

# JUMP TRAINING FOR BASKETBALL SHOOTING

TREINAMENTO DE SALTO PARA ARREMESSO NO BASQUETEBOL

ENTRENAMIENTO DE SALTO PARA LANZAMIENTO EN EL BALONCESTO



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## ABSTRACT

**Introduction:** Basketball has become popular, and important basketball groups have been created for fun and training. However, many athletes do not acquire a professional education, creating a gap between athletes and sports enthusiasts. **Objective:** Study the technical characteristics of the jump shot in basketball and explore its training methods. **Methods:** Intra-group control was selected to train the volunteer enthusiasts. The experiment was conducted twice a week for 6 weeks. Data regarding physical performance were acquired before and after the experiment, subjected to analysis, and discussed confronting the literature. **Results:** After six weeks of training, the total time of the three phases on the sports enthusiasts was 1.14378s, and the average time of the ball preparation phase was 0.72262s, representing 63.178% of the total time. The average time spent in the take-off phase was 0.2011s, representing 17.582% of the total time; the average time spent in the vacancy phase was 0.22006s, representing 19.240% of the total time. **Conclusion:** The jump-throw training protocol showed benefits over 6 weeks of training. The technical characteristics of the participants in the sports enthusiast group were improved statistically. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

**Keywords:** Basketball; Physical Education and Training; Education, Professional.

## RESUMO

**Introdução:** O basquetebol tem se tornado popular, e importantes grupos de basquetebol foram criados para diversão e treinamento. No entanto, muitos esportistas não adquirem um ensino profissionalizante, gerando uma lacuna entre os atletas e os entusiastas do esporte. **Objetivo:** Estudar as características técnicas do salto para arremesso no basquetebol e explorar seus métodos de treinamento. **Métodos:** O controle intra-grupo foi selecionado para treinar os entusiastas voluntários. O experimento foi realizado duas vezes por semana durante 6 semanas. Os dados referentes ao desempenho físico foram adquiridos antes e após o experimento, submetidos a análise e discutidos confrontando a literatura. **Resultados:** Após seis semanas de treinamento, o tempo total das três fases sobre os entusiastas do esporte foi de 1.14378s, e o tempo médio da fase de preparação da bola foi de 0,72262s, representando 63,178% do tempo total. O tempo médio gasto na fase de decolagem foi de 0,2011s, representando 17,582% do tempo total; o tempo médio gasto na fase de vacância foi de 0,22006s, representando 19,240% do tempo total. **Conclusão:** O protocolo de treinamento de salto para arremesso apresentou benefícios ao longo de 6 semanas de treinamento. As características técnicas dos participantes no grupo de entusiastas do esporte foram aprimoradas estatisticamente. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

**Descritores:** Basquetebol; Educação Física e Treinamento; Educação Profissionalizante.

## RESUMEN

**Introducción:** El baloncesto se ha popularizado y se han creado importantes grupos de baloncesto para divertirse y entrenar. Sin embargo, muchos deportistas no adquieren una formación profesionalizante, lo que genera una brecha entre los atletas y los aficionados al deporte. **Objetivo:** Estudiar las características técnicas del salto para lanzar en baloncesto y explorar sus métodos de entrenamiento. **Métodos:** Se seleccionó un control intragrupo para entrenar a los voluntarios entusiastas. El experimento se realizó dos veces por semana durante 6 semanas. Los datos relativos al rendimiento físico se adquirieron antes y después del experimento, se sometieron a análisis y se discutieron confrontándolos con la bibliografía. **Resultados:** Tras seis semanas de entrenamiento, el tiempo total de las tres fases en los entusiastas del deporte fue de 1,14378s, y el tiempo medio de la fase de preparación del balón fue de 0,72262s, lo que representa el 63,178% del tiempo total. El tiempo medio empleado en la fase de despegue fue de 0,2011s, lo que representa el 17,582% del tiempo total; el tiempo medio empleado en la fase de vacante fue de 0,22006s, lo que representa el 19,240% del tiempo total. **Conclusión:** El protocolo de entrenamiento de salto para lanzamiento presentó beneficios a lo largo de 6 semanas de entrenamiento. Las características técnicas de los participantes del grupo de entusiastas del deporte mejoraron estadísticamente. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

