

Yunnan Normal University Students Prepare for the 15th in Yunnan Province Track and Field Games, Physiological and Biochemical Indicators Research Report

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Abstract: With the continuous improvement of the level of track and field sports, the intensity of athletes' training load is also increasing. Therefore, in the process of athletes' training, through the application of physiological and biochemical methods and corresponding index monitoring and data analysis, we can objectively measure the athletes' sports state and physical function state. It provides reference and reasonable suggestions for scientific and reasonable arrangement of training load, prevention of overtraining, keeping athletes in the best state of movement, and improving athletic performance and sports injury.

1. Introduction

The track and field sports have the characteristics of great intensity and high energy consumption, which is closely related to the Athlete's own sports function. In the track and field competition, the Athlete's functional state directly affects the special training effect and the exertion of the athletic level. Therefore, keep abreast of athletics competitor function has become an important part of scientific training. By making a scientific and reasonable training plan, the athletes can recover from sports fatigue quickly, and the training effect is obvious. Also, it contribute to an ideal competitive level.

2. The Measurement Result and Content Analysis of Hemoglobin Index of Athletes

Table 1 Changes of hemoglobin (g/L)

Name	First Time	Second Time	Third Time	The First Change	The Second Change	Overall Change
Sha Guangxu	216	176	189	-18.50%	7.39%	-12.50%
Xu Fan	164	181	214	10.36%	18.23%	30.49%
Zi Yuhang	166	167	176	0.60%	5.39%	6.02%
Huang Guilin	156	150	146	-3.80%	-2.67%	-6.41%
Yang Wangyun	120	175	130	45.83%	-25.70%	8.33%
Tian Jingsong	199	136	209	-31.66%	53.68%	5.02%
Ji Yujun	153	146	163	-4.58%	11.64%	6.53%

Jiang Xu Shuhao	154	176	134	14.29%	-23.86%	-12.99%
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According to the analysis of the changes of hemoglobin of the athletes after several exercises, the hemoglobin of the Athletes Sha Guangxu, Huang Guilin and Jiang Xu Shuhao showed a decreasing trend after a period of training---Sha Guangxu and Jiang Xushuhao are even reduced by more than 10%. If such phenomenon continues, it will affect their competition results. They should adjust their training plan and nutrition intake in time. Medication also should be given when necessary.

Table 2 Variation Characteristics of hemoglobin (HB) concentration

Name	Sample Size	Minimum	Maximum	Average	Standard Deviation	T	P
First Time	8	120	216	166	29.573	15.877	0.000**
Second Time	8	136	181	163.375	16.936	27.284	0.000**
Third Time	8	130	214	170.125	32.458	14.825	0.000**

* p<0.05 ** p<0.01

The changes and characteristics of the hemoglobin concentration of the athletes were carefully analyzed and considered through the test of paired sample T, and the hemoglobin concentration showed firstly decreasing and then increasing; after adjustment, it is reduced to a relatively stable state, which shows that the athletes' adaptability is good and their physical function is at a better level or above. The P value of the three experiments is less than 0.05, which shows that the results of the three experiments are quite different. Because of the number of samples is relatively small, in order to analyze the changes of athletes more directly and in detail, the following statistics were made on the hemoglobin data of athletes:

3. The Measurement Result and Content Analysis of Blood Lactic Acid Index of Athletes

Table 3 Measurement of Blood Lactate(Mmol/l)

Name	First Blood Lactate			Second Blood Lactate			Third Blood Lactate		
	Before practice	Training	10 Min after training	Before practice	Training	10 Min after training	Before practice	Training	10 Min after training
Sha Guangxu	1.1	5.9	2.2	2.1	6.9	2.7	2.6	11.8	8.2
Xu Fan	1.5	4.5	2.4	1.0	5.5	2.4	1.0	8.0	2.3
Zi Yuhang	1.2	5.2	1.9	1.2	7.2	4.9	1.1	8.9	3.4
Huang Guilin	1.7	3.2	2.6	1.7	5.2	1.6	0.9	8.6	1.3
Yang Wangyun	1.3	3.0	2.5	1.3	5.3	2.5	0.8	6.7	1.6
Tian Jingsong	2.3	4.2	1.5	1.5	7.2	2.3	1.3	8.2	1.7
Ji Yujun	2.7	8.4	4.9	1.7	7.4	2.9	1.6	4.9	1.0
Jiang Xu Shuhao	1.6	6.1	2.1	1.6	6.1	1.9	1.2	8.9	2.1

