

# TRAINING METHODS IN BASKETBALL PLAYERS TO INCREASE THEIR SHOOTING PERCENTAGE



ORIGINAL ARTICLE  
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MÉTODOS DE TREINO EM JOGADORES DE BASQUETE PARA MELHORAR A PORCENTAGEM NOS ARREMESSOS

MÉTODOS DE ENTRENAMIENTO EN JUGADORES DE BALONCESTO PARA MEJORAR SU PORCENTAJE EN LOS TIROS

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## ABSTRACT

**Introduction:** In the process of basketball training, players often rely solely on shooting practice to achieve their training objectives. Improving shooting success percentage under the static and variable offensive and defensive conditions have become a significant concern for coaches and basketball enthusiasts. **Objective:** This paper analyzes training methods to improve the shooting success percentage of basketball players. **Methods:** The shooting success percentage between two groups of basketball players is analyzed using comparative mathematical statistics. The training methods of the winning group are explored, investigating the most conducive methods to improve the percentage of shooting success. **Results:** The comprehensive training method adopted by the experimental group paid attention to physical fitness, coordination, throwing speed and angle, ball feel, and psychological attention, effectively improving the percentage of successful throws. The percentage of successful throws of the experimental group before and after the training changed significantly. The results after training were significantly higher ( $P < 0.05$ ). **Conclusion:** The training of moving throws with limited shifts can improve the throwing success percentage of the player in a fatigued state. After several interventions, the basketball players' shooting success percentage and shooting quality improved significantly. **Evidence level II; Therapeutic Studies - Investigating the results.**

**Keywords:** Basketball; Teaching method; Sports; Athletes.

## RESUMO

**Introdução:** No processo de treinamento de basquete, os jogadores muitas vezes contam apenas com exercícios de arremesso para atingir os objetivos do treino. Melhorar a porcentagem de sucesso de arremessos sob condições ofensivas e defensivas estáticas e variáveis tornou-se uma questão de grande preocupação para treinadores e entusiastas do basquete. **Objetivo:** Analisa os métodos de treino visando melhorar a porcentagem de sucesso de arremessos dos jogadores de basquete. **Métodos:** Analisa-se a porcentagem de sucesso de arremessos entre dois grupos de jogadores de basquete através de estatísticas matemáticas comparativas. São explorados os métodos de treino do grupo vencedor, investigando os métodos mais propícios para melhorar a porcentagem de sucesso dos arremessos. **Resultados:** O método de treino abrangente adotado pelo grupo experimental atentou-se à aptidão física, coordenação, velocidade e ângulo de arremesso, sensação da bola e atenção psicológica, melhorando efetivamente a porcentagem de sucesso nos arremessos. A porcentagem de sucesso nos arremessos do grupo experimental antes e após o treino teve alteração significativa. Os resultados após o treino foram significativamente maiores ( $P < 0,05$ ). **Conclusão:** O treino de arremessos em movimento com turnos limitados pode melhorar a porcentagem de sucesso no arremesso do jogador em estado de fadiga. Após várias intervenções, a porcentagem de sucesso de arremessos dos jogadores de basquete e a qualidade do arremesso melhoraram significativamente. **Nível de evidência II; Estudos terapêuticos - Investigação de resultados.**

**Descritores:** Basquetebol; Técnica de Treinamento; Esportes; Atletas.

## RESUMEN

**Introducción:** En el proceso de entrenamiento del baloncesto, los jugadores suelen confiar únicamente en los ejercicios de tiro para alcanzar los objetivos del entrenamiento. Mejorar el porcentaje de acierto en el tiro en condiciones ofensivas y defensivas estáticas y variables se ha convertido en un asunto de gran interés para los entrenadores y los aficionados al baloncesto. **Objetivo:** Analizar los métodos de entrenamiento destinados a mejorar el porcentaje de éxito en el tiro de los jugadores de baloncesto. **Métodos:** El porcentaje de éxito en el tiro entre dos grupos de jugadores de baloncesto se analiza mediante estadísticas matemáticas comparativas. Se exploran los métodos de entrenamiento del grupo ganador, investigando los métodos más propicios para mejorar el porcentaje de tiros exitosos. **Resultados:** El método de entrenamiento integral adoptado por el grupo experimental prestó atención a la aptitud física, la coordinación, la velocidad y el ángulo de lanzamiento, la sensación de la pelota y la atención psicológica, mejorando eficazmente el porcentaje de éxito de los lanzamientos. El porcentaje de lanzamientos exitosos del grupo experimental antes y después del entrenamiento tuvo un cambio significativo. Los resultados tras el entrenamiento fueron significativamente superiores ( $P < 0,05$ ). **Conclusión:** El entrenamiento de lanzamientos en movimiento con desplazamientos limitados puede mejorar el porcentaje de éxito de los tiros del jugador en estado de fatiga. Después de varias intervenciones, el porcentaje de éxito en el tiro y la calidad del tiro de los jugadores de baloncesto mejoraron significativamente. **Nivel de evidencia II; Estudios terapéuticos - Investigación de resultados.**