**Descriptorios:** Baloncesto; Educación y Entrenamiento Físico; Educación Profesional.



## INTRODUCTION

Basketball is a sport that uses basketball as a competitive tool. In the actual combat link of the project, the team holding the ball is the offensive side and the team retreating is the defensive side.<sup>1</sup> During the attack, the goal is to put the basketball into the basket and score. In many sports, basketball is a popular sport. Based on the combination of sports science, the concept of basketball has been constantly updated and improved, and the maturity of the project has been very high.<sup>2</sup> Moreover, with the holding of major basketball related events, a large number of sports enthusiasts have been attracted to join. Even some groups have started the route of professional basketball players.<sup>3</sup> In addition, the public's sports awareness has gradually improved, and they consciously participate in basketball events to maintain their health. Therefore, at this stage, the social popularity of basketball projects is extremely high, and the project participation has a certain scale.<sup>4</sup> The standardized shooting action is helpful to improve the shooting percentage. And when shooting, it can achieve the effect of low physical consumption.<sup>5</sup> A good shooter, every shot is fixed. Therefore, in the process of daily training, it is necessary to deepen muscle memory through a large number of shooting exercises.<sup>6</sup> Through the exploration of the characteristics of jump shot, shooting training will help improve the project performance and obtain better sports experience.<sup>7</sup> After a long time of training, the effect can be changed from quantitative to qualitative. Shooting will become faster, with higher hit rate and less physical energy consumption.

## METHOD

### Analysis of technical characteristics of spot jump shot in basketball

In order to better analyze the technical characteristics of the spot jump shot in basketball, and understand the gap between athletes and sports enthusiasts, this paper selects 5 athletes and 5 sports enthusiasts. The study and all the participants were reviewed and approved by Ethics Committee of Shijiazhuang Institute Of Railway Technology(NO. 2018SIRT-T023). Among them, the athletes are national level II athletes who have been training for more than 5 years, and sports enthusiasts are selected from a college basketball association with more than four years of basketball experience. The basic information is shown in Table 1.

In the analysis of technical characteristics, the time characteristics of athletes and sports enthusiasts in the three stages of ball holding preparation, ground take-off and take-off, and the movement angle of the right elbow joint, right shoulder joint, left hip joint, right hip joint,

**Table 1.** Basic information of test athletes and test enthusiasts.

| Experience group         |        |        |                |              |
|--------------------------|--------|--------|----------------|--------------|
| Athlete No               | Height | Weight | Training years | Sports grade |
| 1                        | 197.1  | 95.6   | 5.1            | second level |
| 2                        | 199.8  | 88.2   | 6.9            | second level |
| 3                        | 189.9  | 90.1   | 6.5            | second level |
| 4                        | 198.1  | 75.2   | 6.5            | second level |
| 5                        | 188.5  | 86.9   | 6.9            | second level |
| Control group            |        |        |                |              |
| Sports enthusiast number | Height | Weight | Training years | Sports grade |
| 1                        | 184.7  | 89.9   | 4.2            | nothing      |
| 2                        | 187.0  | 76.3   | 4.5            | nothing      |
| 3                        | 182.4  | 70.7   | 5.0            | nothing      |
| 4                        | 182.6  | 87.9   | 4.8            | nothing      |
| 5                        | 184.5  | 88.9   | 5.2            | nothing      |

left knee joint, right knee joint, left ankle joint, right ankle joint and other joints in the ground take-off process were measured respectively, and the average of the three measurement results was taken, Carry out statistics and analysis. So as to judge the difference between the two, and provide a certain direction for sports enthusiasts to improve their in-situ jump shot technology.

### Research on the improvement of the training method of standing jump shot

In the aspect of improving the training method of in situ jump shot, we chose the form of intra group comparison to carry out purposeful in situ jump shot training for the five sports enthusiasts mentioned above. Training methods include repeated training of shooting movements, running and jumping training, etc., to improve the mastery of technology, core strength and leg explosive force. This experiment is conducted twice a week, and the time of the experiment is determined according to the situation of the sports enthusiasts themselves, so as to ensure that there is an interval of two days between the two training sessions to prevent the decline of sports effect caused by inadequate recovery. The experiment lasted for 6 weeks, and the relevant characteristics were analyzed again after the experiment.

## RESULTS

### Analysis of technical characteristics of spot jump shot in basketball

It can be seen from Table 2 that the total time of athletes is 1.14758s. The average preparation time for holding the ball was 0.74116s, accounting for 64.585% of the total time; The average time of jumping on the ground was 0.21374s, accounting for 18.625% of the total time; The average flight time was 0.19268s, accounting for 16.790% of the total time. In the analysis of the time characteristics of sports enthusiasts in the three stages, it can be seen that the total time of sports enthusiasts is 1.2742s, and the average preparation time for holding the ball is 0.80518s, accounting for 63.191% of the total time; The average takeoff time of stepping on the ground was 0.22456s, accounting for 17.624% of the total time; The average flight time was 0.24446s, accounting for 19.185% of the total time.

