

Evaluation of Physiological and Biochemical Indexes of Volleyball Players in Training Process Based on Stage Theory of Sports Training

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Abstract: The changes of physiological and biochemical indexes of volleyball players play an important role in improving the physical fitness level of volleyball players. Therefore, based on the theory of stages of sports training, the author studies and analyses the physiological and biochemical indexes of volleyball players in the training process. The results show that the scientific monitoring of physiological and biochemical indicators is very important during the training period of volleyball players, which has a significant significance to ensure the successful completion of volleyball players' altitude training. And when conducting physical function assessment, a reasonable test plan should be developed for comprehensive and systematic monitoring and analysis.

1. Introduction

Volleyball training can improve the athletic ability and physiology of endurance athletes, and has been recognized by domestic and foreign coaches and researchers [1]. The national volleyball team conducted a four-week altitude training in Kunming. Through the tracking and monitoring of some physiological and biochemical indicators of athletes during this period, the monitoring and training effects of these indicators are discussed, which provides reference for the training of volleyball teams in China [2]. With the development of social economy and the continuous improvement of science and technology, improving the effect of sports training through scientific and technological methods has become an important means to improve the training performance of high-level athletes [3]. Due to the same attributes and differences of the project, the athletes' technical and tactical level and physical strength and other factors affecting the competition results have a mutual effect and internal relationship [4]. With the implementation of the new system of scoring per ball, the dominant position of anaerobic energy supply is more prominent. Therefore, according to the characteristics of energy supply, it is based on aerobic exercise, which combines aerobic and anaerobic energy supply [5]. Exactly speaking, when there is a ball, it is mainly anaerobic energy supply; when there is no ball and at rest, it is aerobic energy supply. At the same time, it is helpful for the coaches to have a comprehensive understanding of the athletes' physical function so as to arrange the training plan reasonably and optimally [6].

In sports training, how to ensure that athletes show the best competitive state during the scheduled competition is a primary issue related to the success of the competition. The arrangement of training load directly affects the success or failure of altitude training [7]. Therefore, it is very important to scientifically monitor the physiological and biochemical indicators of athletes during training, which has a significant significance to ensure the successful completion of athletes' altitude training. The blood lactic acid value and heart rate of volleyball players in the process of training are important indicators to measure the level of training competition [8]. Heart rate and blood lactic acid as physiological indicators are commonly used in exercise practice to reflect exercise intensity and physiological load heart rate, and as physical indicators reflect exercise intensity and physiological load in exercise practice, and also a sensitive indicator reflecting internal metabolism. At present, the research between the two at home and abroad is limited to the comparison of technology and tactics and the environment of the stadium [9]. Due to the long time

of volleyball competition, the confrontation is fierce, and the technical movements are complex and varied, higher requirements are placed on the athlete's central nervous system, cardiovascular system and respiratory system. Improving the level of sports training and adding new training methods and methods undoubtedly have important practical significance [10].

2. Methodology

A game of high level and strength can be played for up to 3 hours, and the maximum length of a game can be more than 50 minutes. The basal heart rate has a tendency to decline steadily as the level of exercise increases, indicating that the body functions well and the body adapts to the training load. According to the principles of sports measurement and the needs of research, the required test instruments, test contents and methods are strictly in accordance with the requirements of sports measurement. Therefore, in the high-level athlete training process, blood lactate value and heart rate are also used as an important scientific basis for the coach to assess the training intensity and training effect. A slight increase in HR is normal, lasting about 5 days, and then declining below the initial level of the plateau, gradually tending to a steady state. The level of blood lactic acid concentration in the body and the length of time in the body directly affect the training effect process of athletes, and play an important role in athletic performance. Therefore, the clearance rate of blood lactic acid also directly affects the athletic ability of athletes. The intensity of training reflects the degree of athletes' input and scientific and reasonable training arrangements, while the density of training reflects the quality of training and the scientific nature of training organization.

