

STRENGTH TRAINING AND PHYSICAL IMPROVEMENT IN BASKETBALL



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TREINAMENTO DE FORÇA E APERFEIÇOAMENTO FÍSICO NO BASQUETE

ENTRENAMIENTO DE FUERZA Y MEJORA FÍSICA EN EL BALONCESTO

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ABSTRACT

Introduction: Young basketball players are the future of this sport and strength training in these young people can promote the advancement of the sport at its competitive level. **Objective:** Study the effect of strength training and its impacts on the physical capacity of young basketball players. **Methods:** 30 students were selected as research volunteers. They were divided into experimental and control groups by random sampling and conducted under a control experiment. The experiment totaled 6 weeks, 3 times a week, with strength training added to the experimental group after standard training in both groups. Intra and extra-group data were obtained, including variables on limb strength and fitness improvement. **Results:** The two methods can optimize the related indexes, with the optimization effect of the experimental group being greater than the control. **Conclusion:** Strength training can positively influence the physical endurance and explosive power of young people, positively impacting speed, sensitivity, and other physical qualities. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Basketball; Strength Training; Physical Conditioning, Human.

RESUMO

Introdução: Os jovens jogadores de basquetebol são o futuro dessa modalidade esportiva e o treinamento de força nesses jovens pode promover o avanço do esporte em seu nível competitivo. **Objetivo:** Estudar o efeito do treinamento de força e seus impactos na capacidade física dos jovens jogadores de basquetebol. **Métodos:** 30 estudantes foram selecionados como voluntários de pesquisa. Divididos em grupo experimental e controle por amostragem aleatória, foram conduzidos sob um experimento de controle. O experimento totalizou 6 semanas, 3 vezes por semana, com adição de treinamento de força ao grupo experimental, após o treinamento padrão em ambos os grupos. Foram obtidos dados intra e extra grupo, incluindo variáveis sobre a melhoria da força dos membros e da aptidão física. **Resultados:** Os dois métodos podem otimizar os índices relacionados, sendo o efeito de otimização do grupo experimental superior ao controle. **Conclusão:** O fortalecimento do treinamento da força física pode influenciar positivamente na resistência física e o poder explosivo dos jovens, impactando positivamente na velocidade, sensibilidade e demais qualidades físicas. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Basquetebol Treinamento de Força; Condicionamento Físico Humano.

RESUMEN

Introducción: Los jóvenes jugadores de baloncesto son el futuro de este deporte y el entrenamiento de la fuerza en estos jóvenes puede promover el avance del deporte en su nivel competitivo. **Objetivo:** Estudiar el efecto del entrenamiento de fuerza y sus repercusiones en la capacidad física de los jóvenes jugadores de baloncesto. **Métodos:** Se seleccionaron 30 estudiantes como voluntarios para la investigación. Divididos en grupo experimental y grupo de control por muestreo aleatorio, se llevaron a cabo bajo un experimento de control. El experimento duró 6 semanas, 3 veces por semana, con adición de entrenamiento de fuerza al grupo experimental, después del entrenamiento estándar en ambos grupos. Se obtuvieron datos intra y extra grupo, incluyendo variables sobre la fuerza de las extremidades y la mejora de la condición física. **Resultados:** Los dos métodos pueden optimizar los índices relacionados, siendo el efecto de optimización del grupo experimental superior al del control. **Conclusión:** El entrenamiento de fuerza puede influir positivamente en la resistencia física y la potencia explosiva de los jóvenes, repercutiendo positivamente en la velocidad, la sensibilidad y otras cualidades físicas. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptor: Baloncesto; Entrenamiento de Fuerza; Acondicionamiento Físico Humano.



