TRAINING INTENSITY ADJUSTMENT BY CARDIAC MONITORING IN YOUNG ATHLETES

AJUSTE DE INTENSIDADE NO TREINO POR MONITORAMENTO CARDÍACO EM JOVENS ATLETAS

AJUSTE DE LA INTENSIDAD EN EL ENTRENAMIENTO MEDIANTE LA MONITORIZACIÓN CARDÍACA EN JÓVENES ATLETAS

Lin Hou[1] (iD)
(Physical Education Professional)

1. Sangmyung University, Department of Physical Education, Seoul, South Korea.

Correspondence:
Lin Hou
Seoul, South Korea, 03016.
LinHou6@126.com

ABSTRACT

Introduction: Cardiac monitoring can provide critical information for basketball training among young athletes. Using the data collected, adjustments on exercise load increase, workouts intervals, and the recovery time for each athlete can be made. It is believed that these indexes will provide fine-tuning in quantity and quality training. Objective: Explore cardiac monitoring in the sports training center of young basketball players. Methods: Two male basketball players were selected, using the Polar® brand heart rate monitoring team management system, to monitor the change in heart rate between positions and in different training periods. Results: The measured maximum heart rate is between 181 and 192 BPM. During training, the average heart rate of the team was 146 BPM, the intermittent heart rate was between 99 and 121 BPM, the average difference in players' heart rate recovery was 74 times. Conclusion: This study proves that heart rate can be an effective monitoring indicator. The monitoring index can contribute profoundly to training among young basketball athletes, allowing coaches the adjustment of intensity and type of training with a practical evaluation method. ***Evidence Level II; Therapeutic Studies - Investigating the result.***

Keywords: ADOLEC; Sports; Heart Rate.

RESUMO

*Introdução: O monitoramento cardíaco pode fornecer informações importantes para o treino de basquete entre jovens. Com os dados coletados, pode-se ajustar o aumento de carga de exercícios, intervalos entre treinos e tempo de recuperação de cada atleta. Acredita-se que esses indexadores poderão proporcionar um ajuste fino na quantidade e qualidade do treinamento. Objetivo: Explorar o monitoramento cardíaco no centro de treinamento esportivo de jovens jogadores de basquete. Métodos: Dois jogadores de basquete masculino foram selecionados, usando o sistema de gerenciamento da equipe de monitoramento de batimentos cardíacos finlandês da marca Polar®, monitorar a mudança da frequência cardíaca entre as posições e nos diferentes períodos de treinamento. Resultados: A frequência cardíaca máxima medida está entre 181 BPM e 192 BPM. Durante o treinamento, a frequência cardíaca média da equipe foi de 146 BPM, a frequência cardíaca intermitente está entre 99 e 121 BPM, a diferença média de recuperação da frequência cardíaca dos jogadores é de 74 vezes. Conclusão: O presente estudo comprova que a frequência cardíaca pode ser um indicador de monitoramento eficaz e o índice de monitoramento pode contribuir profundamente no aprimoramento do treino entre jovens esportistas de basquete, permitindo o ajuste de intensidade e tipo de treino pelos treinadores, com um método de avaliação eficaz. **Nível de evidência II; Estudos Terapêuticos - Investigação de Resultados.**

Descritores: *ADOLEC; Esportes; Frequência Cardíaca.*

RESUMEN

*Introducción: La monitorización cardíaca puede proporcionar información importante para el entrenamiento de baloncesto entre los jóvenes atletas. Con los datos recogidos, es posible ajustar el aumento de la carga de los ejercicios, los intervalos entre los entrenamientos y el tiempo de recuperación de cada atleta. Se cree que estos índices podrán proporcionar un ajuste fino en la cantidad y la calidad de la formación. Objetivo: Explorar la monitorización cardíaca en el centro de entrenamiento deportivo de jóvenes jugadores de baloncesto. Métodos: Se seleccionaron dos jugadores de baloncesto de sexo masculino y se utilizó el sistema de gestión de equipos de monitorización de la frecuencia cardíaca de la marca finlandesa Polar® para controlar el cambio de la frecuencia cardíaca entre las posiciones y en diferentes períodos de entrenamiento. Resultados: La frecuencia cardíaca máxima medida está entre 181 BPM y 192 BPM. Durante el entrenamiento, la frecuencia cardíaca media del equipo fue de 146 BPM, la frecuencia cardíaca intermitente está entre 99 y 121 BPM, la diferencia media en la recuperación de la frecuencia cardíaca de los jugadores es de 74 veces. Conclusión: El presente estudio demuestra que la frecuencia cardíaca puede ser un indicador de seguimiento eficaz y el índice de seguimiento puede contribuir profundamente en la mejora del entrenamiento entre los jóvenes deportistas de baloncesto, permitiendo el ajuste de la intensidad y el tipo de entrenamiento por parte de los entrenadores, con un método de evaluación eficaz. **Nivel de evidencia II; Estudios terapéuticos - Investigación de resultados.***

