

# HIGH-INTENSITY PHYSICAL ABILITY TRAINING OF TEENAGER BASKETBALL PLAYERS



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TREINO DE ALTA INTENSIDADE DO PREPARO FÍSICO DE JOGADORES DE BASQUETE ADOLESCENTES

ENTRENAMIENTO DE ALTA INTENSIDAD DE LA PREPARACIÓN FÍSICA DE JUGADORES DE BALONCESTO ADOLESCENTES

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## ABSTRACT

**Introduction:** The antagonism of basketball is very prominent during the game. Athletes with good physical fitness will have great advantages in basketball games. **Objective:** To study the influence of physical exercise on the physical fitness of young athletes. **Methods:** This article uses mathematical statistics to investigate and analyze the physical training status of young basketball players. **Results:** After studying various training methods, we found that impedance training can improve the physical fitness of young athletes. Basketball physical training includes strength, speed, endurance, sensitivity, etc. **Conclusion:** Young basketball players need to adopt a variety of training methods. Group sports can effectively improve the physical fitness of young basketball players and increase the winning probability of the team in the game. **Level of evidence II; Therapeutic studies - investigation of treatment results.**

**Keywords:** Adolescent; Basketball; Physical fitness testing; Athletes.

## RESUMO

**Introdução:** O antagonismo é muito presente em partidas de basquete. Atletas em boas condições físicas terão grande vantagem nessas partidas. **Objetivos:** Estudar a influência da atividade física no preparo físico de jovens atletas. **Métodos:** Esse artigo utiliza estatísticas matemáticas para investigar e analisar o estado do treinamento físico de jovens jogadores de basquete. **Resultados:** Após o estudo de vários métodos de treinamento, descobrimos que o treino de impedância pode aprimorar o preparo físico de jovens atletas. O treino físico do basquete inclui força, velocidade, resistência, sensibilidade, etc. **Conclusão:** Jogadores de basquete jovens precisam adotar diversos métodos de treinamento. Esportes de grupo podem, efetivamente, aprimorar o preparo físico de jovens jogadores de basquete, aumentando as chances de vitória de seus times nas partidas. **Nível de evidência II; Estudos terapêuticos – investigação do resultado de tratamentos.**

**Descritores:** Adolescente; Basquetebol; Teste de Esforço; Atletas.

## RESUMEN

**Introducción:** El antagonismo está muy presente en partidos de baloncesto. Atletas en buenas condiciones físicas tendrán una gran ventaja en estos partidos. **Objetivos:** Estudiar la influencia de la actividad física en la preparación física de jóvenes atletas. **Métodos:** Este artículo utiliza estadísticas matemáticas para investigar y analizar el estado del entrenamiento físico de jóvenes jugadores de baloncesto. **Resultados:** Después del estudio de varios métodos de entrenamiento, descubrimos que el entrenamiento de impedancia puede mejorar la preparación física de jóvenes atletas. El entrenamiento físico del baloncesto incluye fuerza, velocidad, resistencia, sensibilidad, etc. **Conclusión:** Jugadores de baloncesto jóvenes necesitan adoptar diversos métodos de entrenamiento. Deportes de grupo pueden, efectivamente, mejorar la preparación física de jóvenes jugadores de baloncesto, aumentando las oportunidades de victoria de sus equipos en los partidos. **Nivel de evidencia II; Estudios terapéuticos – investigación del resultado de tratamientos.**

**Descriptorios:** Adolescente; Baloncesto, Prueba de Esfuerzo; Atletas.



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## INTRODUCTION

Adolescents are at a rapid physical and mental development stage, which is also an important stage for improving technology and physical function. Strengthening the training during this period will achieve twice the result with half the effort.<sup>1</sup> With the increasing popularity of basketball events, coaches' understanding and penetration of physical fitness can effectively improve the current physical fitness specific situation.

The level of an athlete's physical fitness directly affects the performance of technical skills. In the actual training process, the physical fitness level of basketball players should be fully reflected. In basketball, specific physical fitness mainly includes flexibility, agility, speed, strength, endurance, etc. From the characteristics of today's youth basketball games, it can be seen that physical fitness is the material basis and fundamental guarantee for completing technical and tactical coordination and fully exerting the training level.<sup>2</sup> This article draws the results by

investigating strength, speed, flexibility, agility, and endurance quality and puts forward targeted suggestions. This provides a certain reference basis for formulating and implementing the future youth men's basketball physical training plan.

