

EXPERIMENTAL TRAINING ON ATHLETIC ABILITY AND ATHLETIC PERFORMANCE IN BASKETBALL PLAYERS

TREINAMENTO EXPERIMENTAL SOBRE HABILIDADE E DESEMPENHO ATLÉTICO NOS JOGADORES DE BASQUETEBOLE

ENTRENAMIENTO EXPERIMENTAL SOBRE LA HABILIDAD Y EL DESEMPEÑO ATLÉTICO EN JUGADORES DE BALONCESTO



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ABSTRACT

Introduction: The high-intensity basketball game is physically strenuous for athletes, demanding strength, endurance, flexibility, speed, and agility. These characteristics reinforce the need for attention to the preparation training of basketball players. **Objective:** Explore the effects of experimental training on athletic ability and movement control on the athletic level of basketball players. **Methods:** 20 basketball players were selected by random sampling. They underwent eight weeks of specialized fitness and body control training. In the experiment, the biochemical parameters of the athletes were collected and analyzed by mathematical statistics. The relationship between athletic capacity and athletic ability was also analyzed. **Results:** After eight weeks of special exercises, basketball players tended to improve their fitness level. Significant differences were found in the data between the two groups ($P < 0.05$). The players' competition level improved significantly compared to the previous state of professional training. Significant differences were also found in the data between the two final groups ($P < 0.05$). **Conclusion:** The experimental physical exercise positively impacted the physical performance of basketball players, proving to be valid for improving the athletic level of basketball players. **Level of evidence II; Therapeutic studies - investigating the results of treatment.**

Keywords: Sports; Basketball; Athletic Performance; Physical Conditioning, Human.

RESUMO

Introdução: O jogo de basquetebol de alta intensidade é muito cansativo fisicamente para os atletas, exigindo força, resistência, flexibilidade, velocidade e agilidade. Essas características reforçam a necessidade da atenção ao treinamento de preparação dos jogadores de basquetebol. **Objetivo:** Explorar os efeitos de um treinamento experimental na capacidade atlética e no controle de movimentos sobre o nível atlético dos jogadores de basquetebol. **Métodos:** 20 jogadores de basquetebol foram selecionados por amostragem aleatória. Eles foram submetidos a oito semanas de treinamento especializado em aptidão física e controle corporal. Na experiência, os parâmetros bioquímicos dos atletas foram coletados e analisados através de estatísticas matemáticas. A relação entre a capacidade atlética e a habilidade atlética também foi analisada. **Resultados:** Após oito semanas de exercícios especiais, os jogadores de basquete tendem a melhorar seu nível de aptidão física. Foram encontradas diferenças significativas nos dados entre os dois grupos ($P < 0,05$). Em comparação ao estado prévio do treinamento profissional, o nível de competição dos jogadores melhorou significativamente. Também foram encontradas diferenças significativas nos dados entre os dois grupos finais ($P < 0,05$). **Conclusão:** O exercício físico experimental demonstrou impacto positivo na melhoria do desempenho físico dos jogadores de basquete, demonstrando-se válido para melhorar o nível atlético dos jogadores de basquetebol. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Esportes; Basquetebol; Desempenho Atlético; Condicionamento Físico Humano.

RESUMEN

Introducción: El juego de baloncesto de alta intensidad es muy agotador físicamente para los atletas, exigiendo fuerza, resistencia, flexibilidad, velocidad y agilidad. Estas características refuerzan la necesidad de prestar atención al entrenamiento de preparación de los jugadores de baloncesto. **Objetivo:** Explorar los efectos de un entrenamiento experimental sobre la capacidad atlética y el control del movimiento en el nivel deportivo de los jugadores de baloncesto. **Métodos:** Se seleccionaron 20 jugadores de baloncesto por muestreo aleatorio. Se sometieron a ocho semanas de entrenamiento especializado en aptitud física y control corporal. En el experimento, se recogieron los parámetros bioquímicos de los atletas y se analizaron mediante estadísticas matemáticas. También se analizó la relación entre la capacidad atlética y la habilidad atlética. **Resultados:** Tras ocho semanas de ejercicios especiales, los jugadores de baloncesto tendieron a mejorar su nivel de aptitud física. Se encontraron diferencias significativas en los datos entre los dos grupos ($P < 0,05$). En comparación con el estado anterior de la formación profesional, el nivel de competencia de los



jugadores mejoró considerablemente. También se encontraron diferencias significativas en los datos entre los dos grupos finales ($P < 0,05$). Conclusión: El ejercicio físico experimental demostró un impacto positivo en la mejora del rendimiento físico de los jugadores de baloncesto, demostrando ser válido para mejorar el nivel atlético de los jugadores de baloncesto. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptores: Deportes; Baloncesto; Rendimiento Atlético; Acondicionamiento Físico Humano.