By comparing the time characteristics of the three stages between athletes and sports enthusiasts, it can be seen that the average time of athletes in the preparation stage of holding the ball is less than that of sports enthusiasts; In the stage of ground takeoff, the time used for the

**Table 2.** Analysis on Time Characteristics of Spot Jump Shooting of Tested Athletes and Sports Lovers.

| Athletes group           |                                |                |                |
|--------------------------|--------------------------------|----------------|----------------|
| Athlete No               | Ball holding preparation stage | Kick off phase | Take off stage |
| 1                        | 0.7424                         | 0.2107         | 0.2126         |
| 2                        | 0.7037                         | 0.2147         | 0.1971         |
| 3                        | 0.7639                         | 0.2183         | 0.1766         |
| 4                        | 0.7713                         | 0.2156         | 0.2060         |
| 5                        | 0.7245                         | 0.2094         | 0.1711         |
| Sports enthusiast group  |                                |                |                |
| Sports enthusiast number | Ball holding preparation stage | Kick off phase | Take off stage |
| 1                        | 0.8852                         | 0.2238         | 0.1992         |
| 2                        | 0.7894                         | 0.2173         | 0.2920         |
| 3                        | 0.7782                         | 0.2076         | 0.1791         |
| 4                        | 0.7813                         | 0.2346         | 0.2734         |
| 5                        | 0.7918                         | 0.2395         | 0.2786         |

two is basically the same, but the proportion of time used by athletes in the stage of ground takeoff is higher than that of sports enthusiasts. The time spent by athletes in the stage of taking off is less than that of sports enthusiasts, and the total time spent by athletes is also lower than that of sports enthusiasts. This shows that in the whole process of in situ jump shot, the time of the test athletes is shorter than that of sports enthusiasts, and the test athletes can complete the reaction of the whole movement in a shorter time, indicating that their actions are more consistent.

As shown in Table 3, the joint angle characteristics of the test athletes and sports enthusiasts in the change of the ground take-off of the spot jump shot. From the data of the athlete group, it can be seen that the average angle of the right elbow joint in the athlete group is 75.9994°, the average angle of the right shoulder joint is 19.54228°, the average angle of the left hip joint is 118.55008°, the average angle of the right hip joint is 127.1143°, and the average angle of the left knee joint is 124.42788°, The average angle of the right knee joint is 145.5209°, the average angle of the left ankle joint is 80.4236°, and the average angle of the right ankle joint is 80.04252°.

From the data of sports enthusiasts group, it can be seen that the average angle of the sports enthusiasts group is 68.49516° for the right elbow, 48.31172° for the right shoulder, 114.12718° for the left hip, 126.96108° for the right hip, 104.42752° for the left knee, 153.6821° for the right knee, and 97.5766° for the left ankle, The average angle of the right ankle joint is 90.62348°. Through the comparison of data, it can be seen that the angle of each joint is more scientific than that of sports enthusiasts in the process of taking off from the ground in situ jump shot of the athlete group.

### Analysis on the training effect of spot jump shot in basketball

As the sports enthusiast group also has a passion for basketball for many years, and has completed some training under the organization of self-study and basketball clubs, their professional foundation is also good. Therefore, after six weeks of training in situ jump shot, good results have been achieved. Therefore, in this section, three groups of data of sports enthusiasts before training, after training and athletes comparison group are selected for comparative analysis to discuss the effectiveness of training.

As shown in Table 4, the change of time characteristics of in situ jump shot before and after the intervention of sports enthusiasts. Compared with the other two groups of data, it can be seen that rigorous and scientific professional training has a very significant effect on basketball

fans with a certain foundation, which can significantly shorten the gap between professional basketball players and improve basketball level.

Table 5 shows the joint characteristics of sports enthusiasts in the stage of standing jump shooting and taking off after six weeks of sports training. Through comparative analysis with the other two groups of data, it shows that professional in situ jump shot training can effectively shorten the gap with professional athletes, so that non professional basketball fans have a better basketball level and stimulate their interest in basketball.