## METHOD

### Research object

The article takes coaches and athletes of sports schools' men's basketball teams as the research objects. 4 men's basketball teams will be drawn, including 12 coaches and 80 athletes.

### Modeling the optimal angle of basketball rotation projection

The article adopts the local dynamic optimization method to design the distributed reconstruction of the virtual flight space of rotating basketball projection.<sup>3</sup> According to the research, the stable characteristic solution of the controlled object of rotating basketball projection is:

$$\dot{x}(t) = Ax(t) + BKx(t - d_s(t) - d_a(t)) \quad (1)$$

We use the basketball rotation projection flight trajectory tracking control method to estimate the parameters and calculate the projection angle to obtain the ideal flight angle of the basketball rotation projection.<sup>4</sup> The construction kinematics model is described as:

$$\begin{aligned} \dot{x}(t) &= Ax(t) + Bx(t - d_1(t) - d_2(t)) \\ x(t) &= \varphi(t) \quad t \in [-h, 0] \end{aligned} \quad (2)$$

The article uses the time-delay two-degree-of-freedom simulation method to perform the parameter fusion and adaptive tracking recognition of basketball rotating projection.<sup>5</sup> The error correction method of the track end position error is adopted to correct the angle of the basketball rotation projection. Combine the particle swarm filter to get the kinematics mathematical model of rotating basketball projection:

$$\dot{x}(t) = Ax(t) + Bx(t - d(t)) \quad (3)$$

Define  $d(t) = d_1(t) + d_2(t)$  to calculate the angle of basketball rotation projection under small disturbance as a linear programming problem. We convert the angle calculation of the basketball rotation projection into a linear feedback system to get the adaptive learning weight:

$$\frac{Y(s)}{R(s)} = \frac{G_c(s)G_0(s)e^{-rs}}{1 + G_c(s)G_0(s)} \quad (4)$$

Among them  $x(t) = [x_1(t), x_2(t), \dots, x_n(t)]^T$  is the spatial position state vector of the basketball rotating projected flight trajectory.  $d_1(t)$  and  $d_2(t)$  denote the stable solution and the time-delay solution of the Kalman filter, respectively. Thus, the flight dynamics and kinematics model of rotating basketball projection is constructed.

### Research methods

We designed the questionnaires for coaches and athletes in the "Questionnaire for Physical Training of Men's Basketball Teams in Sports Schools," respectively. Twelve copies and 80 copies were distributed to coaches and athletes.<sup>6</sup> The recovery rate is 91.7%, and the effective rate is 93.75%. At the same time, we conduct research and analysis on the data obtained from the questionnaire survey and establish a table.

## RESULTS

### The importance of the coaches of the men's basketball team of the sports school to physical training

The importance of coaches and athletes on physical training will affect the results of athletes' physical training, which will affect the impact of athletes' skills and tactics in actual combat. Improving students' awareness of physical training is helpful to students in practical training.<sup>7</sup> Table 1 shows that the importance of coaches' physical training in actual combat needs to be strengthened. Deepen the understanding that physical training is the foundation of all competitive sports. The survey of athletes shows that the importance of students on physical training needs to be further improved. While training physical fitness, coaches should also let students understand the role of physical fitness in practice. This allows students to deepen their understanding so that they can invest more energy in subsequent training.

### Training Arrangements for Men's Basketball Teams of Sports Schools

#### Investigation and analysis of physical training time of men's basketball team of sports school

Athletes need to improve their skills and tactics if they want to improve their physical fitness. Through the survey and statistics, it is found that because of the needs of students in class, their training time generally starts after school. Table 2 shows that the physical training time of most athletes can be maintained at 80min-120min hours, followed by 40min-80min. Training time can be guaranteed.

#### Investigation and analysis of training frequency of men's basketball teams in sports schools

As shown in Table 3, the men's basketball team of sports schools has the largest number of athletes who train 4-5 times a week. Most athletes are guaranteed some training sessions per week. The guarantee of the number of training sessions can help steadily improve physical fitness.

#### Investigation and analysis of physical training content of men's basketball teams in sports schools

Physical training is an important part of improving the athletic ability of basketball players. It is mainly used to improve the physical shape of the athletes while improving the functional capabilities of the athletes and developing the physical fitness of the athletes. Special physical fitness in basketball mainly includes the following content: special speed training, overall strength training, endurance training, flexibility training, and sensitivity training.

