FUNCTIONAL TRAINING METHODS FOR BASKETBALL PLAYERS

MÉTODOS DE TREINAMENTO FUNCIONAL PARA JOGADORES DE BASQUETEBOL

MÉTODOS DE ENTRENAMIENTO FUNCIONAL PARA JUGADORES DE BALONCESTO

ORIGINAL ARTICLE
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ABSTRACT

Introduction: Although exercise development has shown great theoretical progress, there are still many problems regarding the current sports teaching process in physical fitness training dedicated to basketball. One of the current needs is the evaluation of the current training methods of its players and the functional introduction method in this scenario. Objective: Explore the physical characteristics and functional training methods in different positions of basketball players. Methods: A literature search was conducted to survey the current scientific practices and the athletes of the second national men's and women's basketball team who participated in a winter training from January 10 to March 10, 2019 were taken as the objects of study, also considering the different positions of the active athletes of the CBA, WCBA, NBA and WNBA. Results: The results showed that the average blood lactate level of the second national women's basketball team was 11.19mmol/L, slightly lower than the national women's team (11.8±1.2mmol/L), indicating that the athletes' anaerobic capacity reached a high level. Conclusion: Basketball players in different positions have different demands regarding physical characteristics and training methods. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Basketball; Physical Education and Training; Fitness Trackers.

RESUMO

Introdução: Embora o desenvolvimento de exercícios tenha apresentado grandes progressos teóricos, ainda há muitos problemas quanto ao atual processo de ensino esportivo no treinamento de aptidão física dedicado ao basquetebol. Uma das necessidades atuais é a avaliação dos métodos de treinamento atual de seus jogadores e o método de introdução funcional neste cenário. Objetivo: Explorar as características físicas e os métodos de treinamento funcional em diferentes posições dos jogadores de basquetebol. Métodos: Efetuou-se uma pesquisa bibliográfica para levantamento das práticas científicas atuais e tomou-se como objetos de estudo os atletas da segunda equipe nacional masculina e feminina de basquetebol que participaram de um treinamento de inverno de 10 de janeiro a 10 de março de 2019, considerando também as diferentes posições dos atletas ativos da CBA, WCBA, NBA e WNBA. Resultados: Os resultados mostraram que o nível médio de ácido láctico no sangue das atletas da segunda equipe nacional feminina de basquetebol foi de 11,19mmol/L, o que foi ligeiramente inferior ao das atletas da seleção nacional feminina (11,8±1,2mmol/L), indicando que a capacidade anaeróbica das atletas atingiu um nível elevado. Conclusão: Jogadores de basquetebol em diferentes posições têm diferentes exigências quanto às características físicas e métodos de treinamento. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Basquetebol; Educação Física e Treinamento; Monitores de Aptidão Física.*

RESUMEN

Introducción: Aunque el desarrollo de los ejercicios ha presentado un gran progreso teórico, todavía existen muchos problemas en relación con el proceso actual de educación deportiva en el entrenamiento de la condición física dedicado al baloncesto. Una de las necesidades actuales es la evaluación de los métodos actuales de entrenamiento de sus jugadores y el método de introducción funcional en este escenario. Objetivo: Explorar las características físicas y los métodos de entrenamiento funcional en diferentes posiciones de los jugadores de baloncesto. Métodos: Se realizó una búsqueda bibliográfica para sondear las prácticas científicas actuales y se tomaron como objeto de estudio los deportistas de la segunda selección nacional de baloncesto masculina y femenina que participaron en un entrenamiento de invierno del 10 de enero al 10 de marzo de 2019, considerando también las diferentes posiciones de los deportistas en activo de la CBA, WCBA, NBA y WNBA. Resultados: Los resultados mostraron que el nivel medio de ácido láctico en sangre de las atletas del segundo equipo nacional de baloncesto femenino era de 11,19mmol/L, ligeramente inferior al de las atletas del equipo nacional femenino (11,8±1,2mmol/L), lo que indica que la capacidad anaeróbica de las atletas alcanzó un nivel elevado. Conclusión: Los jugadores de baloncesto en diferentes posiciones tienen diferentes exigencias en cuanto a características físicas y métodos de entrenamiento. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

Descriptores: *Baloncesto; Educación y Entrenamiento Físico; Seguidores de la Aptitud Física.*