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INTRODUCTION

In the development of modern basketball sports, the major sports events play a very positive role. It has attracted many youth groups to join the group of basketball fans.¹ Among these fans, there are some youth

groups who have planned the growth path of professional basketball players for themselves.² Before becoming a professional basketball player, young basketball players should go through a professional training system. Youth basketball should complete the corresponding training

plan. Through daily training, we can improve our competitive ability in an all-round way.³ The training of young basketball players provides a direct talent reserve for the national competitive sports. Therefore, we should attach great importance to the daily training of young basketball players and the improvement of their abilities. In the aspect of physical quality, we should reduce the gap with powerful countries and achieve competitiveness at the level of competitive ability.⁴ Therefore, this paper chooses a senior high school sports specialty student as the research object to carry out the body strength training, so as to explore the effect of the body strength training of young basketball players on their physical fitness and body strength.⁵

METHOD

In the selection of research objects, this paper selects a senior high school basketball special sports students as the research objects. These students are about 16 years old on average, in the youth stage, and have a certain basketball foundation, and can complete the relevant experiments well. In addition, these teenagers belong to boarding high schools, so their accommodation can be arranged according to the actual situation during the experiment to reduce the interference of unnecessary factors. Based on the understanding and consent of the guardian and the students themselves on the experimental contents, 30 students were selected as the research subjects on the principle of voluntariness. The study and all the participants were reviewed and approved by Ethics Committee of Zhengzhou University of Aeronautics (NO.2019ZZUA07). Their scores were not significantly different. They were divided into the experimental group and the control group by random sampling. The basic information of the subjects in the two groups is shown in Table 1. Among them, $P > 0.05$ indicates that there is no significant difference.

The experiment was conducted in the form of a control experiment. The whole experiment lasted for 6 weeks. The physical strength training was conducted once a week on Monday, Wednesday and Friday. In the rest of the time, the students carried out daily learning and life according to the learning activities and life schedule arranged by the school. The experimental group carried out training on limb strength three times a week to improve the limb muscles, especially the lower limb strength. At the same time, the control group carried out physical training based on running. Except that the two groups of athletes were different in the experimental training three times a week, the rest of the time and the training intensity remained basically the same. Before and after the experiment, the data of the experimental group and the control group were obtained, mainly including the improvement of limb strength and physical fitness.

RESULTS

Effect of body strength training on the improvement of body strength of young basketball players

For basketball, the improvement of physical strength means stronger explosive power, and can obtain higher advantages in both confrontation and shooting. Therefore, strengthening physical strength is an important aspect for young basketball players to improve their basketball performance. Through this study, the limb strength improvement effects of the experimental group and the control group before and after the experiment are shown in Table 2 and Table 3.

Table 1. Summary of basic information of subjects.

Basic situation	Experience group	Control group	P
Age (years old)	16.374±0.921	16.105±0.511	0.3196
Height (cm)	183.770±5.462	184.402±4.594	0.4597
Weight (kg)	72.698±4.019	73.156±3.463	0.2987
Training years (years)	3.526±0.739	3.397±0.619	0.6002

Table 2. Effect of limb strength improvement in the experimental group before and after the experiment.

Options	Before experiment	After the experiment	P
40% 1RM squat failure (pcs)	34.803±6.788	38.485±4.987	0.0118
Standing triple jump (m)	8.369±0.395	8.730±0.377	0.0000
Vertical jump with legs in place (cm)	37.102±7.575	39.497±6.147	0.0197
In situ single-leg vertical jump (cm)	17.472±2.571	19.266±2.461	0.0070

Table 3. Effect of improving limb strength before and after the experiment in the control group.

Options	Before experiment	After the experiment	P
40% 1RM squat failure (pcs)	32.829±8.193	35.922±9.170	0.0513
Standing triple jump (m)	8.358±0.375	8.659±0.397	0.0000
Vertical jump with legs in place (cm)	39.539±8.538	40.654±7.884	0.0296
In situ single-leg vertical jump (cm)	17.740±2.760	18.594±3.028	0.0070