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INTRODUCTION

Basketball is a team sport. Its characteristics are confrontational, competitive, ornamental, and commercial. Basketball players must have good speed, strength, and basketball skills and tactics.¹ The overall development of China is quite different from that of other countries in the world. In order to obtain excellent sports results, the physical fitness of athletes is essential.² In physical education, professional physical exercise is a very critical link. Specialized physical exercise can improve the stability of an athlete's body during exercise. Take 20 basketball players as a research sample. Eight weeks of specialized training in physical fitness and body control for athletes. In the experiment,³ the biochemical parameters of athletes were analyzed by mathematical statistics. At the same time, the relationship between athletes' athletic ability and athletic ability is also analyzed. The results can lay a foundation for the promotion and popularization of professional sports in my country in the future.⁴

METHOD

Research objects

A sample of 20 basketball players was investigated. There was no significant difference in the relationship between different ages, heights, weight, and living habits. No physical problems and a great lifestyle.⁵

Investigation method

This study collected the mental status and body mass index of patients who did not engage in special physical activity before receiving special exercise. After eight weeks of physical activity, their mental state and BMI were collected. Objective: To explore the effect of physical exercise on the mental and physical condition of athletes.⁶

Test standard

The main content of the heart condition detection has two aspects: time and frequency. The time-domain index includes the mean root value of the adjacent N-N values and the standard value of normal R-R.⁷ This study took 5 minutes as the research object and collected ECG data. The acquired data were processed and analyzed by the Sports Technology system and the cardiac load profile analysis system.⁸

The exercise of motor skills refers to the physical exercise performed by athletes with unrestricted motor function and function. Sports function screening, explosive training, agility training, muscle strength training, and recovery training.⁹

The optimal projection route in the basketball court

The time $t = \frac{v_0 \sin \beta}{g}$ When the ball reaches the highest point. In this process, the speed of serving is the fastest. is v_0 . The angle of release of the ball is the angle formed by the direction of the release of the ball and the horizontal direction of the advance of the ball as β . Then we have the following expression:

$$H - h = \frac{v_0 \sin^2 \beta}{g^2} \quad (1)$$

The equation of the motion trajectory after the ball is thrown is:

$$y = a[y + (H - h)]^2 + M - m \quad (2)$$

We get an $\sin \beta = \frac{H + h}{M - m}$. Therefore, the trajectory equation of the ball after it is thrown is:

$$h = \frac{x + y}{(M - m)^2} \frac{[H - (x + y)]^2}{M - m} \quad (3)$$

Therefore, formula (3) can be used to determine the optimal position for the highest score when shooting.

Mathematical analysis

Excel and SPSS20 were used. Statistical analysis of experimental data was performed using paired sampling t-test.

There is no need for a code of ethics for this type of study.

RESULTS

Research on Cardiopulmonary Function Status Index

Heart Rate Variation

The sports-specific intervention period for athletes is eight weeks. Their heartbeats were tested both the week before and after the experiment. The changes in heart rate of the players before and after exercise over eight weeks of exercise are shown in Table 1 below. The heart rate of 20 players decreased from 92.26 (92.26)/min to 84.65 (6.12) after eight weeks of training.

Changes in the frequency domain index in the time range

As can be seen from Table 2, there is a significant difference ($P < 0.05$) between the total power and the power index in the high-frequency range. There were no significant changes in other test results.¹⁰ This suggests that performing a high-intensity physical exercise can improve total power and high-frequency strength index.

Time-domain index and frequency domain index change

It can be seen from Table 3 that the difference between the total power in the frequency domain index of the basketball player's

Table 1. Changes in mean heart rate per minute after physical activity test time times/min.

Testing time	Heart rate
Week 1	92.26±2.66
After training	84.65±6.12

Table 2. Changes in frequency index in each time domain before and after sports and sports.