From Table 1, it can be seen that after one week of training, RBC, Hct, Hb and WBC of athletes decreased, but there was no significant difference, serum CK increased.

Table 1 Changes of Five Blood Indicators of Swimmers in Training Stage

Index	RBC	H ct	H b	WBC	CK
Before training	4.91 \pm 0.10	47.25 \pm 1.68	143.7 \pm 1.63	5.96 \pm 1.01	113 \pm 13.24
Training for 1 week	4.4 \pm 0.14	48.07 \pm 4.20	142.1 \pm 1.25	6.6 \pm 1.06	125.5 \pm 28.8
Training for 2 weeks	5.03 \pm 0.45	49.4 \pm 3.14	161.0 \pm 15.5	138.5 \pm 8.9	109.4 \pm 12.4

In the training process, the intensity and density of sports training is one of the important indicators to measure the quality and level of sports training. In normal normal state, the blood lactate concentration is below 2mmol/L, and the athlete's blood lactate quiet value is no different from normal people. After the exercise, the blood lactate value increased greatly, indicating that the exercise intensity is large. After a period of training, the increase in blood lactate is reduced, indicating that the body adapts to this training. Under normal circumstances, the basal heart rate is quite stable, and there is a tendency to decline steadily as the level of exercise increases. This indicates that the body function is good and the body adapts to the training load. . After the large amount of exercise training, the urine protein output increased 4 hours later or the next morning to fully return to a quiet level, indicating that the body adapts to this load. The reason lies in the combination of training in sandy land and hard land. Because of the small number of trainers, the enlargement of defensive area, the increase of moving and running distance, the difficulty of completing technical movements, the short gap time, and the close connection of techniques and tactics, these factors are closely related, which conform to the characteristics of volleyball training. VO₂max showed a continuous decline during the training period, indicating that the athletes' cardiopulmonary function did not adapt well to the high altitude hypoxic environment, and the training load should be strictly controlled. Because of the special competition environment, in order to make athletes control their body balance reasonably on the sandy land 30-40 cm thick, give full play to their sports ability, and successfully complete the technical and tactical cooperation, it is necessary to emphasize the physical fitness training to adapt to the sandy land. Volleyball players'

physical training methods and means are interesting and varied, which are embodied in the combination of hard ground and field in strength, speed and flexibility training.

In this survey, 19 volleyball team students of a university were selected, all of them were in grade 3-4. The basic information of their height, age and weight were counted. The specific statistics are shown in Table 2.

Table 2 Basic situation of experimental subjects

Group	Age	Height	Weight	Training years
Volleyball team students	23 \pm 1.9	170 \pm 4.7	65 \pm 6.5	1.5 \pm 0.5

3. Result Analysis and Discussion

Exercise causes the increase of glomerular filtration rate, which makes some macromolecular substances enter the urine. Therefore, the biochemical analysis of urine after exercise is helpful to understand the intensity of training load and the state of athletes' function. The significant decrease of RBC may be attributed to the peak of altitude training, high intensity of training and more broken red blood cells. Hct and Hb also decreased. Heart rate is an important index to evaluate the physical recovery after training. Heart rate recovery rate is an important index to evaluate the recovery of heart rate. Therefore, heart rate recovery rate can directly reflect the strength of athletes' heart rate recovery ability after exercise. However, due to the long duration of the game and the high requirements for continuous motion, it has the characteristics of aerobic energy supply. In the actual training and competition, from the technical and tactical characteristics, the technical actions such as smashing, blocking, moving, running, and fighting are required to not only have the explosive power of the moment, but also require the movement quality to be repeated for a long time. If the morning urine protein does not decrease or increases, the amount and intensity of exercise should be appropriately reduced. When the amount of exercise is appropriately increased, the body has a process of gradually adapting, and the basic heart rate will be slightly accelerated, but the change range is generally not more than 6 times. From the technical movements, we can see that jumping spike and jumping block do not require athletes to jump high, but also require a long continuous take-off, each repetition must maintain the height. There is no oxygen supply during jumping, and oxygen supply is repeated many times.