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INTRODUCTION

An important feature of competitive sports is to constantly explore the competitive potential of athletes in order to continuously improve the level of sports technology. From the first Olympic Games to the present, sports training has roughly experienced four stages: natural development stage, new technology stage, large amount of sports stage and multidisciplinary comprehensive utilization, that is, scientific training stage.[1] The goal of each stage of progress and training is to best promote the improvement of athletes' physical ability and maximize the development of athletes' competitive ability. With the continuous improvement of modern competitive level, the competition is becoming increasingly white hot. As one of the main elements of competitive ability, the physical development level plays a more and more prominent role in modern competitive sports.[2] It has become the goal of modern sports training to explore and study the basic theories and methods of developing athletes' physical fitness, seek the best theoretical model of physical fitness training, and make physical fitness training more scientific, systematic and optimal. In recent years, many scholars at home and abroad have conducted various research on physical fitness and achieved many research results, but on the whole, they still lag behind the training practice, and the existing research has not formed a systematic and complete understanding.

SUBJECTS AND METHODS

Literature method

By consulting a large number of documents on functional physical training and juvenile basketball physical training, this study grasps the development status and future trend of juvenile athletes' physical training in a country as a whole, and then analyzes the problems existing in juvenile physical training, so as to lay a solid theoretical foundation for this study. The main data resources used in this study are: a National Journal Network full-text database (CNKI), Baidu academic search engine, hundred chain cloud search engine, EBSCO, SCI, Elsevier and other retrieval platforms. Search keywords or subject words mainly include: teenagers, basketball, physical training, functional training, functional physical training, strength training, anaerobic ability, sensitivity training, etc.

Expert interview method

For the interview outline of athletes in sports injury rehabilitation training, male and female basketball experts of the professional league of full-time fitness coaches visited some coaches, basketball theorists, academics and individuals in China for training in the club, and obtained valuable opinions and suggestions. The experts interviewed are shown in Figure 1.

Questionnaire survey method

On the basis of theoretical research and investigation and interview, a questionnaire is designed for all links of physical fitness training and the results of theoretical application of male basketball players in colleges above level 2.[3] In order to ensure the validity of the questionnaire, the first draft of the questionnaire for coaches and athletes was presented to 30 experts, and the purpose of the study was explained. After obtaining their valuable opinions, suggestions and questions were integrated, and then the questionnaire was modified and improved. Finally, experts were asked to test the validity of the questionnaire.

Experimental results

The ability of the human body to exercise is inseparable from the supply of oxygen. The ability of the human body to transport oxygen mainly depends on the function of the cardiovascular system and the content of hemoglobin in the blood. Cardiac function index is a simple index developed by the Swedish Sports Federation to measure the cardiovascular function of athletes. The evaluation standard generally used for elite athletes is: the index is less than or equal to 0, the heart function is the best; 0-5 is better; 6-10 is average; 11-15 is poor; greater than 16 is the worst. Studies have shown that the cardiac function index of outstanding female middle-distance runners is 2.3±0.22; studies have shown that the cardiac function index of soldiers is 7.4±3.1, indicating that the cardiac function index test is suitable for Chinese athletes.[4] The diagnostic test results in this paper show that the cardiac function indexes of the second national women's basketball team and the national youth women's basketball team are 7.39±2.65 and 7.16±2.43, respectively. Compared with the evaluation standards of elite athletes, they basically belong to the general category. From the perspective of hemoglobin content, the average values of the two teams were 12.68±0.64g% and 12.45±1.20g%, both of which belonged to the normal range. Figure 2:

All the energy of human movement comes from aerobic metabolism and anaerobic metabolism. Therefore, the function of aerobic metabolism and anaerobic metabolism of athletes largely determines their exercise ability. Maximal oxygen uptake and blood lactic acid tolerance are the most important indicators reflecting aerobic and anaerobic metabolic functions of athletes.[4] Figure 3 of the diagnostic test results in this paper shows that the relative value of the maximum oxygen uptake of the athletes of the second national women's basketball team before the start of winter training is 42.56±2.92ml/kg/min, which is far lower than the value of 53.73±4.55ml/kg/min of the National Women's basketball team reported by Chen Dechun and others, and also lower than the athletes of the National Women's