Descriptores: *ADOLEC; Deportes; Frecuencia Cardíaca.*

INTRODUCTION

In physical training and physical exercise, how to master and control the appropriate exercise load is the key to improving the athletic performance of young basketball players. Most basketball coaches have different opinions on the arrangement of exercise volume and intensity in training, and whether the recovery time between groups is reasonable.[1] Especially in the grass-roots amateur training, when they make a training plan, often only rely on one's own sensory experience and subjective estimation, one-sided emphasis on a certain aspect, or ignoring the coordination of the three, this approach is not scientific enough and has a certain degree of blindness.[2] In order to solve this problem, people have obtained a lot of practical research: The pulse monitoring method is the simplest, practical and scientific method, because the change of pulse is the physiological load reflected by a certain amount of stimulation on the human body, it is the internal reflection of the body, so it can objectively test the actual training effect of athletes.[3] Sundararajan P believes that pulse is the physiological load reflected by a certain stimulus after it acts on the human body, it is the internal reflection of the body, so it can objectively test the actual training effect of athletes.[4]

METHOD

Research objects

Twenty male basketball players from a provincial sports school were randomly selected as the experimental subjects of this study. They were 13-15 years old, with an average height of 177cm and a training period of 3-6 years. (Table 1)

Research methods

Scientific theories are analyzed and tested with the help of time. Through testing and research, perform statistical processing on the experimental data obtained, and review the results of all those who participated in the test, at the same time, the advanced Polar heart rate monitor team management system is used to control the analysis software, carry out careful analysis and research on the obtained data, and use the relevant knowledge of statistics for analysis.[5]

Experimental method

Selection of experimental equipment

The measuring instrument used is the Finnish Polar heart rate monitor (team type), the analysis software used is Polar Pro-Trainer 5, its advantage is mainly reflected in its ability to continuously work and record heart rate for up to 11.5 hours, and it can record data every 5 seconds. Through the analysis software, the athlete's heart rate curve, heart rate distribution graph, heart rate list, heart rate segment summary and other data graphs can be accurately read during the test. The heart rate change curve is mainly for analyzing the data of the athlete's heart rate change during training with an intuitive curve rise and fall graph, the

heart rate distribution graph shows the percentage of the athlete's heart rate in this training during the test time, the heart rate list can clearly see the specific heart rate value of the athlete every 5 seconds in the test phase through the data column, the heart rate segment summary shows the percentage of the athlete's heart rate under the target heart rate, within the target heart rate range, and higher than the target heart rate during the training period.[6]

Specific test methods

Two tests were conducted on 20 athletes at the same time (special intensity training course was selected for the first test, and teaching competition training course was selected for the second test, the two tests were conducted at a time interval of 1 week, and the teaching competition training course was conducted in two groups at the same time), before the start of each training session, wear a polar heart rate belt for athletes, using the team receiving device supporting the instrument to adopt wireless real-time monitoring, and record the heart rate change data of each exercise, after the training, the heart rate belt is recovered and the data is saved at the same time. In the morning of each training session, the trainer will test the basic heart rate of each athlete and record it.[7] (Table 2)

Table 2. Contents of special training courses.