As shown in Table 2, the improvement effect of limb strength before and after the experiment in the experimental group. The number of 40% 1RM squat exhaustion was 34.803 ± 6.788 (before the experiment) and increased to 38.485 ± 4.987 (after the experiment), $P = 0.0118 < 0.05$, indicating that there was a significant difference. The distance of standing triple jump was 8.369 ± 0.395 (m) before the experiment and increased to 8.730 ± 0.377 (m) after the experiment, $P = 0.0000 < 0.01$, indicating that there was a significant difference. The vertical jump distance of both legs in situ was 37.102 ± 7.575 (CM) before the experiment, and increased to 39.497 ± 6.147 (CM) after the experiment, $P = 0.0197 < 0.05$, indicating that there was a significant difference. The vertical jump distance of one leg in situ was 17.472 ± 2.571 (CM) before the experiment, and increased to 19.266 ± 2.461 (CM) after the experiment, $P = 0.0070 < 0.01$, indicating that there was a significant difference. It can be seen from this that carrying out limb strength training can effectively improve the lower limb strength and jumping ability of athletes, so that they have more initiative in the basketball field.

As shown in Table 3, the improvement effect of limb strength before and after the experiment in the control group is shown. The number of 40% 1RM squatting exhaustion is 32.829 ± 8.193 (before the experiment) and 35.922 ± 9.170 (after the experiment), $P = 0.0513 > 0.05$, indicating that there is no significant difference. The distance of standing triple jump was 8.358 ± 0.375 (m) before the experiment and increased to 8.659 ± 0.397 (m) after the experiment, $P = 0.0000 < 0.01$, indicating that there was a significant difference. The vertical vertical jump distance of both legs in situ was 39.539 ± 8.538 (CM) before the experiment, and increased to 40.654 ± 7.884 (CM) after the experiment, $P = 0.0296 < 0.05$, indicating that there was a significant difference. The vertical jump distance of one leg in situ was 17.740 ± 2.760 (CM) before the experiment, and increased to 18.594 ± 3.028 (CM) after the experiment, $P = 0.0070 < 0.01$, indicating that there was a significant difference. From the experimental results in Table 3, it can be found that the traditional physical strength training based on running and track and field can also improve the relevant indicators to a certain extent, which shows that the training method that has been practiced is effective, but the effect is not significant enough.

The effect of physical strength training on improving the physical ability of young basketball players

Table 4 and Table 5 of this paper analyze the effect of physical fitness improvement of the two groups of athletes.

Table 4. Effect of physical improvement before and after the experiment in the experimental group.

Test content	Before experiment	After the experiment	P value
Standard push-ups (pcs)	18.881±3.107	22.229±3.789	0.0424
Flexion Plank(s)	61.253±11.129	68.698±14.067	0.0070
In situ vertical jump and touch height (cm)	271.815±8.397	277.899±8.651	0.0000
One foot touch height (cm)	314.020±9.343	329.957±9.648	0.0172
17 return run(s) on the basketball court	70.372±0.625	62.579±0.476	0.0000

Table 5. Physical improvement effect of the control group before and after the experiment.

Test content	Before experiment	After the experiment	P value
Standard push-ups (pcs)	18.486±3.445	20.052±4.144	0.0000
Flexion Plank(s)	55.892±12.677	61.167±14.573	0.0070
In situ vertical jump and touch height (cm)	270.723±7.785	274.151±8.101	0.0000
One foot touch height (cm)	314.415±8.061	320.952±8.366	0.0456
17 return run(s) on the basketball court	70.553±0.318	67.315±0.425	0.0000

As shown in Table 4, the physical improvement effect of the experimental group before and after the experiment is shown. The number of standard push ups per minute is 18.881 ± 3.107 (before the experiment) and 22.229 ± 3.789 (after the experiment), $P = 0.0424 < 0.05$, indicating that there is a significant difference; The duration of flexor plate support was 61.253 ± 11.129 (s) before the experiment and increased to 68.698 ± 14.067 (s) after the experiment, $P = 0.0070 < 0.01$, indicating that there was a significant difference; The height of vertical jump in situ was 271.815 ± 8.397 (CM) before the experiment, and increased to 277.899 ± 8.651 (CM) after the experiment, $P = 0.0000 < 0.01$, indicating that there was a significant difference; Before the experiment, the touch height of the run-up single foot was 314.020 ± 9.343 (CM), and after the experiment, it increased to 329.957 ± 9.648 (CM), $P = 0.0172 < 0.05$, indicating that there was a significant difference; The length of 17 turn back runs in the basketball court was 70.372 ± 0.625 (s) before the experiment, and increased to 62.579 ± 0.476 (s) after the experiment, $P = 0.0000 < 0.01$, indicating that there was a significant difference. It can be seen from the table that after the experiment, the athletes' standard push ups, bent arm flat support, in-situ vertical jump touch height, run-up single foot touch height, and 17 turn back runs on the basketball court have been better optimized, which proves that limb strength training is helpful to the improvement of athletes' physical fitness.

