

Research Article

The Research on Biochemical Indexes of Athletes after Taking Nutritional Supplements during Winter Training

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Abstract: The paper takes hemoglobin and blood urea as the indexes of biochemical monitoring and accordingly supplying sports nutritional supplements into them at the same time, the effect on exercise capacity and the changes in biochemical indicators in different training stages will be observed in this research. The quality of winter training determines the motion states of athletes in the next year. However, the poor weather condition and the large amount of training will lead to the accumulation of fatigue, affecting the training status of athletes seriously. Therefore, it is essential to monitor their biochemical indicators and supply them with special nutrition. In order to ensure the completion of a large load of training for athletes, it is far enough to supplement the nutrients just by food, some special powerful nutrition are also needed in a scientific way.

Keywords: Biochemical indicators, nutrition supplement, winter training

INTRODUCTION

As an important stage of laying the foundation for athletes, winter training plays a very important role in enhancing cardiovascular and other visceral functions as well as improving the quality of basic movement. Athletes must rely on the scientific and effective training methods if they want to achieve outstanding results in the current high-level sports competition. While the implementation of training methods is based on the motion states of individuals. The training level is remained almost the same in today's sports world. So athletes should restore and maintain their high-level physiological and biochemical indicators via nutrition supplements. And the reasonable training intensity will be applied in athletes in accordance with high-level indexes to stimulate their bodies so as to get an effective stress response, then attaining the best training results. From the physiological and biochemical points of view, we have chosen to observe the stress-response characteristics of individuals and the role the nutritional supplements played in their bodies through the detection of hemoglobin (HB), urine protein (PRO) and urea nitrogen (BUN).

MATERIALS AND METHODS

Indicators in different training phases:

Hemoglobin (HB): As an indicator of the functional state of the body's reaction, hemoglobin (HB), which commonly known as hemachrome, the main component of red blood cells, has been favored by sports training sector (Yang, 2009). The main functions of hemachrome are to carry oxygen and carbon dioxide for

red blood cells and to keep acid-base balance and constant Ph, thus directly influencing body's function and exercise capacity, especially in endurance sports. Therefore, hemachrome is recognized as an important indicator of evaluating athletes' body functions. Among the outstanding young male soccer athletes in our country, the hemoglobin levels of all the athletes are higher than 140 g and the average value of their hemoglobin is 152.6 g, closing to 160 g considered as the best hemoglobin content an athlete should have. Under normal circumstances, the hemoglobin content in human body can maintain relatively stable, while during training and competition, the hemoglobin content of athletes will change differently because of exercise stress, nutrition, rest and other factors. At the beginning of the large amount of exercise training, there will be a fall in the hemoglobin content. After a phase of training, the body gradually adapt to the physical activity and the hemoglobin content begins to rebound, The longer the time of football training is and the larger amount of training is, the higher endurance ability of athletes is demanded. And the higher hemoglobin value is, the ability of binding oxygen is stronger and the much amount of oxygen is transported, thus helping aerobic metabolic processes, which leads to the good athletic performance during the training and competition. The hemoglobin values of college football player are in a higher level and are decreased significantly only after the later period of physical training. Usually if the hemoglobin value decreases (men less 12 g. 100 mL; women less 11 g. 100 mL), this athlete can be diagnosed as exercise-induced anemia, leading the dowing of exercise capacity. And if the hemoglobin value continues to decline more than

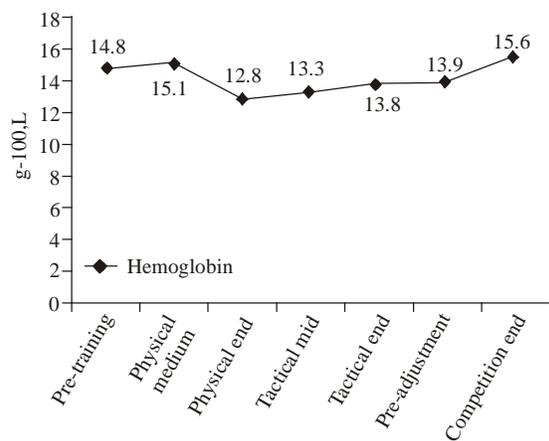


Fig. 1: The graph of athletes' hemoglobin indicators in different training stages

