

APPLICATION OF OPTIMIZED STRENGTH TRAINING IN UNIVERSITY BASKETBALL



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APLICAÇÃO DO TREINAMENTO DE FORÇA OTIMIZADO NO BASQUETEBOL UNIVERSITÁRIO

APLICACIÓN DE ENTRENAMIENTO DE FUERZA OPTIMIZADO EN EL BALONCESTO UNIVERSITARIO

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ABSTRACT

Introduction: In current university basketball instruction, strength training is relatively extensive, being employed in running, jumping, and other sports. Training specifically targeted at basketball players is believed to have a superior effect on athlete performance. **Objective:** Explore the effect of applying optimized strength training to teaching college basketball. **Methods:** This experiment adopts the single variable method, and the control group uses the traditional strength training method. The experimental group combines training optimized for basketball needs. The duration of each strength training is 60 minutes, three times a week, for a total of 6 weeks. The college students' baseline quality scores and basketball skills were measured before and after the intervention. **Results:** Both traditional and optimized strength training can effectively improve college players' baseline quality and skills. Since optimized strength training is more targeted, the improvement of basketball skills is more evident. **Conclusion:** Optimized basketball strength training can effectively fill the deficiencies of traditional strength training and increase the performance of its athletes, and research is needed for its popularization. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Resistance Training; Physical Education; Basketball.

RESUMO

Introdução: No ensino de basquetebol universitário atual, o treinamento de força é relativamente amplo, sendo o mesmo empregado nos atletas de corrida, salto e outros esportes. Acredita-se que um treino especificamente direcionado aos jogadores de basquete possa proporcionar um efeito superior na performance dos esportistas. **Objetivo:** Explorar o efeito da aplicação do treinamento de força otimizado para o ensino de basquetebol universitário. **Métodos:** Este experimento adota o método de variável única e o grupo controle adota o método tradicional de treinamento de força. O grupo experimental combina um treino otimizado para as necessidades do basquetebol. A duração de cada treinamento de força é de 60 minutos, três vezes por semana, para um total de 6 semanas. Os índices de qualidade basal e habilidades de basquetebol dos estudantes universitários foram mensurados antes e após a intervenção. **Resultados:** Tanto o treinamento de força tradicional quanto o treinamento de força otimizado podem efetivamente melhorar a qualidade basal e as habilidades dos jogadores universitários. Como o treinamento de força otimizado é mais direcionado, a melhoria das habilidades de basquete é mais evidente. **Conclusão:** O treinamento de força otimizado do basquetebol pode efetivamente preencher as deficiências do treinamento de força tradicional e aumentar o desempenho de seus atletas, sendo necessárias pesquisas para a sua popularização. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Treinamento de Força; Educação Física; Basquetebol.

RESUMEN

Introducción: En la enseñanza actual del baloncesto universitario, el entrenamiento de la fuerza es relativamente extenso, siendo el mismo utilizado en atletas de carrera, salto y otros deportes. Se cree que un entrenamiento dirigido específicamente a los jugadores de baloncesto puede proporcionar un efecto superior en el rendimiento de los atletas. **Objetivo:** Explorar el efecto de la aplicación de un entrenamiento de fuerza optimizado para la enseñanza del baloncesto universitario. **Métodos:** Este experimento adopta el método de variable única y el grupo de control adopta el método tradicional de entrenamiento de fuerza. El grupo experimental combina un entrenamiento optimizado para las necesidades del baloncesto. La duración de cada entrenamiento de fuerza es de 60 minutos, tres veces por semana, durante un total de 6 semanas. Se midieron las puntuaciones de calidad y las habilidades de baloncesto de los estudiantes universitarios antes y después de la intervención. **Resultados:** Tanto el entrenamiento de fuerza tradicional como el entrenamiento de fuerza optimizado pueden mejorar eficazmente la calidad basal y las habilidades de los jugadores universitarios. A medida que el entrenamiento de fuerza optimizado es más específico, la mejora de las habilidades de baloncesto es más evidente. **Conclusión:** El entrenamiento de fuerza optimizado para el baloncesto puede suplir eficazmente las deficiencias del entrenamiento de fuerza tradicional y aumentar el rendimiento de sus atletas, y es necesario investigar para su popularización. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptores: Entrenamiento de Fuerza; Educación Física; Baloncesto.