## DISCUSSION

Shooting is the key technical link of basketball project and an important means of scoring in basketball competition. Jump shot is the core of shooting technology. The level of jump shot affects the trend of the game and the use of tactics. Having excellent pitchers can make the team's playing field more spacious and the available tactics more abundant. By studying the technical characteristics of jump shot, the shooting plan and shooting guidance are formulated. It will help improve

**Table 4.** Analysis of Time Characteristics of Spot Jump Shooting before and after Sports Lovers' Intervention.

| Before training          |                                |                |                |
|--------------------------|--------------------------------|----------------|----------------|
| Sports enthusiast number | Ball holding preparation stage | Kick off phase | Take off stage |
| 1                        | 0.8852                         | 0.2238         | 0.1992         |
| 2                        | 0.7894                         | 0.2173         | 0.292          |
| 3                        | 0.7782                         | 0.2076         | 0.1791         |
| 4                        | 0.7813                         | 0.2346         | 0.2734         |
| 5                        | 0.7918                         | 0.2395         | 0.2786         |
| After training           |                                |                |                |
| Sports enthusiast number | Ball holding preparation stage | Kick off phase | Take off stage |
| 1                        | 0.8204                         | 0.2074         | 0.1766         |
| 2                        | 0.7000                         | 0.1884         | 0.2589         |
| 3                        | 0.7134                         | 0.1799         | 0.1642         |
| 4                        | 0.6772                         | 0.2174         | 0.2424         |
| 5                        | 0.7021                         | 0.2124         | 0.2582         |
| Athlete comparison group |                                |                |                |
| Athlete No               | Ball holding preparation stage | Kick off phase | Take off stage |
| 1                        | 0.7424                         | 0.2107         | 0.2126         |
| 2                        | 0.7037                         | 0.2147         | 0.1971         |
| 3                        | 0.7639                         | 0.2183         | 0.1766         |
| 4                        | 0.7713                         | 0.2156         | 0.2060         |
| 5                        | 0.7245                         | 0.2094         | 0.1711         |

**Table 3.** Analysis of the joint angle characteristics of the test athletes and sports enthusiasts in situ jump shooting and taking off from the ground (°).

| Athletes group           |             |                      |                |                 |                 |                  |                  |                   |
|--------------------------|-------------|----------------------|----------------|-----------------|-----------------|------------------|------------------|-------------------|
| Athlete No               | Right elbow | Right shoulder joint | Left hip joint | Right hip joint | Left knee joint | Right knee joint | Left ankle joint | Right ankle joint |
| 1                        | 74.0317     | 20.9535              | 117.9837       | 128.1337        | 124.8257        | 144.2721         | 80.3191          | 82.9256           |
| 2                        | 77.6955     | 19.2064              | 118.3262       | 125.2934        | 124.4373        | 145.6261         | 81.4132          | 81.6175           |
| 3                        | 77.9149     | 20.3541              | 117.8321       | 129.0313        | 124.5023        | 145.0320         | 81.0897          | 76.8124           |
| 4                        | 73.6017     | 16.6661              | 119.0929       | 126.3318        | 123.9091        | 146.7121         | 79.4099          | 78.9918           |
| 5                        | 76.7532     | 20.5313              | 119.5155       | 126.7813        | 124.4650        | 145.9622         | 79.8861          | 79.8653           |
| Sports enthusiast group  |             |                      |                |                 |                 |                  |                  |                   |
| Sports enthusiast number | Right elbow | Right shoulder joint | Left hip joint | Right hip joint | Left knee joint | Right knee joint | Left ankle joint | Right ankle joint |
| 1                        | 67.8720     | 49.2351              | 118.3571       | 127.6481        | 103.6253        | 155.3347         | 99.1565          | 91.3034           |
| 2                        | 68.0618     | 44.8722              | 110.5363       | 124.6648        | 103.5648        | 153.1334         | 96.9332          | 90.8863           |
| 3                        | 67.4307     | 49.1005              | 114.1395       | 129.3947        | 105.0954        | 150.5361         | 97.4484          | 91.4663           |
| 4                        | 70.7017     | 49.1966              | 110.5444       | 127.0126        | 104.8447        | 154.7239         | 97.3649          | 87.3167           |
| 5                        | 68.4096     | 49.1542              | 117.0586       | 126.0852        | 105.0074        | 154.6824         | 96.9800          | 92.1447           |