**Descriptorios:** Baloncesto; Técnica de Entrenamiento; Deportes; Atletas.



## INTRODUCTION

In more than 100 years of the evolution of modern basketball, the competition rules and systems have been continuously revised and improved. Shooting as the only means of scoring in a basketball game is always the ultimate goal of all offensive techniques and tactics.<sup>1</sup> Improving the shooting percentage under strict and changeable offensive and defensive conditions has become an issue of great concern to coaches and basketball enthusiasts. In addition to shooting technique, shooting percentage is also affected by many other factors. In the process of basketball training, practitioners often only rely on a large number of shooting exercises to train to achieve the desired effect. This article analyzes the shooting percentage data of the two groups of players from the experimental data obtained through the comparative study. We analyze the training methods of the winning group from all levels. In this way, explore training methods and methods that are more conducive to improving shooting percentages. The research results of this article provide a useful reference for the majority of basketball enthusiasts to improve their shooting percentage further.

## Research methods

### Experimental method

The article takes 30 male basketball enthusiasts from the basketball club as the research object. We use the random sampling method to select 15 experimental and 15 control groups.<sup>2</sup> Before the experiment, the shooting percentage of 30 basketball enthusiasts was measured as the original record. Volunteers conducted an 8-week experiment, three times a week, each for 60 minutes. The control group is general training. The content is dribbling, passing and receiving, shooting technique training, and general physical fitness training. The experimental group adopts a comprehensive training method. The training content reduces the training volume of the training content of the control group. However, the volunteers have strengthened the training of special physical fitness, the ball feels, shooting speed and angle, coordination, psychological quality, and limited-time displacement shooting.

### Extraction method of basketball player's shooting motion trajectory

The gray-scale feature of the basketball player's shooting motion image is solved as  $x(P(A_n)) = \{x(s_j)\}, j = 1, 2, L, N$ . We cluster the target domain data into a reliable  $C$  class. At the same time, we use the linear filtering method to filter the image to obtain the filter coefficient  $A_n = \{y_i\}, i = 1, 2, L, N$ . Perform noise reduction processing on the pixel feature amount of the shooting action image. The filter system function is:

$$\min_{\omega}(E) = \min_{\omega}(\omega^T R) A_n \quad (1)$$

$T$  is the transpose symbol.  $R$  is the Lagrange multiplier.  $\omega$  is the linear differential vector reconstructed from the detail of basketball shooting action.<sup>3</sup> In the entire reconstructed geometric space, the second-order moment  $\eta$  and the gray-level invariant moment  $R_x$  of the characteristic distribution of the basketball player's shooting motion image are obtained. Its estimated value is:

$$\hat{\eta} = \arg \min L(\eta), R_x = \frac{1}{K} \sum_{k=1}^K \min_{\omega}(E) x_k \quad (2)$$

$L(\eta)$  represents the template function of the basketball player's shooting motion image. All the input pixel features are  $K$ . The information feature number  $x_k$  of the basketball player shooting motion image.<sup>4</sup> We adopt the discrete pixel sequence reconstruction method

to reconstruct the three-dimensional image of basketball players' shots. The video information collection method is adopted to obtain the image sampling output result. The quantization error  $P(A_n)$  of the image and video information collection is:

$$P(A_n) = \{s_i\}, i = 1, 2, L, N \quad (3)$$

Where  $s_i = \{x_j : d(x_p, y_i) \leq d(x_p, y_j)\}$  represents the quantized set of the distribution of the shooting action image.<sup>5</sup> According to the sample similarity, the image pheromone distribution  $D$  is obtained. The total average distortion  $D_n$  of the acquired image is

$$D_n = D(\{P(A_n), A_n\}) \quad (4)$$

## RESULTS

It can be seen from Table 1 that the average shot success rate of the control group and the experimental group before and after training are 56.800, 58.067, and 55.933, 61.333. Both have a certain improvement. Table 2 shows that the average values of the different sequence of the shot success rate of the control group and experimental groups' shot success rates before and after training are -1.267 and -5.400, respectively.<sup>6</sup> The calculated T values are -1.357 and -4.747, respectively. It can be seen from the P-value data. Only the experimental group has a concomitant probability of 0.000, which is less than the significance level of 0.01. The shooting success rate in the experimental group before and after training has changed significantly. From the average of the samples, it can be seen that the performance after training is significantly higher than before training. This shows that the training method of the experimental group is more scientific and more conducive to improving the practitioner's shooting success rate.

