POSITIVE CORRELATION MODEL IN BASKETBALL ON ATHLETES' PHYSICAL TRAINING

MODELO DE CORRELAÇÃO POSITIVA NO BASQUETE SOBRE O TREINO FÍSICO DOS ATLETAS

MODELO DE CORRELACIÓN POSITIVA EN EL BALONCESTO SOBRE EN EL ENTRENAMIENTO FÍSICO DE LOS DEPORTISTAS

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ABSTRACT

Introduction: The athletic capacity improvement in basketball players is closely connected with their training. It is believed that the focus on training by basketball players can contribute to the gain of strength, speed, agility, and endurance. Objective: Analyze the specific methods in the players' training scoring the critical factors for improving physical conditioning. Methods: Correlation statistics were used to analyze the factors that affected the physical performance of basketball players. Periodic physical training programs were designed by relating training load to the competition schedule to evaluate the essential parameters (strength, speed, explosive strength, cardiorespiratory endurance, coordination, flexibility, agility, and accuracy) and the changes in physical fitness. Results: Basketball players' strength, agility, endurance, and speed improved after physical training. There are considerable differences in several fitness indices before and after training (P<0.05). Conclusion: Periodic physical training of basketball players can improve their physical fitness. Physical training is an essential tool to improve basketball in China. ***Evidence Level II; Therapeutic Studies - Investigating the result.***

Keywords: Basketball; Physical exercise; Plyometric exercise; Sports.

RESUMO

Introdução: A melhora da capacidade atlética nos jogadores de basquete está intimamente relacionada com o seu treino. Acredita-se que o foco no treinamento por parte dos jogadores de basquete possa contribuir com o ganho de força, velocidade, agilidade e resistência. Objetivo: Analisar os métodos específicos no treino dos jogadores pontuando os fatores chave para a melhora de condicionamento físico. Métodos: Estatísticas de correlação foram utilizadas na analise dos fatores que afetaram o desempenho físico dos jogadores de basquete. Programas periódicos de treinamento físico foram elaborados relacionando carga de treino com o cronograma de competição para avaliar os parâmetros de importância (força, velocidade, força explosiva, resistência cardiorrespiratória, coordenação, flexibilidade, agilidade e exatidão) e as alterações na aptidão física. Resultados: A força, agilidade, resistência e velocidade dos jogadores de basquete foram muito melhoradas após o treinamento físico. Há grandes diferenças em vários índices de aptidão física antes e depois do treino (P<0,05). Conclusão: O treinamento físico periódico dos jogadores de basquete pode melhorar seu condicionamento físico. O treino físico é uma ferramenta importante para aprimorar o basquete na China. ***Nível de evidência II; Estudos Terapêuticos - Investigação de Resultados.***

Descritores: *Basquetebol; Exercício Físico; Exercício Pliométrico; Esportes.*

RESUMEN

Introducción: La mejora de la capacidad atlética en los jugadores de baloncesto está estrechamente relacionada con su entrenamiento. Se cree que la concentración en el entrenamiento por parte de los jugadores de baloncesto puede contribuir con la ganancia de fuerza, velocidad, agilidad y resistencia. Objetivo: Analizar los métodos específicos en el entrenamiento de los jugadores puntuando los factores clave para la mejora de la condición física. Métodos: Se utilizaron estadísticas de correlación en el análisis de los factores que afectan al rendimiento físico de los jugadores de baloncesto. Se diseñaron programas periódicos de entrenamiento físico relacionando la carga de entrenamiento con el calendario de competición para evaluar los parámetros de importancia (fuerza, velocidad, fuerza explosiva, resistencia cardiorrespiratoria, coordinación, flexibilidad, agilidad y precisión) y los cambios en la aptitud física. Resultados: La fuerza, la agilidad, la resistencia y la velocidad de los jugadores de baloncesto mejoraron mucho después del entrenamiento físico. Hay grandes diferencias en varios índices de aptitud física antes y después del entrenamiento (P<0,05). Conclusión: El entrenamiento físico periódico de los jugadores de baloncesto puede mejorar su forma física. El entrenamiento físico es una herramienta importante para mejorar el baloncesto en China. ***Nivel de evidencia II; Estudios terapéuticos - Investigación de resultados.***

Descriptores: *Baloncesto; Ejercicio Físico; Ejercicio Pliométrico; Deportes.*

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INTRODUCTION

Basketball is generally welcomed in countries around the world. Basketball has a large group of fans in China. Yao Ming is the first Asian No. 1 player to enter the American Professional Basketball League. He is the top Chinese men's basketball team in Asia. Yao Ming promoted Chinese sports to the world. Basketball is a sport that requires extremely high athletes' comprehensive athletic ability. Physical training is particularly important for contemporary male basketball players. Physical fitness training has a significant impact on the competitive fitness of male basketball players.[1] The level of an athlete's physical fitness depends on three aspects: body shape, physiological function, and athletic quality. Body shape and physiological functions are the material basis of physical fitness. Sports quality is an important manifestation of physical fitness. The article analyzes the specific basketball players' physical fitness training.[2] At the same time, we analyze the factors influencing basketball training players' physical fitness improvement.