According to the data in the sample table, the concentration of blood lactic acid of eight athletes was between 1.0 mmol/l and 2.0 mmol/l before training. Some athletes, such as Tian Jingsong and Ji Yujun, had slightly higher concentrations of blood lactic acid (2.0 mmol/l), which could be attributed to the increased activity of adrenal gland secretion and tissue energy consumption. For avoiding unnecessary energy use, they should reduce their pre-race jitters.

Table 4 Changes of blood lactate (mmol/L)

Name	Blood lactic acid during the first training	Blood lactic acid during the second training	Blood lactic acid during the third training
Sha Guangxu	5.9	6.9	11.8
Xu Fan	4.5	5.5	8.0
Zi Yuhang	5.2	7.2	8.9
Huang Guilin	3.2	5.2	8.6
Yang Wangyun	3.0	5.3	6.7
Tian Jingsong	4.2	7.2	8.2
Ji Yujun	8.4	7.4	4.9
Jiang Xu Shuhao	6.1	6.1	8.9

According to the analysis of blood lactic acid concentration of eight athletes in three training sessions, the blood lactic acid concentration of Ji Yujun is getting lower and lower in the training sessions. The analysis shows that the ATP-CP system of the athletes is low in reserve and their anaerobic capacity is weak, which requires special training. Several other athletes in the training have higher blood lactic acid concentration increase, which means their training intensity is much too high, and it's needed to pay attention to reduce training intensity, giving athletes a proper rest.

Table 5 blood lactate reduction rate

Name	The first exercise reduced the rate of blood lactate	The second exercise reduced the rate of blood lactate	The third exercise reduced the rate of blood lactate
Sha Guangxu	0.63	0.61	0.30
Xu Fan	0.47	0.56	0.71
Zi Yuhang	0.63	0.31	0.61
Huang Guilin	0.19	0.69	0.85
Yang Wangyun	0.17	0.68	0.76
Tian Jingsong	0.64	0.43	0.79
Ji Yujun	0.42	0.61	0.79
Jiang Xu Shuhao	0.65	0.68	0.76

According to the table above, the recovery rate of blood lactic acid of eight athletes after three training sessions, except for Sha Guangxu and Zi Yuhang, decreased quickly. The Aerobic metabolism of Sha Guangxu and Zi Yuhang athletes decreased after the training, which may be due to the wrong training method, too high or too low training intensity, or improper diet and lack of rest, etc. . The recovery rate of blood lactic acid concentration of other athletes has increased obviously. The analysis shows that their aerobic capacity has improved obviously after training.

4. The Measurement Result and Content Analysis of Urine Protein Index of Athletes

Table 6 Changes of Urine Protein of Athletes Before and after Training

Name	Before exercise	After exercise	Difference between before and after exercise	Early the next morning after exercise
Sha Guangxu	±	1+ 30	1+ 30	1+30
Xu Fan	-	1+ 200	1+ 200	-
Zi Yuhang	±	2+ 200	2+ 200	1+30
Huang Guilin	-	2+ 200	2+ 200	-
Yang Wangyun	-	3+ 300	3+ 300	-
Tian Jingsong	-	1+ 30	1+ 30	-
Ji Yujun	-	±	-	-
Jiang Xu Shuhao	-	1+30	1+30	-