Curriculum	Course content	Class time
Preparation part	1 Field jogging	20min
	2 Muscle stretching	
	3 Dynamic joint surround	
Main content part	1 Strictly control the time for each section 12min	67min
	2 The content of each section is: Technical contact Passing practice Interspersed running exercises Sensitive practice	
End part	1 Jogging to relax	10min
	2 Active stretch, passive stretch and relax	

RESULTS

Experimental results

In order to analyze the monitoring results, we must first classify the heart rate segments. Check relevant information, integrating the classification methods of exercise intensity in the two books "Sports Training" and "Exercise Physiology", the exercise intensity is divided into the following 4 levels:

- The first level is high intensity, with a heart rate higher than 180 beats per minute;
- The second stage is the second high intensity, with a heart rate of 161 beats/minute to 180 beats/minute;
- The third level is medium intensity, with a heart rate of 121 beats/minute to 160 beats/minute;
- The fourth level is low intensity, with a heart rate of less than 120 beats per minute.

Analysis of the results of heart rate monitoring in the special intensity training class

It can be seen from Table 3 that the maximum heart rate of an athlete during training is between 175 beats/min and 184 beats/min, the intermittent heart rate is between 110 beats/min and 126 beats/min. Basketball is a high-intensity sport, through intermittent rest heart rate measurement, the coach can grasp the lowest value of the athlete's heart rate during the rest interval, it can directly reflect the athlete's heart rate recovery level.[8,9]

Table 1. Basic situation of athletes.

Players	Age	Height	Training years	Players	Age	Height	Training years
1	13	176	3	11	15	181	3
2	14	177	5	12	14	182	4
3	13	186	4	13	15	172	3
4	14	182	4	14	15	169	6
5	14	170	6	15	15	177	4
6	14	189	4	16	15	180	6
7	14	171	5	17	13	179	6
8	13	176	3	18	15	175	4
9	14	173	5	19	15	178	3
10	13	175	5	20	14	176	3

Monitoring and analysis of training center rate in different locations

Count the changes in the heart rate of the forward, center, and guard in the two training sessions. Analyzing Figure 1, we can find that, the corresponding training period of different players for their positions, the percentage of each heart rate segment is basically the same, this means that there is no big difference in training various heart rate segments in different positions, therefore, in training, it should be based on the contrast trend of the energy consumption difference required by different positions during the competition, to arrange different training content for different players, so that they can better play their abilities when they are in that position on the field, it is extremely important for the whole team to win the game, it can also better develop and promote the development of their athletic ability and the improvement of their athletic performance, it also makes their performance in this position more personal.

Figure 1. Heart rate percentage distribution of training centers in different locations.

Table 3. Heart rate monitoring results of special intensity training sessions.

Serial number	Basal heart rate	Maximum heart rate	Average heart rate	Intermittent heart rate	Recovery difference
1	51	181	151	118	63
2	54	178	145	116	62
3	55	179	150	110	69
4	54	177	147	121	56
5	57	180	157	119	61
6	53	176	146	118	58
7	60	181	143	117	64
8	61	182	143	117	64
9	52	184	139	120	64
10	54	180	121	124	56
11	55	178	153	122	56
12	59	176	151	117	59
13	61	180	153	119	61
14	62	175	158	122	53
15	64	183	150	121	62
16	61	179	148	126	53
17	59	182	147	120	62
18	58	180	149	119	61
19	56	179	151	118	61
20	55	178	156	117	61
Average value	57	179	150	118	60

DISCUSSION

In youth basketball training, pulse monitoring is an important basis for a reasonable increase in exercise load. The pulse monitoring method is used to control the interval time between various trainings, not only can the coaches accurately grasp the quantity and quality of training, and you can learn about the athlete's recovery status. Through a period of pulse monitoring training, it is found that the pulse of the athletes has changed to a certain extent.[10] Athletes' abilities in form, function, athletic quality, etc. have been improved. In each small period of training, train according to the same exercise load, after one cycle, the athlete's pulse will decrease, and the amount of exercise in the early stage increases with the extension of the training cycle, the various systems of the human body have transitioned from the stage of non-adaptation to the stage of adaptation, this is how training adaptation comes about——Not fit——Adapt again and again and gradually improve, promote the next adaptation, only when the training adaptation occurs, the training plan is changed in time, and the appropriate load is increased is an important guarantee for improving sports performance.

CONCLUSION

Through this experimental research, i think: The training of relevant professional qualities of grassroots physical education teachers should be continuously strengthened to improve the scientific nature of amateur training, reduce blindness. It is suggested that the pulse monitoring method should be further promoted and used in the amateur training at the grassroots level to increase practical experience and explore its rules.

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