INTRODUCTION

Basketball is a multi-person antagonistic sports activity completed by team cooperation. Because of its strong appreciation and interest, it has been enduring all over the world. It is also an important part of College Physical Education at present.¹ Basketball is a sport that combines strength and beauty, so strength training has always been a focus of basketball teaching research, which has been analyzed by predecessors.² The literature puts forward that the characteristics of basketball require athletes to have good core strength and muscle strength from the birth of basketball, so as to ensure that relevant technical actions are effectively played and improve competition results.³ The literature puts forward that basketball is a high-intensity game. Therefore, in the process of the game, the strong core strength of athletes can maintain the stability of the body, which constitutes the basis of difficult movements.⁴ From the analysis of literature, it can be seen that the strength of athletes, especially the core strength, plays a vital role in the exertion of athletes' excellent sports skills. Therefore, strengthening strength training has many benefits to optimize the effect of college basketball teaching.⁵ By analyzing the strength training in the current college basketball teaching, we can see that the current strength training is relatively extensive, which is not only suitable for basketball, but also for running, jumping and other sports. Although the current basketball strength training can also effectively enhance the effect of college basketball teaching, it is not targeted enough, and many strength training do not play a real effect. Therefore, this paper optimizes the current strength training of college basketball teaching, discusses the advantages of strength training on college basketball teaching, and analyzes its application.

METHOD

In terms of the selection of research objects, the sophomores majoring in basketball in a university are selected. The research objects are required to have good physical quality. The study and all the participants were reviewed and approved by Ethics Committee of China University of Mining and Technology (NO. 2020CUMT-D079). At present, there is no sports injury or discomfort, and they can maintain a good training state in the following six weeks (Table 1).

This experiment adopts the method of single variable. The control group adopts the existing traditional strength training method. The strength training design of the experimental group combines the actual needs of current basketball, including the following points.

For the action of holding the ball up in the process of basketball training and shooting preparation, choose the action of holding 5 ~ 10kg dumbbell up, 10 times in each group, three groups each time; For the action of throwing and shooting in the air, choose the strength training method of throwing solid ball in the air after taking off, throw 2.5kg solid ball, 10 times in each group, three groups each time; In view of the common form of multi-directional jump in basketball, choose 25 ~ 50kg dumbbells to carry out weight-bearing multi-directional jump, eight times in each group, three groups each time. Other movements include supine chest push, ball holding vertical jump, barbell fast push and other methods to effectively exercise the core strength.

Table 1. Comparison of basic information of research objects.

Option	Experimental group (n = 20)	Control group (n = 20)	T	P
Age (years old)	20.241±0.784	20.030±0.741	0.2766	P>0.05
Height (CM)	177.308±4.066	178.386±4.358	-0.6050	P>0.05
Weight (kg)	73.956±6.930	74.163±4.804	0.0943	P>0.05

The duration of each strength training in the experimental group and the control group was 60 minutes, including 10 minutes of warm-up preparation, 40 minutes of strength training and 10 minutes of relaxation and stretching. Three times a week for six weeks. In addition to strength training, the types and duration of other physical training in the experimental group and the control group are exactly the same.

In terms of the acquisition of judgment indicators, the physical test results are selected as the analysis indicators of the basic quality of college students, and the 1 minute and 30 second jump shot, pass and cut shot, full court comprehensive dribble layup, half court mobile pass and catch, ball holding breakthrough layup and so on are selected as the training evaluation indicators of basketball skills. The relevant indexes were measured before and after strength training, and the data were sorted and analyzed.