METHOD

Research objects and training methods

From March 2020 to July 2020, we selected 15 active male basketball players as the research objects. We divide the various physical qualities related to basketball into various boards. The power quality section and the speed quality section each account for three weeks. Endurance, coordination, flexibility, and agility each account for two weeks.[3] The accuracy section occupies a week. The single quality module that focuses on development comprises main exercises and auxiliary exercises.[4,5] We use training methods that closely combine the specific characteristics of basketball to carry out a skill-based training method for physical training.

Training load and competition schedule

The athlete's exercise load in each training cycle shows rhythmic changes. Coaches pay attention to the quality and intensity of training. Athletes participate in the competition at the end of each mini-cycle. In this way, the improvement of various qualities is integrated into the technology.[6] We perform mathematical, statistical analysis on physical fitness data before and after the experiment, athletes' performance, and competition results.

Establishment of basketball trajectory algorithm

We use the player's tracking trajectory to merge the background from adjacent frames. This article uses an independent *BLSTM* to complete the above operations. The *BLSTM* learns to implicitly represent each player at a given time step.[7] The hidden state h^p_{ti} of *BLSTM* in the entire player tracking trajectory represents the implicit relationship of player i in frame t:

$$h^p_{ti} = BLSTM_{trace}(h^p_{t-1,i}, h^p_{t+1,i}, p_{ti}) \quad (1)$$

This article selects the most relevant players at each time step. Players are represented as a convex combination to complete the selection at this time step.

$$a^{trace}_t = \sum_{i=1}^{N_t} \gamma^{trace}_{ti} h^p_{ti} \quad (2)$$

$$\gamma^{trace}_{ti} = soft\max(\varphi(h^f_t, h^p_{ti}, h^e_{t-1}); \tau) \quad (3)$$

γ^{trace}_{ti} represents the normalized index of player i in frame t under the condition of trajectory tracking. N_t is the number of detections in frame t. $\varphi()$ is a multilayer perceptron. τ is the temperature parameter of *oft max*.

This paper treats the detection in each frame as being independent of other frames.[8] The calculation based on the player characteristics without tracking attention is as follows:

$$a^{non-trace}_t = \sum_{i=1}^{N_t} \gamma^{non-trace}_{ti} p_{ti} \quad (4)$$

$$\gamma^{non-trace}_{ti} = soft\max(\varphi(h^f_t, p_{ti}, h^e_{t-1}); \tau) \quad (5)$$

$\gamma^{non-trace}_{ti}$ represents the normalized index of player i in frame t without trajectory tracking.

RESULTS

Physical training ideas

Some scholars analyze the specific quality structure of basketball players based on analyzing the characteristics of basketball. He gave the empirical parameters of the importance of various physical fitness according to the different positions of the athletes on the court (Table 1). From the table, we can draw that strength training is the basis in basketball physical training.[9] Speed training is the core. The combination of physical training and technical tactics is the key.

Changes in physical fitness indicators before and after the experiment

The importance of the above qualities and some special physical fitness indexes of excellent basketball players to compare. In this way, the two indicators that can reflect the specific speed and agility are the 30-meter and full-court turnback run.[10] Reflecting the speed and endurance are the two indicators of 400 meters and 10,000 meters; The semi-squat barbell and the bench press barbell (both 6 reps) reflect strength. An indicator of the upper step height (clear height) reflects explosive power and jumping ability.

The final scores in Table 2 are the average scores of all the team members measured after 15 weeks of system physical training. After the experiment, the athletes' 30-meter, full-court turnback, 400-meter, and 10,000-meter index values have improved. There was a significant difference after the test and before the test. This shows that the players' absolute speed, starting speed, action speed, speed endurance, and endurance quality have been improved to a certain extent after the targeted physical training.[11] The indicators of a semi-squat barbell, bench press barbell, and upstroke can reflect the players' absolute strength and explosiveness and the quality of jumping ability. Tests show that these indicators have improved after physical training. There was also a

Table 1. Parameters of the importance of various qualities of basketball players.