From the table, it can be seen that the urine protein content of the athletes changed obviously after the training. The positive rate of urine protein (+) reached 87.5%, which indicated that the training intensity was high, and the training place was Yunnan Normal University and located in Yunnan-Guizhou Plateau, which was in accordance with the characteristics of the events and the training schedule, the intensity of track and field sports is great, which has some pressure on the athletes' physical function stimulation and movement state. In preparing for track and field competition, we should paid great attention to the rest, so as to avoid excessive fatigue caused by overtraining. From the measurement in the early morning of the next day after exercise, the athletes generally recovered well and basically returned to their normal state, but the urine protein content of the two athletes, Sha Guangxu and Zi Yuhang, remaining at a high level and not returning to the normal state. it shows that during the course of training, the intensity of exercise is too high and the amount of training is too much, which has already exceeded the limit that the physical function of the athletes can bear, and the body is already in the state of fatigue, and the physical function has already declined, need to be properly rested and adjusted.

5. The Measurement Result and Content Analysis of Athlete's Heart Rate Index

As it can be seen clearly from the graph, the resting heart rate of all the athletes except Zi Yuhang showed a rising trend after several training sessions, and the rest heart rate of all the others decreased. Heart rate is one of the key indexes used to reflect the function of blood circulation system in human body, which can effectively reflect the training effect of athletes and the changes of physiological and biochemical conditions of the body, thus promotes the training movement quantity and the training way reasonable change. Through this training, the athletes' resting heart rate is lower and the Stroke volume is higher, which effectively improves the athletes' mental reserve, indicating that the early training has achieved good results. The increase in heart rate of athletes may be caused by special conditions such as diet or disease, which requires coaches to make reasonable changes according to the details and characteristics of their bodies. (See Fig.1)

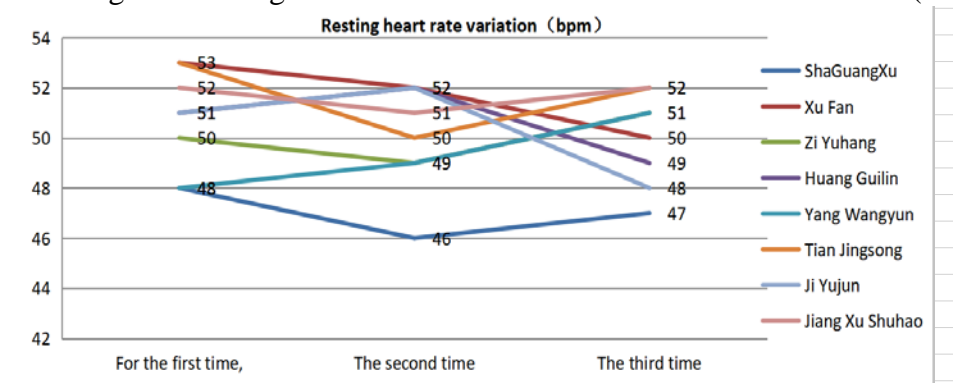


Fig.1 Resting Heart Rate Variation (Bpm)

6. Experimental Conclusions and Recommendations

During the whole training and competition process, the athletes' blood lactic acid (LAC) , hemoglobin (HB) , heart rate (HR) and urine protein (PRO) were all in a reasonable range, which showed that the athletes and the training program were in agreement on the whole, the overall physical function of the athletes is in good condition; the formulation of the Athletes' individualized training program is somewhat deficient; the two athletes, Sha Guangxu and Zi Yuhang, have physical fatigue and unreasonable diet, the training of athletes in the period of preparing for war can not be arranged without rhythm, the content of different load training should be interspersed, otherwise it tends to cause some changes of physiological and biochemical indexes, leading to physical fatigue and overtraining. Coaches should formulate a personalized program according to each athlete's different physical function condition. Sha Guangxu, Ziyuhang should pay attention to living habits, moderate rest, maintain a good diet and daily living. For athletes of different sports

events, there is no special and careful monitoring. In the course of training, we should monitor the physical condition of different events and adjust the training schedule flexibly so as to get better effect. The track and field team should improve the relevant measures to monitor the athletes' physical indicators, arranging the training and preparation plan reasonably, so as to achieve better results in the track and field games.

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