**Table 1.** Investigation on the importance of coaches and athletes to physical training.

	Very important	More important	Generally important	Not so important	Unimportant
Coach	5	5	1	0	0
Percentage (%)	45.5	45.5	9	0	0
Athlete	29	23	17	6	0
Percentage (%)	38.7	30.6	22.7	8	0

**Table 2.** Physical training time (N=75).

	40min or less	40min-80min	80min-120min	120min or more
Choose the number of people (N)	6	24	37	8
%	8	32	49.3	10.7

**Table 3.** Training frequency per week (N=75).

	2-3 times	4-5 times	More than 5 times
Choose the number of people (N)	6	56	13
%	8	74	18

## Investigation and analysis of speed training content of men's basketball teams in sports schools

With the continuous improvement of basketball level and intensity, the development of basketball players' speed quality has been paid more and more attention. The quality of speed can directly determine and affect the performance of athletes' skills and tactics.<sup>8</sup> This is an important factor in the strength of competitiveness and the outcome of the game. It takes a short time to complete an action on the basketball court to gain an advantage, so the speed of the action is critical. If you want to have an advantage in the competition, good speed quality is very important. Although the first, second, third, and fourth teams adopt the same training content, we need to formulate different requirements according to the differences in the athletes' physical functions. (Table 4)

## Investigation and analysis of endurance training content of men's basketball teams in sports schools

Endurance quality refers to the body's ability to maintain a specific intensity load or movement quality for a certain period. "A certain period" refers to the stipulation of different special events for exercise time. Maintaining a specific exercise intensity or exercise quality is a manifestation of endurance level. Athletes have to go back and forth hundreds of times on the field for 40 minutes in a game.<sup>9</sup> In addition to the speed requirements, good endurance is also very important. In fierce competition, victory or defeat is often determined at the last minute, and endurance plays a decisive role in the critical moment. Sports school basketball endurance training is more of continuous training. Including a 3000-meter run, 15-meter turnback × 17 times, halftime rebounds, and so on. The survey results on the endurance training content of the men's basketball team of the sports school show (Table 5) that the four teams take 3000-meter timed running, 15-meter turnbacks × 17 times, and full-court rebounding training content. Athletes can only adapt to the amount and intensity of the high load after the body is continuously stimulated and can continuously improve the effectiveness of physical training.

## DISCUSSION

### Strengthen the construction of coaches

The school should give more training opportunities to train the younger generation of coaches. Continuous learning can improve the coach's

**Table 4.** Athletes' speed training content.

	Free throw line return (seconds/group)	Full four-line turnback (seconds/group)	15m turnback (seconds/group)	Three people in a straight line (seconds)
Training a team	13×4	36×4	10×10	42
Training the second team	13×4	38×4	11×10	44
Training three teams	13×4	38×4	12×10	45
Training four teams	13×4	39×4	12×10	46

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**Table 5.** Endurance training content of athletes.

	3000 meters (min/group)	15 meters turn back×17 times (seconds/group)	Half-time rebounds (pieces/group)
Training a team	13×1	76×2	100×2
Training the second team	14×1	78×2	80×2
Training three teams	15×1	80×2	70×2
Training four teams	15×1	82×2	60×2

awareness of physical training.<sup>10</sup> In this way, the coaches can quickly improve the athletes' performance in cultural classes or physical education and improve their qualities within a limited time. In this way, more high-quality new sports talents can be delivered to colleges and universities.

### Strengthen management and strict requirements to ensure the quality of training

In terms of training content, the coach strictly controls and strictly requires the athletes' training movements. Ensure that the quality is completed according to certain requirements. Strengthen monitoring to improve the training effect of students.

### Self-supervision and improvement in free time

In addition to learning and improving your cultural knowledge, you should spend more time on diversified self-training and consolidation in your spare time. At the same time, students summarize and reflect on the problems arising in this process.

### Scientific training

In addition to completing basic physical exercises in the load arrangement of basketball training, it is also necessary to standardize the requirements for special qualities. Practice density and intensity should be arranged according to a scientific basis.

## CONCLUSION

In the basketball physical training content arrangement, the coaches of the sports school have strict requirements on the athletes. Different training loads are arranged to help athletes develop their physical fitness according to the athlete's age and the actual situation. The training time of the men's basketball team of a sports school is mainly 80min-120min and 40min-80min. A very small number of students have training time less than 40 minutes or more than 120 minutes. The main reason is still limited by factors such as cultural lessons. Basketball players are relatively satisfied with physical training. In the practice of physical training, the principles of physical training should be practiced. In practice, diversified methods must be adopted. Coaches need to pay attention to load control when formulating training tasks.

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