RESULTS

The influence of strength training on College Students' basic quality

It can be seen from Table 2 that the forward flexion performance of sitting body in the experimental group increased from (15.761 ± 2.471) cm before training to (18.457 ± 1.816) cm after training, $P < 0.01$, indicating a very significant improvement; The results of 3 / 4 field acceleration run in the whole field increased from (3.359 ± 0.192) before training to (3.246 ± 0.051) s after training, $P < 0.01$, indicating a very significant improvement; The high performance of run-up increased from (2.759 ± 0.101) m before training to (2.917 ± 0.060) m after training. $P < 0.01$ shows that it has been significantly improved. The pull-up performance increased from (3.192 ± 2.185) before training to (3.615 ± 2.269) after training ($P < 0.05$). The results of standing long jump changed from (2.700 ± 0.079) m before training to (2.743 ± 0.081) m after training, $P > 0.05$, indicating that although there is a certain improvement, there is no significant difference; The results of 15m * 17 turn back runs changed from (58.385 ± 1.893) s before training to (55.763 ± 1.077) s after training, $P > 0.05$, indicating that although there is a certain improvement, there is no significant difference.

By comparing the results in Table 2 and 3, it can be seen that both the traditional strength training and the optimized strength training can effectively enhance the basic sports performance of college students, and the growth rate of the optimized strength training is slightly higher than that of the traditional strength training. College Students' basic sports are the premise of basketball technical sports. Therefore, enhancing the performance of basic sports can effectively improve the basic skills of basketball and improve the level of basketball technology.

Influence of strength training on College Students' basketball skills

It can be seen from Table 4 that the performance of jump shooting in 1 minute and 30 seconds of the experimental group increased from (4.817 ± 2.216) before training to (7.102 ± 1.420) after training, $P < 0.01$, indicating that it has been significantly improved; The overall dribble layup performance of the whole court changed from (38.216 ± 1.711) s before training to (36.880 ± 1.593) s after training, $P < 0.01$, indicating that it has been significantly improved; The performance of half court mobile passing and receiving changed from (22.495 ± 2.431) times before training to (25.371 ± 2.770) times after training, $P < 0.01$, indicating that it has been significantly improved. The results of passing and cutting shots increased from (2.580 ± 0.524) before training to (3.255 ± 0.417) after training ($P < 0.05$); The layup results of breaking through various actions with the ball changed from (15.258 ± 0.862) min before training to (15.674 ± 0.816) min after training,

$P > 0.05$, indicating that although there is a certain improvement, there is no significant difference.

By comparing the results in Table 4 and 5, it can be seen that both traditional strength training and optimized strength training can effectively improve college students' basketball skills. Because the optimized strength training is more targeted, its improvement range is more obvious.

DISCUSSION

Through experimental analysis and previous literature research, we can see that basketball is a sport combined with fierce confrontation. Therefore, in the process of sports, if we can maintain the balance and stability of the body, we can provide effective guarantee for the implementation of athletes' technical actions. The important premise of body balance and stability is to have good strength quality. The strength training of basketball players can not only enhance the physical stability and balance, so as to obtain a better action basis, but also enhance the strength of shooting and jumping, so as to make the players jump higher and shoot more effectively, increase the difficulty of defense as much as possible and improve the hit rate of shooting.

Through the analysis of this experiment, it can be seen that the optimized basketball strength training simulates the human body structure in relevant actions by extracting the common action needs in the process of basketball competition, such as the strength in shooting, the stability in jumping and the balance in confrontation, so as to enhance the strength of muscle groups involved in relevant actions, so that when athletes perform relevant actions. Can produce greater power. In addition, the training of core strength is also very important to basketball. This paper not only carries out strength training for some shooting movements, but also enhances the training of core strength, so as to enhance the strength foundation, optimize the training structure of basketball from the two aspects of stability and technical movement,

make the training more combined with the game, and make the college basketball teaching more targeted. It improves the competitive ability of relevant basketball majors.