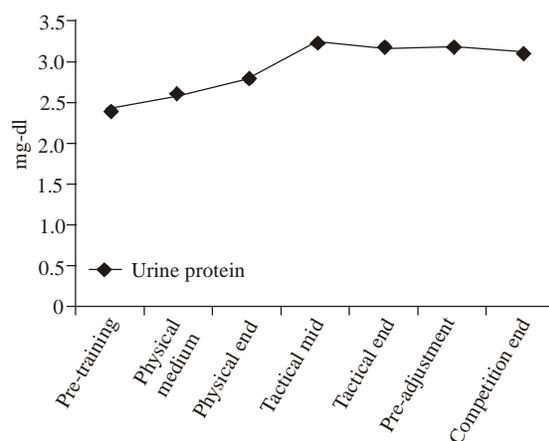


Fig. 2: The graph of athletes' urine protein indicators in different training stages

10%, may be with the reason of inadequate nutrition or the sake of large amount of training, then the athlete need to adjust the amount of training or take other specific measures.

Many researches have confirmed that at the beginning of the large amount of training, due to the increased destruction of red blood cells, hemoglobin content decreases significantly, but after the adaption to the exercise, the hemoglobin content in bodies begins to rise again (Yang, 2004). The result of this research is also consistent with this change rule. From the mid to the end of the body training, the hemoglobin content decreases dramatically, but after entering the interim of technical and tactical training, the HB content starts to gradually rise and rises to maximum at the end of this training. Therefore, during the whole stages of the training, the HB level of athletes drops firstly and rises again and then tends to stable, which show that athletes have experiences a process from not adapting to adapting of the amount of training load (Fig. 1). It can be also further explained that during this race, despite

the large load and the large body stimulation on athletes, they can also endure this. And I also found that the HB level of individual athlete is always volatile, incompatible with the level change trend of the whole team, which indicates that he or she may not adapt to the exercise or in a poor performance status.

Urine Protein (PRO): In general, urine protein excretion after exercise is related to the amount of exercise, exercise intensity and the physical function of athletes, especially the exercise intensity. By measuring the excretion of urine protein, the amount of exercise can be assessed, especially the assessment of exercise intensity and the motion state of athletes, thus grasping the functional state of the athletes to provide reference to the adjustment of training load. Because of the big differences of urine protein in individuals after exercise, it is inappropriate to make a comparison of load, exercise level as well as physical state between different humans via urine protein indicators. However, to the same individual, the urine protein content remains stable in the completion of a similar exercise load or an identical race. Usually after a large amount of exercise training, there will be an increase in the excretion of urine protein (Jin, 2005). But if the urine protein content recovers completely to the level of resting after 4 h or the next morning, it show that the body adapts to the load; if not decreases but increased, athletes should pay attention to their physical condition and appropriately reduce the amount and intensity of exercise, The results of this study indicates that in the whole process of training and competition, although the urine protein content is not completely same in the next morning after exercise, the difference is also not significant, indicating the adaption to the load for athletes. Due to the non-invasion of the urine protein detection and the well-acceptance by subjects and the great relationship with the exercise load size and the functional state, so this indicator is applied widely. But to the items, like football, the urine PRO in players seems very sensitive to exercise load, resulting an obvious lower evaluation compared with other items as well as the existence of noticeable individual differences. Attention should be made to observe continuously and systematically, particularly the continuity of individual indicator, if taking urine PRO as the evaluation indicator (Fig. 2). We cannot conclude easily just from a single measurement result, but should be noted in the combination with other indicators.