**Table 5.** Analysis of joint characteristics of standing jump before and after the intervention of sports enthusiasts.

| Before training          |             |                      |                |                 |                 |                  |                  |                   |
|--------------------------|-------------|----------------------|----------------|-----------------|-----------------|------------------|------------------|-------------------|
| Sports enthusiast number | Right elbow | Right shoulder joint | Left hip joint | Right hip joint | Left knee joint | Right knee joint | Left ankle joint | Right ankle joint |
| 1                        | 67.8720     | 49.2351              | 118.3571       | 127.6481        | 103.6253        | 155.3347         | 99.1565          | 91.3034           |
| 2                        | 68.0618     | 44.8722              | 110.5363       | 124.6648        | 103.5648        | 153.1334         | 96.9332          | 90.8863           |
| 3                        | 67.4307     | 49.1005              | 114.1395       | 129.3947        | 105.0954        | 150.5361         | 97.4484          | 91.4663           |
| 4                        | 70.7017     | 49.1966              | 110.5444       | 127.0126        | 104.8447        | 154.7239         | 97.3649          | 87.3167           |
| 5                        | 68.4096     | 49.1542              | 117.0586       | 126.0852        | 105.0074        | 154.6824         | 96.9800          | 92.1447           |
| After training           |             |                      |                |                 |                 |                  |                  |                   |
| Sports enthusiast number | Right elbow | Right shoulder joint | Left hip joint | Right hip joint | Left knee joint | Right knee joint | Left ankle joint | Right ankle joint |
| 1                        | 62.9022     | 42.1835              | 109.6906       | 110.6424        | 91.8925         | 143.9606         | 85.9466          | 80.9657           |
| 2                        | 60.3556     | 38.8942              | 94.7049        | 106.8099        | 89.7676         | 135.7952         | 83.0501          | 84.2313           |
| 3                        | 57.7731     | 42.0682              | 101.2163       | 119.9200        | 90.0433         | 138.0080         | 89.3384          | 81.1102           |
| 4                        | 65.5247     | 43.6264              | 101.3445       | 112.6318        | 97.1676         | 134.1111         | 86.3409          | 80.0499           |
| 5                        | 58.6118     | 42.6057              | 108.4872       | 109.2877        | 93.1181         | 132.5283         | 89.8788          | 81.7118           |
| Athlete comparison group |             |                      |                |                 |                 |                  |                  |                   |
| Athlete No               | Right elbow | Right shoulder joint | Left hip joint | Right hip joint | Left knee joint | Right knee joint | Left ankle joint | Right ankle joint |
| 1                        | 74.0317     | 20.9535              | 117.9837       | 128.1337        | 124.8257        | 144.2721         | 80.3191          | 82.9256           |
| 2                        | 77.6955     | 19.2064              | 118.3262       | 125.2934        | 124.4373        | 145.6261         | 81.4132          | 81.6175           |
| 3                        | 77.9149     | 20.3541              | 117.8321       | 129.0313        | 124.5023        | 145.0320         | 81.0897          | 76.8124           |
| 4                        | 73.6017     | 16.6661              | 119.0929       | 126.3318        | 123.9091        | 146.7121         | 79.4099          | 78.9918           |
| 5                        | 76.7532     | 20.5313              | 119.5155       | 126.7813        | 124.4650        | 145.9622         | 79.8861          | 79.8653           |

the team's performance. The overall action of jump shot can be divided into several links. The first is the squat link, which is a stage to provide energy for the completion of the overall shooting. The leg muscles are contracted through knee flexion, and then the body is quickly bounced up through the interaction with the ground. When using the standard shooting action, in the squatting phase, the feet should be kept as parallel as possible, and the squatting depth should not be too deep. The next step is to push the floor and lift the arm. At the end of the squat, both feet push the floor quickly. The power is generated by the leg muscles to provide kinetic energy for the body to take off. You can improve your speed through daily strength training.

## CONCLUSION

Through the analysis of the characteristics of the technical movements of the basketball players' group and the sports enthusiasts' group, it can be seen that although the two groups of athletes have

been trained for about the same length of time, the athletes' group has undergone strict and professional training, and their sports are more scientific than the sports enthusiasts' group. It is more scientific that they can better use their body functions, adjust the proportion of time, and complete the action in the shortest time. Therefore, it is necessary to teach the sports enthusiast group relevant movements. The teaching results show that after six weeks of professional training, the technical characteristics of the sports enthusiast group's in-situ jump shot have been greatly improved, which shows that for some sports enthusiasts with a certain foundation, more scientific training can better regulate their own movements, improve training efficiency, and reduce the occurrence of sports injuries. So as to improve the average level of basketball and promote the development of basketball in the social level.

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