As shown in Table 5, the physical improvement effect of the control group before and after the experiment is shown. The number of standard push ups per minute is 18.486 ± 3.445 (before the experiment) and 20.052 ± 4.144 (after the experiment), $P = 0.0000 < 0.01$, indicating that there is a significant difference; The duration of flexor plate support was 55.892 ± 12.677 (s) before the experiment, and increased to 61.167 ± 14.573 (s) after the experiment, $P = 0.0070 < 0.01$, indicating that there was a significant difference; The height of vertical jump in situ was 270.723 ± 7.785 (CM) before the experiment, and increased to 274.151 ± 8.101 (CM) after the experiment, $P = 0.0000 < 0.01$, indicating that there was a significant difference; Before the experiment, the touch height of the run-up single foot was 314.415 ± 8.061 (CM), and after the experiment, it increased to 320.952 ± 8.366 (CM), $P = 0.0456 < 0.05$, indicating that there was a significant difference; The length of 17 turn back runs in the basketball court

was 70.553 ± 0.318 (s) before the experiment, and increased to 67.315 ± 0.425 (s) after the experiment, $P = 0.0000 < 0.01$, indicating that there was a significant difference. It can also be seen that the physical improvement effect before and after the control group is also very significant, which proves that the traditional physical training method has a certain role in promoting the physical improvement of basketball.

DISCUSSION

Because of their small age, young basketball players have strong shaping ability, high talent limit and strong knowledge absorption ability. It can absorb advanced knowledge well. Adolescence is also the most obvious period in training. Therefore, professional strength training in adolescence can rapidly improve the physical strength of adolescents. In the competition results to the full feedback. Basketball players mainly look at the control ability of physical strength to basketball. Therefore, the training of body strength is the core content of the training system. Because of the particularity of basketball, the classification of special training of limbs is more detailed. The first is the strength training of the fingers. Push-ups and other training methods to exercise the strength of the fingers can be carried out through the way of holding the fingers on the ground. To improve the finger strength, the players' technical abilities such as shooting, passing and dribbling are significantly improved. Secondly, it is the wrist strength training. You can hold the dumbbell and do the wrist turning movement in the weight increasing mode. As far as possible, take groups as a unit. Take a full rest before each group, and then continue training. The improvement of wrist strength is of great help to the shooting ability and shooting control of athletes. Next is arm strength training. Arm strength training can be conducted by holding dumbbells. Daily pull-up training can greatly improve arm strength. Since arm strength is the core strength of human upper limbs, the training intensity is the strongest link. The improvement of arm strength can increase the resistance ability of the athlete when contacting with the other athlete and the control ability of the whole upper limb. While doing upper limb strength training, lower limb strength training is equally important. Lower limb strength training, first of all, is the training of waist and abdomen core strength. Since there are often running, jumping and stagnating movements in basketball, these technical movement abilities are directly determined by waist and abdomen strength. Therefore, waist and abdomen strength is suitable for training under high-intensity conditions. The training methods vary from person to person. The last is the training of leg strength. The training of leg strength can be carried out by sprinting, long-distance running, variable speed running, and uniform running. It is very important for basketball players to improve their leg muscles.

CONCLUSION

Young basketball players are the successors of China's basketball cause and the key force to promote the continuous development of China's basketball. Therefore, it is very important to improve the physical quality of young basketball players. Through the research of this paper, we can find that strengthening physical strength training can effectively exercise the physical endurance and explosive power of the youth, and improve their speed quality, sensitivity quality and other physical quality, which can effectively improve the advantage of the athletes in the field, and thus improve their competitive strength.

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

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