

EVALUATIVE INDEX SYSTEM IN PHYSICAL TRAINING OF BASKETBALL PLAYERS



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SISTEMA DE ÍNDICE AVALIATIVO NO TREINAMENTO FÍSICO DOS JOGADORES DE BASQUETEBOL

SISTEMA DE ÍNDICE DE EVALUACIÓN EN LA PREPARACIÓN FÍSICA DE LOS JUGADORES DE BALONCESTO

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ABSTRACT

Introduction: The training should be performed according to the characteristics of basketball by establishing a scientific evaluation index system to fully exploit the potential of its players. **Objective:** Evaluate the index system for measuring physical training specific to basketball players. **Methods:** The physical training evaluation indexes of athletes were studied by checking the scientific literature and mathematical statistics, and an evaluation index for the physical training of young basketball players was designed and experimented. **Results:** The highest proportion of the special fitness score in athletic average was 46.25%; the proportion of the players' general fitness score represented 15% above and 13.75% below. The specific fitness level of basketball players is mainly at the average level. **Conclusion:** The effects of training can be effectively evaluated by the experienced index system, and it is useful for athletes to find deficiencies, make full use of their potential, improve skills and adapt basketball tactics. It may also provide more reserve talent for professional basketball. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Basketball; Mediation Analysis; Physical Education and Training.

RESUMO

Introdução: O treinamento deve ser realizado de acordo com as características do basquetebol estabelecendo um sistema de índice de avaliação científica para explorar plenamente o potencial de seus jogadores. **Objetivo:** Avaliar o sistema de índices de medição do treinamento físico específico para os jogadores de basquetebol. **Métodos:** Os índices de avaliação do treinamento físico dos atletas foram estudados verificando a literatura científica e estatísticas matemáticas, um índice de avaliação para o treinamento físico de jovens jogadores de basquetebol foi projetado e experimentado. **Resultados:** A maior proporção da pontuação da aptidão física especial na média atlética foi de 46,25%; a proporção da pontuação da aptidão física geral dos jogadores representou 15% acima e 13,75% abaixo, o nível de aptidão física específica dos jogadores de basquetebol está principalmente no nível mediano. **Conclusão:** Os efeitos do treinamento podem ser efetivamente avaliados pelo sistema de índice experimentado, sendo útil para que os atletas possam encontrar deficiências, aproveitar plenamente seu próprio potencial, melhorar as habilidades e adaptar as táticas do basquetebol. Também poderá fornecer mais talentos de reserva para o basquetebol profissional. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Basquetebol; Análise de Mediação; Educação Física e Treinamento.

RESUMEN

Introducción: El entrenamiento debe realizarse de acuerdo con las características del baloncesto estableciendo un sistema de índices de evaluación científica para explotar plenamente el potencial de sus jugadores. **Objetivo:** Evaluar el sistema de índices de medición del entrenamiento físico específico para jugadores de baloncesto. **Métodos:** Se estudiaron los índices de evaluación del entrenamiento físico de los deportistas mediante la comprobación de la literatura científica y la estadística matemática, y se diseñó y experimentó un índice de evaluación del entrenamiento físico de los jóvenes jugadores de baloncesto. **Resultados:** La proporción más alta de la puntuación de la aptitud física especial en la media atlética fue del 46,25%; la proporción de la puntuación de la aptitud física general de los jugadores representó un 15% por encima y un 13,75% por debajo, el nivel de aptitud física específica de los jugadores de baloncesto está principalmente en el nivel medio. **Conclusión:** Los efectos del entrenamiento pueden evaluarse eficazmente mediante el sistema de índice de experiencia, y es útil para que los deportistas encuentren las deficiencias, aprovechen al máximo su propio potencial, mejoren las habilidades y adapten las tácticas de baloncesto. También puede proporcionar más talentos de reserva para el baloncesto profesional. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptorios: Baloncesto; Análisis de Mediación; Educación y Entrenamiento Físico.



INTRODUCTION

The application of techniques and tactics in basketball often depends on the high physical fitness level of basketball players, only when basketball players have a high level of physical fitness, can they apply combat techniques in highly confrontational basketball games and win the game.¹ In basketball, the speed, strength, endurance, psychology and other physical factors of basketball players are very important.