CONCLUSION

Through the research results of this paper, it can be seen that the current traditional strength training can also optimize and improve college students' basketball skills, but because it is not targeted, or it is not obviously designed for the actual needs of basketball, there are still some deficiencies. The optimized basketball strength training can effectively fill the shortcomings in this aspect and enhance its pertinence, so as to improve the teaching effect of college basketball teaching. Therefore, it is worth popularizing.

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Table 5. Analysis of the influence of different strength training on College Students' basketball skills.

Option	Experience group	Control group	T	P
1 minute and 30 seconds to shoot (one)	7.102±1.420	5.357±0.812	3.7090	$P < 0.01$
Pass to shoot (one)	3.255±0.417	2.848±0.625	0.4301	$P < 0.05$
The whole game is layup on the game (s)	36.880±1.593	37.518±1.286	-2.5860	$P < 0.05$
Half-time mobile pass (times)	25.371±2.770	24.272±2.444	1.9936	$P < 0.05$
Hold the ball and break through a variety of actions to lay layup (min)	15.674±0.816	15.623±0.766	0.4203	$P > 0.05$

Table 2. Effect of strength training on physical test scores of College Students.

Option	Experience group			Control group		
	Before training	After training	P	Before training	After training	P
Siter forward flexion (CM)	15.761±2.471	18.457±1.816	$P < 0.01$	16.370±1.175	17.625±1.151	$P > 0.05$
Standing long jump (m)	2.700±0.079	2.743±0.081	$P > 0.05$	2.720±0.079	2.774±0.071	$P > 0.05$
15 meters*17 times to run back (s)	58.385±1.893	55.763±1.077	$P > 0.05$	58.516±2.481	57.289±1.566	$P > 0.05$
3/4 acceleration running in the audience (s)	3.359±0.192	3.246±0.051	$P < 0.01$	3.258±0.030	3.246±0.081	$P > 0.05$
Timing upward (one)	3.192±2.185	3.615±2.269	$P < 0.05$	3.252±1.925	3.534±1.967	$P < 0.05$
Run a high	2.759±0.101	2.917±0.060	$P < 0.01$	2.769±0.071	2.877±0.030	$P < 0.01$

Table 3. Analysis of the influence of different strength training on College Students' physical test results.

Option	Experience group	Control group	T	P
Siter forward flexion (CM)	18.457±1.816	17.625±1.151	1.3201	$P > 0.05$
Standing long jump (m)	2.743±0.081	2.774±0.071	-0.0727	$P > 0.05$
15 meters*17 times to run back (s)	55.763±1.077	57.289±1.566	-5.4317	$P < 0.01$
3/4 acceleration running in the audience (s)	3.246±0.051	3.246±0.081	-0.0618	$P > 0.05$
Timing upward (one)	3.615±2.269	3.534±1.967	-0.1715	$P > 0.05$
Run a high	2.917±0.060	2.877±0.030	0.2744	$P < 0.01$

Table 4. Influence of strength training on College Students' basketball skills.

Option	Experience group			Control group		
	Before training	After training	P	Before training	After training	P
1 minute and 30 seconds to shoot (one)	4.817±2.216	7.102±1.420	$P < 0.01$	4.069±1.702	5.357±0.812	$P < 0.05$
Pass to shoot (one)	2.580±0.524	3.255±0.417	$P < 0.05$	2.481±0.534	2.848±0.625	$P > 0.05$
The whole game is layup on the game (s)	38.216±1.711	36.880±1.593	$P < 0.01$	38.206±1.227	37.518±1.286	$P > 0.05$
Half-time mobile pass (times)	22.495±2.431	25.371±2.770	$P < 0.01$	22.743±3.113	24.272±2.444	$P < 0.05$
Hold the ball and break through a variety of actions to lay layup (min)	15.258±0.862	15.674±0.816	$P > 0.05$	15.318±0.822	15.623±0.766	$P > 0.05$

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