It can be seen from Figure 1 that the clearance rate of lactic acid in the body is increasing from the initial training period to the training half a year, and the heart rate threshold has reached a higher value.

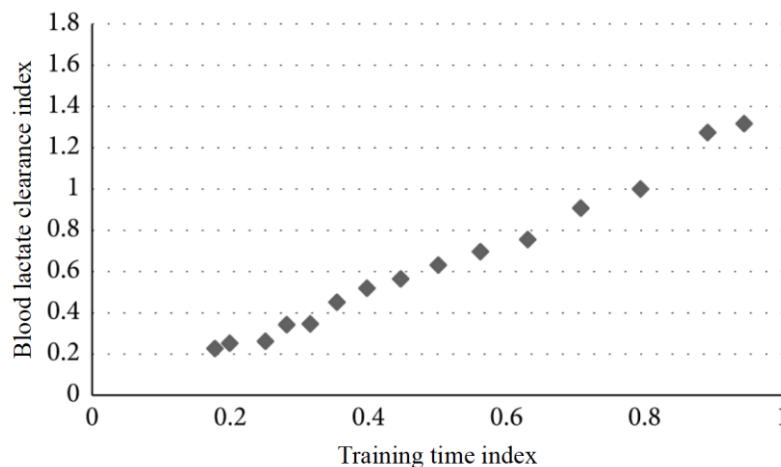


Fig.1. Blood lactate clearance rate

Because volleyball competition is a combination of aerobic and anaerobic sports, it is necessary to strengthen the training of athletes' aerobic and anaerobic energy supply ability. The excretion of urinary protein after exercise is related to the amount of exercise, the physical function of athletes,

and the intensity of exercise, but the relationship between the excretion of urinary protein and the intensity of exercise is the greatest. By measuring the excretion of urinary protein after exercise, it can also provide reference for load adjustment of training class and grasp the athletes' functional state. At the same time, in the team studied, it reflects that the proportion of individual tactical training is relatively small, while the comprehensive training of techniques and tactics, and the tactical training driven by technology almost runs through the training. If the clearance rate of blood lactic acid is low and the accumulation of blood lactic acid is high, the aerobic ability of athletes will be weak. Although the intensity and amount of exercise have increased, the body has developed adaptation, and mild hypoxia and training (hypoxia) double stimulation of the plateau leads to increased secretion of EPO in the kidney. EPO is transported by blood to hematopoietic tissues such as bone marrow. Promote the differentiation of bone marrow hematopoietic cells, nucleated red blood cell division, mature and release of giant red blood cells, enhance iron intake, and accelerate the synthesis of hemoglobin. On the contrary, the exercise load should be reduced. During the altitude training period, when the urinary bile in the morning urine is higher than the normal range, accompanied by the appearance of urine protein, the athletes have signs of fatigue.

4. Conclusion

During the training period, a reasonable test plan should be formulated for the athlete's physiological and biochemical indicators, and the comprehensive system should be monitored and analyzed. And timely feedback the results to the coaches, provide an objective basis for the coaches to develop a training plan in a reasonable and scientific manner, and provide guarantees for the athletes to successfully complete the altitude training tasks. The intensity of exercise for college students in the initial stage of training should be smaller, and the interval time is about 9 minutes. After 3 months of training, the training intensity can be increased appropriately, and the interval time is adjusted to 8 minutes. Since the clearance rate of blood lactic acid and recovery rate of heart rate have reached a higher level after six months of systematic training, the interval time can be adjusted to 7 minutes by using greater training intensity and shortening training time appropriately. The comparative teaching experiment proves that volleyball training plays an important role in promoting and improving the physical quality of volleyball players. Four physical fitness indicators of volleyball training athletes have been significantly improved. Because volleyball players should always pay attention to flying balls in training and competition, and react to opponents' situation in time, so the central nervous system is very easy to fatigue. Therefore, volleyball players should not only pay attention to the recovery of physical fatigue, but also to the recovery of the central nervous system.

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