 0.367) km/h, and the kill speed was (172.991 ± 6.232) km/h.

DISCUSSION

Principle of weight bearing training for badminton players

Weight bearing training is a highly effective training method that has been widely accepted. Weight bearing training is a training method aimed at increasing muscle strength and volume. Skeletal muscles in

Table 4. Badminton special test of the experimental group and the control group before the experiment (related to forehand killing).

Special test items	Experience group	Control group	P value
Wrist joint speed (km/h)	11.765±0.823	11.785±0.780	0.3424
Elbow joint speed (km/h)	12.189±0.472	12.321±0.625	0.7566
Shoulder joint speed (km/h)	2.568±0.418	2.564±0.525	0.7684
Kill speed (km/h)	162.309±6.639	167.681±5.682	0.7305

Table 5. Special badminton test of the experimental group and the control group after the experiment (related to forehand killing).

Special test items	Experience group	Control group	P value
Wrist joint speed (km/h)	12.352±0.535	12.163±0.689	0.4031
Elbow joint speed (km/h)	13.365±0.717	12.636±0.789	0.0265
Shoulder joint speed (km/h)	2.776±0.448	2.613±0.367	0.3663
Kill speed (km/h)	177.506±8.299	172.991±6.232	0.0395

different parts of the body contract to generate strength to counter the resistance caused by the gravity of the load. By increasing the resistance, the muscles can be trained efficiently. For different physiques and different muscle tissues, there are different training methods at this stage. In addition, different weight bearing training methods can be selected according to the type of sports. Weight bearing training is not an independent sport, but the basic training method of athletes in each event in the training link. Weight bearing training can determine the intensity of weight bearing, the range of action, the number of times of exercise, and the number of groups through precise calculation. Various motion attributes can be displayed through data. And weight bearing training can further improve the training intensity by increasing the weight bearing level while improving the athletes' ability. The weight bearing training of the upper limbs can effectively reduce the fatigue and stiffness of the arms and neck. It has a key influence factor on the improvement of athletes' balance ability. Lower limb weight bearing training can effectively improve the speed, explosive force and jumping ability of athletes. The weight bearing training of waist and abdomen can effectively improve the core strength of athletes. It can effectively increase the antagonistic ability of athletes and self-protection ability under the condition of body imbalance. After weight bearing training, different muscle tissues have different ways to improve their sports attributes. In addition, weight bearing training can accelerate the consumption of fat. During weight bearing training, muscles need more energy, so the metabolism of glucose in the body is faster, and fat burning is more efficient. Secondly, weight bearing training can effectively change the body shape of athletes. At the beginning of their career, most athletes are weak and emaciated, and their antagonism is obviously insufficient. Through weight training, you can have a larger muscle area and excellent muscle volume. Through weight training to improve their muscle capacity, enough muscle can play a sufficient role in protecting their bones and effectively prolong the career of athletes. The core of weight bearing training mode for athletes is to select a weight bearing mode suitable for their own projects. The weight bearing training can improve the athletes' sports level through the above aspects. And the training sequence of weight bearing training is also very important. Through the scientific and rigorous calculation of coaches, the training sequence plan in line with their own sports events is formulated for athletes. It can effectively improve the sports ability through weight bearing training.

Weight bearing training methods for badminton players

The most important training method for weight bearing training in badminton is training methods. As coaches and athletes, they should master these main methods and make training plans based on their own physical conditions. Different events have their own weight bearing training means. For the training form of badminton, the following main means are summarized. The first is the weight bearing resistance training. This training method can be used for every muscle tissue in the body, mainly by repeating the same action under the weight bearing state to continuously stimulate the muscle. It is a quick break and reorganization of muscles everywhere, effectively improving muscle strength. Increase the weight bearing strength with the improvement of self capacity. The second is the antagonistic weight bearing exercise, which can constantly produce muscle confrontation when both sides are in a weight-bearing state. This method can make the muscle in a certain regular contraction state. Next is the resistance training of elastic objects. You can increase the training intensity by changing the resistance of the equipment through auxiliary equipment such as spring pullers and rubber belts. Then there is environmental weight bearing training. Athletes can train in different environments during the training process. For example, carry out weight bearing training in water, sand, snow and other geographical environments with high resistance.

CONCLUSION

The results of this study show that there is a certain gap between the existing explosive training forms and the actual needs of athletes. Although it can improve the killing speed, it is not obvious to improve the indicators of some basic sports. Therefore, the article adds 10% weight bearing training, which can give better play to the effect of explosive force training, so that each explosive force index of athletes can be better improved, so it is worth promoting in badminton teaching.

Acknowledgements

This paper was supported by Key project of Scientific Research Project of Education Department of Hunan Province: Dynamic Mechanism of Transformation of Sports Scientific and Technological Achievements in Hunan Province under the Background of the New Era, (Project No. 18A485).

All authors declare no potential conflict of interest related to this article

AUTHORS' CONTRIBUTIONS: The author has completed the writing of the article or the critical review of its knowledge content. This paper can be used as the final draft of the manuscript. Every author has made an important contribution to this manuscript. Yunzhao Liu and Li Liu: writing and execution.

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