RESULTS AND DISCUSSION

Blood Urea Nitrogen (BUN): Blood Urea Nitrogen (BUN) is a metabolic product of body protein (Pro). The level of its content reflects the metabolism condition to a certain extent. The reference range of blood urea of Chinese Elite Male Soccer Players (U17) is 7.32 ± 1.43 nmol.L. After a long time of high-intensity

exercise, the catabolism of Pro in bodies significantly accelerate, resulting the higher content of BUN (Tang, 2003). Therefore, the determination of blood BUN can provide a reference for fatigue monitoring of exercise training and the assessment of the athletes' physical states. The concentration of blood BUN, which used to evaluate the fatigue degree, is very sensitive to the endurance ability of the amount of exercise for athletes.

Studies have shown that changes caused by exercise in BUN content are closely related with exercise intensity, duration and types of movement. The long and high-intensitive exercise strengthen the body Pro catabolism and its metabolite concentrations-serum BUN are significantly increased. The results of this research are in line with the above law. After the late period of great physical training exercise, blood BUN values of college football players are significantly increased ($p < 0.05$), which is the inevitable result of prolonged high-intensity exercise. You can see when they are quiet, the level of their blood urea values are close to the outstanding soccer players'. The significant increased blood urea after intensive training is considered to be the severe results of protein or amino acid metabolism. This phenomenon occurs not only in the time of their unsuitable to training load, but will also continue to the recovery period after exercise. The results of this study also showed the same variation, after the late period of the large amount of exercise, the players come into the mid-period of technical and tactical training. Despite the rising in blood BUN of athletes is not as significant as that at the end of physical training exercise, but the blood BUN content continues to rise. The study found that if the blood BUN content in athletes next morning after exercise is greater than the underlying value of two units and continues to remain high, it indicates that either the decline of their physical function and unsuitable to the exercise load, or protein quality changes from diet (Zheng, 2003). Then athletes should adjust exercise timely or supple nutrition appropriately in order to avoid the phenomenon of over-training. While other physiological indicators showed that athletes can accept and endure the amount of exercise without the exist and emergence of decline in body function in the phase of training and competition. Further research found that when the exercise load remains unchanged and on the condition of the same physical situation of athletes, the rising of blood urea values are often related to diet and nutrition. The mistake of nutrition concept that protein should be consumed the most nutrients caused the excessive intake of too much fat of football players. The degradation of too much protein in bodies causes elevated blood urea and high-fat and high-protein cause

the acidification of body fluids and kidney burden and any other adverse effects. At the same time, the diet with high-fat and high-protein can cause too small intake of sugar which is the energy substance used by soccer plays in sports training or competition. This unreasonable kind of dietary intake seriously affects the results of exercise training. In the results of this research, a very important reason of the continuous rising of blood BUN content is that too much high-fat and high-protein are took. Attention should be paid to exclude the impact of the exercise load if blood urea indicators are applied to monitor athletes' nutritional status.

CONCLUSION

The body's stress-response is an important function of self-protection. High-intensity training is a stimulus on the human body. If the stimulation is insufficient, the body will not exhibit the corresponding state, while stimulates overly, the stress-response will be inserted. We accordingly select appropriate indicators and observe the body's response to the training intensity at any time. BUN can reflect the adaption condition of exercise intensity to the body timely and accurately, which makes it as a reference of taking a small cycle or a single row of hours of training. HB should be given much attention in the arrangement of stage training and big cycle exercise. Athletes should take Vita and blood iron when the value of HB is too low, for that both drugs are effective in the training.

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REFERENCES

- Jin, J.Q., 2005. Contemporary sports training theory and practice to the stage theory. *J. Shandong Sport. Inst.*, 21(5): 89-91.
- Tang, S., 2003. Female athletes who load training researches on the change of humoral immunity. *J. Wuhan Sport. Coll.*, 5: 165-162.
- Yang, G., 2004. Modern sports training stage theory of thinking and discussion. *J. Sport. Sci.*, 24(6): 52-55.
- Yang, Y., 2009. Creatine kinase. *J. Sport Training Wuhan Sport. Coll. J.*, pp: 82-85.
- Zheng, L., 2003. The animal models of fatigue study. *J. Chin. Sport. Sci. Technol.*, 33(2): 20-23.