## DISCUSSION

### Strengthened the training of shooting angles

The shot angle refers to the angle formed by the tangent direction of the ball's center of gravity flight trajectory and the horizontal plane of

**Table 1.** Statistical results of paired samples.

	Average	N	Standard deviation	Standard error
Control group shots before training	56.8	15	10.058	2.597
Control group shooting percentage after training	58.067	15	7.741	1.998
Shooting percentage of the experimental group before training	55.933	15	9.422	2.433
Shooting percentage after training in the experimental group	61.333	15	7.518	1.941

**Table 2.** Paired sample T-test result table.

	Average	Standard deviation	Standard Error of Difference	T	Free	P
Control group shots before training	-1.267	3.615	0.933	-1.357	14	0.196
Control group shooting percentage after training						
Shooting percentage of the experimental group before training	-5.4	4.501	1.162	-4.647	14	0
Shooting percentage after training in the experimental group						

the shot point when the ball leaves the hand.<sup>7</sup> It determines the arc of the ball in the air and the angle of the basket. If the shot speed remains the same and the shot angle is small, the ball's arc in the air is low. Only a certain shooting angle and speed can make the ball fly along a suitable trajectory in space and land on a predetermined target. However, the shooting angle is not static. It varies with the shooter's height, the shooting method used, the speed of the shot, and the distance of the shot.

When we use the comprehensive training method, we first adopt freehand exercises. In the shooting action, the arm is fully extended after the shot is taken, and the wrist is pressed down with reasonable force as the standard. This makes the players' movements proficient.<sup>8</sup> Then, in the case of proficient unarmed movements, strengthen the training of holding the ball and shooting the basket. In this way, after the shooting angle is determined, the players have a certain direction instead of randomly shooting.

### Strengthened the training of shooting speed

Shot speed refers to combining the muscle strength of various body parts on the ball when the ball is shot.<sup>9</sup> The reasonable shooting speed depends on the force of the shot and the rate of wrist finger movements. The suddenness, continuity, and softness of the wrist flexion and the finger movement play a key role in the speed of the shot. The time-limited method is used in the training process of the comprehensive training method. It increases the number of hits within a certain period. As the number of practice increases, the shooting speed of the players also increases. Under the time-limited factor, repeatedly strengthening the technical action of a single shot makes the shooting action more and more proficient and improves the shooting percentage.

### Exercises that strengthen the athlete's sense of the ball

Athletes spend a lot of time familiarizing themselves with the ball. In particular, the proprioception that the hand and the ball are touched in different ways is more important.<sup>10</sup> Learn to use various methods, strengths, speeds, and different ball touch positions to perform specialized exercises to improve the sensing ability of fingers and wrists.

In practicing the comprehensive training method, each athlete stands under the backboard and uses high and low hand shooting positions to practice the ball. In this way, the ascending height of the basketball is directly above the hand, and the allocated basketball is gently rubbed on the board surface. The height of the basketball is controlled by the power of fingers and wrist shaking.<sup>11</sup> In this way, the shooting handshape can be practiced, and the proprioception of the fingers and wrist muscles can be improved, but the angle and arc of the basketball shot can also be improved.

### Strengthened special physical fitness training

In basketball, athletes continuously complete fast running, jumping, and competition within 40 minutes (or 48 minutes). Players with poor physical fitness can still shoot more accurately at the beginning of the

game. But with the continuation of the game and physical exhaustion, it will appear to be unable to do so. The deformation of technical movements directly affects the shooting percentage.<sup>12</sup> Therefore, we must pay attention to physical training to improve the hit rate. The shooting rate is stable and improved only with good special physical fitness as a foundation.

Comprehensive training method training pays more attention to the special physical fitness training in the training process. This training method uses antagonistic exercises with less playing and more to strengthen the athlete's sense of time and space in the movement. In this way, the athlete masters the timing of the action and the correct shooting method. In training, the main arrangement is for two-on-three practice. Increase the frequency and difficulty of the confrontation force and the endurance exercise of running in the training. Hone the players' strength, speed, flexibility, and endurance in high-intensity exercises.

### Strengthened the mental training of athletes when shooting

Psychological factors play an important role in the shooting. Good psychological quality and mental states are the prerequisites and conditions for athletes to give full play to their level. The practitioner's momentary distraction and emotional changes will affect the shooting percentage. Some athletes are known as "marks shooters" in normal training, but they are often inaccurate during competitions. The most important factor is the psychological impact. In high-speed, high-intensity, and high-confrontation games, the shooting action is always completed at the end of various comprehensive techniques. If there is no willpower to overcome fatigue, the technique will deform and affect the hit rate.

The overall training method mainly uses representational training in the training process. Imagine that you are in a violent game every time you shoot a basket. In this way, some psychological pressure is applied to the players when shooting to improve the athlete's attention, emotional control, and mental balance.

## CONCLUSION

The success rate of shooting in the experimental group before and after training has changed significantly, and the results after training are significantly higher than those before training. The comprehensive training method adopted by the experimental group paid attention to physical fitness, coordination, shot speed, shot angle, ball feel, and mental quality training in the process of practice, thereby effectively improving the shooting percentage. The training method of moving shots with limited time shifts is used in the overall training method. This can improve the shooting percentage in a fatigued state. In basketball, technical training should strengthen the practice of shooting techniques. This reduces the impact of various factors on shooting techniques and improves shooting percentages.

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