In the physical training of basketball players, training should be carried out according to the characteristics of basketball, and set up a scientific evaluation index system to fully tap the basketball players' own potential.² When divided by positions of defenders, forwards and centers, defenders completed various movements more than forwards and centers in the game, among them, the high-intensity exercise (skating, sprinting and dribbling) is significantly more than that of forward and center athletes, and the time of low-intensity exercise (walking or standing) is significantly less than that of forwards and centers, therefore, it shows that basketball players in different positions bear significantly different loads during the game, when distinguishing according to the "inside line and outside line", the loads borne by athletes at different positions can be clearly distinguished, in this way, targeted physical fitness evaluation, diagnosis, and training that meet the physical fitness needs of athletes in different positions, that is, position-specific physical fitness training.³ In view of this, taking the competitive characteristics of basketball as the basic starting point, combined with the actual situation of young men's basketball players, explore the structural model of the special physical training of basketball projects, on this basis, a simple and practical special physical fitness index system and evaluation system are constructed, diagnose and evaluate the special physical fitness of young men's basketball players, and provide a unified reference and a relatively scientific standard paradigm for the selection of young men's basketball players and special physical fitness training in the future.⁴

Excellent U19 young men's athletes will become the backbone of the Chinese men's basketball team in the future, therefore, it is necessary to start targeted physical training from now on to make up for the "physical weakness".⁵ At present, there is no domestic line from the perspective of "internal line, external line" classification, research on the construction of a specialized physical fitness evaluation and diagnosis system for basketball players, therefore, this study hopes to construct the physical fitness evaluation index system of my country's outstanding male basketball players.

METHOD

Research object

Taking the special physical training of athletes participating in the 2020 national U19 youth men's basketball competition as the research object. A total of 300 players from 18 teams participated in the competition, the top 8 teams were selected according to the needs, and a total of 80 people were analyzed and investigated, the top 8 teams basically represented the highest level of U19 youth men's basketball in the country.

Research methods

1. Documentation Law

Taking CNKI as the retrieval platform, retrieving the research results of basketball-specific physical fitness, a total of 75 results were retrieved, and the OSTCM6 content mining system was used to conduct word frequency statistics.⁶

2. Mathematical statistics

The correlation analysis (Pearson's correlation coefficient) in SPSS19.0 was used to eliminate the target that the correlation is too strong, which

may lead to repeated measurement, using factor analysis, screening factors, classifying and naming factors, and using percentile method to formulate evaluation criteria.⁷

Ethical Compliance

Research experiments conducted in this article with animals or humans were approved by the Ethical Committee and responsible authorities of Guangzhou Xinhua University following all guidelines, regulations, legal, and ethical standards as required for humans or animals.

RESULTS

Word Frequency Screening Indicator

There is a big gap in the control level of sports training at home and abroad, the domestic youth basketball training, especially the monitoring of grassroots training, is still in the experience stage, the level of using scientific methods to obtain and analyze information is low, while foreign coaches attach great importance to using scientific methods to obtain sufficient information, and use scientific quantitative analysis methods to analyze information and assist training.

The author uses the ROSTCM6 content mining system to conduct word frequency statistics on 75 articles about basketball-specific physical fitness in 16 core sports journals included in CNKI, and based on the statistical results, establish a primary selection index system for the special physical fitness of young men's basketball players.⁸ According to the opinions of experts, it is determined that the index whose single word frequency accounts for more than 30% of the total word frequency is included in the primary selection index system. As shown in Table 1, the special physical fitness index system for the primary selection includes a total of 5 first-level indicators and 19 second-level indicators.

After establishing the evaluation standard of the single index, according to the weight of each special physical fitness index, the grade evaluation standard $O = \sum \beta_i R_i$ of the secondary index and the comprehensive level of physical fitness is determined, in the formula, R_i is the index system, the score of the secondary indicator i selected under the primary indicator; β_i is the weight of the secondary index i . The comprehensive score of athlete's special physical fitness, that is, the sum of the three first-level index scores $W = O_1 + O_2 + O_3$, among them, O_1 , O_2 , O_3 represent the scores (weighted) of the two first-level indicators, respectively. After calculating W , the special physical fitness development level of Chinese youth male players can be sorted. As shown in Table 2.

Carry out special physical fitness evaluation

Through the construction of the special physical fitness index evaluation system and the formulation of the evaluation standards formulated in this study, the special physical fitness of 80 youth basketball players participating in the 2020 National U19 Youth Men's Basketball Competition was systematically evaluated, in this way, we can understand the status

Table 1. Primary indicators of specific physical fitness of young men's basketball players.