Player position	Point guard	Shooting guard	Small forward	Power Forward	Center forward
Strength	5	5	5	5	5
Speed	5	5	5	4	3
Explosive force	5	5	5	5	5
Endurance	5	4	4	4	4
Cardiorespiratory Endurance	3	3	3	3	3
Coordination	5	5	5	5	5
Flexibility	4	4	4	4	4
Agility	5	5	5	4	3
Accuracy	5	5	5	5	5

Table 2. Comparison of certain indicators before and after physical training.

Project indicators	Before the experiment	After the experiment	P
30m(s)	4.66±0.84	4.49±0.62	p<0.05
Full court return run (s)	30.2±5.3	28.9±4.8	p<0.05
400m(s)	66±6.8	62±8.9	p<0.05
10000m(min)	46.85±5.8	42.45±6.2	p<0.05
Half squat barbell (kg)	114±9.6	126±8.8	p<0.05
Bench press barbell (kg)	52±6.3	65±5.8	p<0.05
Upper step touch height (cm)	60.5±6.8	81.8±4.5	p<0.05

significant difference after the test and before the test. This shows that a targeted physical training plan formulated with periodic training can improve the physical fitness of high-level basketball players in colleges and universities.

Performance and results in the competition

In the 7 short cycles of 15 weeks of training, we focused on developing a certain quality in each section and combined the improved quality with basketball skills. This allows the development of physical fitness and skills and tactics simultaneously. Athletes organize competitions at the end of each mini-cycle. In the game, the specific physical fitness of basketball is strengthened, but also the technical and tactics can be found. In this way, return to training to improve and improve, and return to the game after improvement and improvement.[12] After many competitions related data statistics, it is found that the athletes' fast-break success rate, shooting percentage, steals, defensive success rate, and other technical indicators have shown an upward trend. During the competition, the athletes were skilled in their skills, had clear tactical ideas, and did not suffer from exhaustion throughout the game.[13] This fully shows that physical training improvement is integrated with basketball's special technology. The targeted physical training plan formulated with periodic training is successful for training high-level basketball players in colleges and universities.

DISCUSSION

Physical training in the last century followed the "dual" training theory. Physical fitness (physical fitness) and technology "dual" exist separately.[14] Physical fitness is the foundation, and technology can only grow based on physical fitness. Therefore, the coach must first have physical fitness (physical fitness) and technical skills in the training arrangement. With the deepening of people's understanding of the characteristics of this type of project, people realize that physical fitness must be developed simultaneously with skills and tactics. Only when the skills and tactics reach a certain level can the athlete's physical fitness level achieve the desired effect. It is not obvious to only insist on overloaded physical training and ignore the combination and simultaneous improvement of physical training and technical and tactical training.[15] As Dutch football experts put it: "Physical training is football training, and football training is physical training." Dutch football experts believe that physical fitness and skills are one. This theory of physical fitness and skills as a single factor is called the "unary" training theory.

Cycle training is a training cycle theory based on improving the quality of training. Its theoretical basis is based on the "monism" in which physical fitness and special skills are inseparable. "Monism" believes that the improvement of exercise ability is the biological adaptation of the human body or the new balance of the human body's orderly state.[16] Whether it is a biological adaptation or the balance of an orderly state, exercise ability is promoted by the external stimulation with a certain direction and a specific load. Periodic training inherits the basic idea of "Monism." This thought believes that physical fitness training and special training are inseparable. Physical fitness training should be combined with specific characteristics and with obvious directionality. Special training must have a sufficient intensity guarantee. The key to the whole training process is transforming improved physical fitness into sports skills in actual competitions.

CONCLUSION

We draw the following conclusions in basketball players' 15-week period physical training experiment. After basketball players have undergone targeted training in each physical fitness section, all indicators have improved significantly, and the differences are significant. Basketball players' fast-break success rate, shooting percentage, steals, defensive success rate, and other technical indicators in the game are showing an upward trend. At the same time, the physical fitness training practice did not cause excessive fatigue and damage to the body of the experimental subject. The above conclusions show that the training plans of various quality sections formulated with the guidance of periodic training are successful for training high-level basketball players in colleges and universities.

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AUTHORS' CONTRIBUTIONS: Each author made significant individual contributions to this manuscript. BL: Write and organize articles. CY: data analysis, article review and intellectual concept of the article.

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