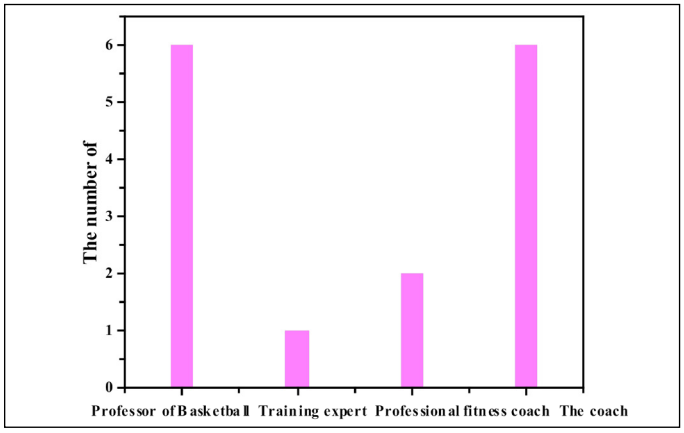

Figure 1. Interviewed experts.

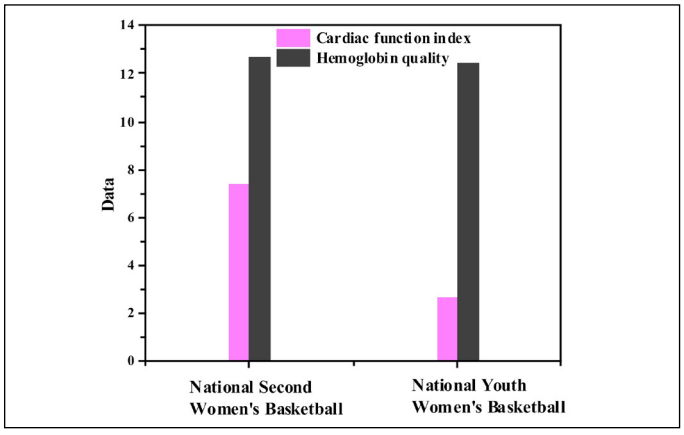

Figure 2. Statistical table for comparison of heart function index and hemoglobin content between national second women's basketball team and National Youth Women's basketball team before winter training.

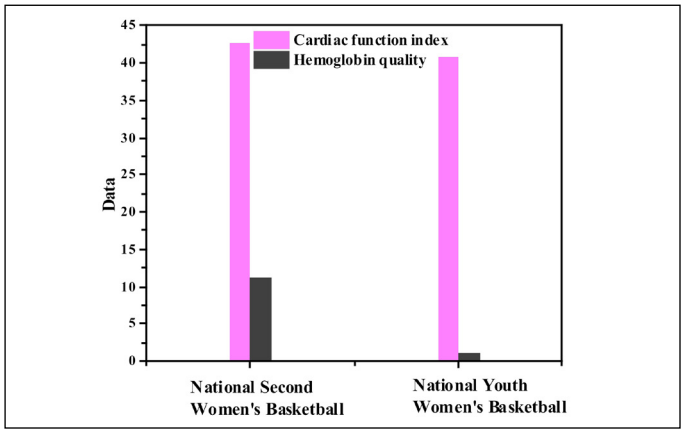

Figure 3. Statistics of maximum oxygen uptake and blood lactic acid before winter training of national second women's basketball team and National Youth Women's basketball team.

handball team (52.4±4.1 ml/kg/min), indicating that the aerobic capacity of the athletes is not ideal.[5] The measurement of lactic acid resistance adopts the maximum intensity run of 5x300 m, 4 min in each interval, and blood is taken 3 min after the fifth 300 m run. The results show that the average value of blood lactic acid of the athletes of the second national women's basketball team is 11.19mmol/L, which is slightly lower than that of the National Women's basketball players (11.8±1.2mmol/L), indicating that the anaerobic ability of the athletes has reached a high level.[6]