First-level indicator	Secondary indicators	Number of indicators
Speed quality	5m sprint, 10m sprint, 30m, 50m, 100m	5
Strength quality	1min sit-ups, grip strength, back throw medicine ball, standing long jump, sit-ups	5
Endurance quality	1000m run, pull-ups	2
Sensitive qualities	10m*4 turnaround run, cross jump, forward and backward run, sprint before turning left/right line	5
Flexibility	Sitting forward flexion, three-dimensional forward flexion	2

Table 2. Grade evaluation criteria of special physical fitness indicators for young men's basketball players.

First-level indicator	Inferior [0,10%]	Lower-middle [10%, 25%]	Medium [25%, 75%]	Upper-middle [75%, 90%]	Superior [90%, 100%]
Speed quality	<1.8	[1.8,2.1]	[2.1,3.1]	[3.1,3.6]	≥3.6
Strength quality	<0.2	[0.2,0.4]	[0.4,1.4]	[1.4,1.6]	≥1.6
other qualities	<1.2	[1.2,1.7]	[1.7,2.9]	[2.9,3.6]	≥3.6
overall ratings	<4.4	[4.4,5.1]	[5.1,6.4]	[6.4,7.6]	≥7.6

quo of different youth basketball players' special physical fitness levels, and find out the deficiencies in their special physical fitness, advantages, provide a basis for the formulation of targeted special physical training plans in the future, improve the scientific degree of physical training, Table 3 shows the evaluation results of the special physical fitness indicators of different young men's basketball players.

As shown in Table 4, among the 80 young men's basketball players surveyed, 37 of them had the most moderate comprehensive scores in specific physical fitness, accounting for 46.25%; There were 12 and 11 people with a comprehensive physical fitness score of lower-middle and lower, upper-middle and above, accounting for 15% and 13.75%, respectively. On the whole, the specific physical fitness level of young men's basketball players is mainly at the medium level, and the proportion of good specific physical fitness levels is not high, this is a common problem among young men's basketball players in my country at this stage.

The reasons are as follows: 1) The concept of physical fitness training for basketball players is lagging behind, emphasising basic training, despising physical training, and the physical training system is still immature; 2) Physical training methods are lagging behind, taking strength training as an example, it is still dominated by barbell weight-bearing and squatting, there is a lack of core strength training and functional sports training, and some novel training methods are rarely used.⁹

DISCUSSION

Basketball is a highly confrontational, fast and changeable speed-strength sport, which has high requirements on the physical fitness of basketball players. The physical fitness level of basketball players is generally reflected by four factors: speed, strength, endurance, and psychological function. When performing physical training for athletes, the principle of speed training as the core and strength training as

Table 3. Partial evaluation results of specific physical fitness indicators for different young men's basketball players.

Serial number	Speed quality	Strength quality	Other qualities
1	Lower-middle	Superior	Medium
2	Upper-middle	Inferior	Medium
3	Medium	Medium	Lower-middle
4	Upper-middle	Medium	Upper-middle
5	Medium	Medium	Upper-middle
6	Lower-middle	Medium	Medium
⋮	⋮	⋮	⋮
80	Medium	Medium	Medium

Table 4. Comprehensive evaluation results of special physical fitness indicators for young men's basketball players.

Grade range	Overall ratings	Proportion of people
Inferior	<4.1	13.75%
Lower-middle	[4.4,5.1]	15%
Medium	[5.1,6.4]	46.25%
Upper-middle	[6.4,7.6]	18.75%
Superior	≥7.6	6.25%

the basis should be adhered to.¹⁰ When evaluating the level of physical fitness training of athletes, first-level indicators and second-level indicators should be reasonably set. After the first-level indicators are determined, the second-level indicators should be determined, and the weights and evaluation standards of the second-level indicators should be reasonably set.

CONCLUSION

The author's evaluation of the special physical fitness level of athletes in the 2020 national U19 youth men's basketball competition shows that, the specific physical fitness level is not high, mainly at the medium level, the reason may be that the concept and training methods of physical fitness training lag behind. It is suggested that scientific special physical fitness assessment should be carried out in future training, according to the evaluation results, the strengths and weaknesses of physical fitness training of male basketball players are understood, and a targeted training plan is designed to improve the scientific degree of physical fitness training of young male basketball players and improve the level of special physical fitness.

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