Index	Before training	After training
Standard deviation	38.31±14.38	36.31±18.30
Difference root mean square	36.16±13.33	36.34±16.65

time-domain index and the power index in the high-frequency range is statistically significant ($P < 0.05$). There were no statistically significant differences in other indicators.¹¹ This shows that a large amount of physical function training can improve the total power in the time domain index, the frequency domain index of basketball players, and the power index in the high-frequency range.

Analysis of changes in sports ability indicators

The test is designed to measure the athletic level of an athlete. Its main content is aerobic, balance, strength, agility, and other aspects of the score (percentage system, see Table 4).

There were different degrees of aerobic capacity between the two groups ($P < 0.05$). The scores of motor balance after exercise and rehabilitation were significant ($P < 0.05$). There was a significant difference in the scores of strength and quality between the two groups ($P < 0.05$). There were significant differences in athletes' sensitive quality scores before and after training ($P < 0.05$).

DISCUSSION

In basketball, in addition to having comprehensive physical fitness and skilled techniques, it is also necessary to have strong coordination and control over one's core. The lower body will have a rotating torque, and other parts will also have a reverse torque in order to achieve a balance. Then in this process, the ability of a strong core area cluster will play a role in linking the past and the future. Sensitivity refers to the adaptability to the external environment during a variety of complex movements.¹² Special sensitivity refers to the ability to combine with its own technology according to specific requirements to meet changes in external conditions. When training on agility, coaches should exercise the physical endurance of athletes accordingly. Athletes have to carry out the physical exercise with goals. It can prevent excessive training from making players feel exhausted emotionally and physically. At the same time, it can also ensure that

when participating in the training, the physical condition and work enthusiasm are very high.¹³

Practice without exhaustion has no effect, and practice without recovery is a risk. This article cannot blindly pursue high-intensity exercise. Coaches should combine their own characteristics, combine their own characteristics, and carry out scientific physical exercises. Athletes should be proactive in physical rehabilitation after training. Active rehabilitation training should be matched with exercise content. In the middle of sports, coaches should increase the intensity of anaerobic exercise for athletes. Great help for his injury. Athletes' bodies and rehabilitation are carried out according to the characteristics of basketball. In basketball, there is a 20-second pause in each phase. There is a 10- or 15-minute break in the first half. Exercising the core muscles helps to enhance the balance ability of the body, improve the coordination of the body, and prevent sports injuries. The characteristics of basketball are not only good physical fitness but also pre-judgment skills. This is the characteristic of the special physique of basketball. The physical quality of basketball players is an important guarantee for the normal performance of basketball techniques and tactics. Sports, technology, and strategy complement each other. Physical education, physical education should pay attention to techniques and techniques while ignoring the role of physical function.

In physical education, coaches and players should actively change some teaching concepts in physical education. Coaches should focus on cultivating "people-centeredness" in students. During training, athletes should pay special attention to preparation. Athletes can improve various functions of the body after making adequate preparations. It speeds up blood circulation and reduces muscle stickiness. At the same time, athletes can wake up muscles, fascia, ligaments, etc., after fully preparing for exercise, thereby improving the elasticity of muscles and joints. Preparing for exercise can promote central nervous system hyperactivity and neurotransmission rates, reducing training injuries.

CONCLUSION

After eight weeks of physical exercise, the heat capacity of the basketball players improved. The storage of its myocardial function is enhanced. On the time scale, there are significant differences in the standard deviation, the RMS value of the deviation, and the power index for the full power and high-frequency ranges. The results show that physical exercise has a certain effect on improving the myocardial burden of basketball players. Athletes' physical function can be improved through specialized physical exercise. After training, the athletes' physical quality, agility quality, strength quality, and other aspects have improved. In physical education, we should pay attention to the integration of professional and conventional strengths. Athletes need to pay attention to both the small muscles and the muscles of the large muscle groups. So as to ensure the overall and systematic exercise in physical education.

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Table 3. Changes of time-domain indicators and frequency-domain indicators of athletes before and after physical function training.

Index	Before training	After training
Total power	278.32±245.78	338.52±288.55
High frequency	82.40±85.54	125.48±87.27
Low frequency	128.52±87.32	138.55±53.22
Shallow frequency	55.88±32.32	58.54±25.20

Table 4. Changes in various sports indicators before and after physical exercise of athlete training.

Training program	Before training	After training
Aerobic capacity	82.78±2.98	92.87±3.44
Balance ability	74.21±3.79	88.24±6.35
Strength quality	89.32±14.01	94.25±15.29
Agility qualities	83.07±3.28	92.12±4.03

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