"Functional physical fitness training pyramid" was proposed by Dr. Yan Qi in his doctoral thesis. It is the basic framework of functional physical fitness training of national women's handball team in preparation for the 2012 London Olympic Games. The application of this model has been successful in the National Women's handball team. In its model, it is divided into three stages:[7] basic motor function training stage, general motor function training stage and special motor function training stage. The study is divided into three large exercise cycles, and the proportion of these three stages of each cycle is different. In the first large cycle, the proportion of the above three stages is 1:1:1, the proportion of the second large cycle is 1:3:2, and the proportion of the third large cycle is 1:1:3.[8] It can be seen that although the functional action pyramid model is wide at the bottom and narrow at the top, in view of the heavy competition task and tight time of the Olympic Games, a doctor's training program still focuses on more special functions, and the closer it is to the large cycle of the final competition, the higher the proportion of special training. Through an interview with a doctor, he believes that the training object of this scheme is young athletes. Except for the National Games, the number of other major competitions is less, so the training plan of order cycle can be made, and the proportion distribution of the three stages should conform to the model of wide at the bottom and narrow at the top of the pagoda.[9]

Ethical Compliance

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

DISCUSSION

The investigation shows that the injuries of basketball players usually focus on the long-term injury and inflammation caused by acute and excessive use of muscles, ligaments and bones. Chronic injury is the main injury of basketball players, which is mainly concentrated in the

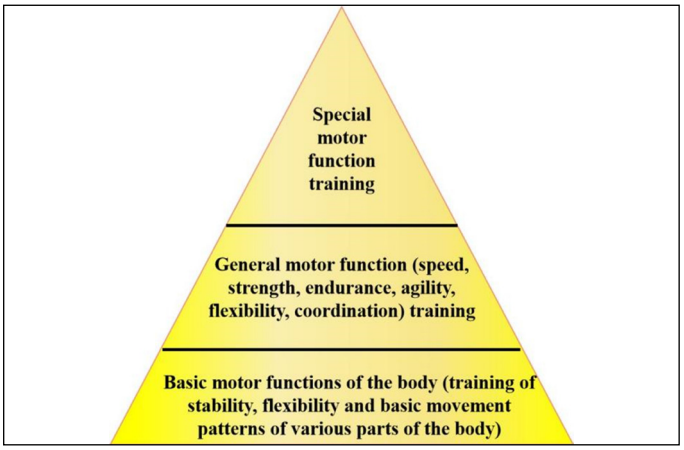

Figure 4. Pyramid model of functional physical training.

injured parts of waist, knee and ankle. In the past, sports medicine focused on recovery and rehabilitation treatment based on physiology, but ignored the importance of rehabilitation physical training and injury prevention physical training. It leads to the repeated injury of basketball players and the long recovery time. At the same time, due to the influence of injury and the lack of in-depth understanding of physical training, the risk of sports injury increases unconsciously. Combined with the sports injury of Chinese basketball players and the shortcomings of physical training, this paper constructs the framework system of injury preventive physical training, mainly including training principles, evaluation system, content framework, stage division and effect monitoring. Through the evaluation and diagnosis of athletes' physical state and real-time monitoring, the training quality and training load control of physical training are ensured, so as to effectively reduce the risk of sports injury. In addition, through the eight basic injury preventive physical fitness tests of athletes, we can carry out targeted training, so as to improve the ability of athletes to prevent sports injury. After being troubled by sports injury, we can maintain their sports competitive state through functional training and sports medical treatment scheme, and restore their original competitive state in a short time and then improve it. Injury preventive physical training can effectively improve the players' basic abilities in the early stage of the competition for the players to use during the competition period. Through monitoring and adjusting the proportion and other measures, the players can maintain the peak of their body during the League period without any decline in all data. Injury preventive physical training can also effectively improve the physical quality of players, so as to reduce the occurrence of sports injuries.

CONCLUSION

It can be seen from the experiment that injury-preventive physical training can also effectively improve the physical fitness of players, thereby reducing the occurrence of sports injuries, and even during recovery, it can help players reduce the decline in the ability of the injured part and reduce the time for recovery to keep up with the progress. Injury preventive physical training, this year's players, after the implementation, the injury rate is far lower than the league average, and through the T test to prove that the intervention of Yang's injury preventive physical training has a significant effect on the physical fitness of the players. Hope In the future, there will be opportunities to implement more widely, and build a more complete model through more data feedback, so that more players can benefit.

All authors declare no potential conflict of interest related to this article

AUTHORS' CONTRIBUTIONS: Each author made significant individual contributions to this manuscript. Jie Wu: writing and data analysis; Yu Huang: article review and intellectual concept of the article.

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