

Research Article

Study on Anti-fatigue Food Supplement Scheme for Badminton Athletes based on Body Function

Hongbo Chen

Xidian University, Xi'an, China

Abstract: Badminton is a sports item, its competitive feature is quite strong, therefore, the timely recovery of fatigue for badminton players is very important, which is related to the improvement of athlete's ability. This study is based on the interpretation of motion fatigue, taking it as the breakthrough point, by means of analyzing the parts that caused the fatigue, combined with the characteristics of badminton, it discusses the recovery method of nutrition supplement for badminton athletes.

Keywords: Badminton athletes, motion fatigue, nutrition supplement

INTRODUCTION

Badminton match can conduct a comprehensive confrontation with opponents at high speed. It can measure the level of athletes in the fierce confrontation condition, who can complete all kinds of strokes, pace, which must be fast, accuracy, stability, thus it can reflect the strain capacity of players as well as high techniques (Avrham, 2001). This kind of ability needs to be accumulated in the usual training, in order to accumulate the training results; we must handle well with the relationship between exercise load and recovery. Sports fatigue can have great influence on the performance of athletes.

After the moderate sports fatigue, we can impose reasonable restoration means, which can promote the function of the body as well as promote the continuous improvement level; while the excessive sports fatigue will cause the accumulation of fatigue, which cannot improve the level of body's function, likely to form the over-training syndrome, as well as affect the health of athletes. How to effectively promote the recovery of exercise fatigue, improve the anti-fatigue ability, is always one of the core and hot issues in the fields of sports physiology and sports medicine (Carpenter and Karpati, 1984).

MATERIALS AND METHODS

The concept of sports fatigue: According to Sports Physiology, the definition of sports fatigue is: the phenomenon that exercise capacity and body function is temporarily declined caused by the sports exercise. In 1982, in the Fifth Session of the International Conference on Sports Biochemistry, sports fatigue was defined as: the physiological process of the organism

cannot continue its function in the specific level or maintain a predetermined movement. This definition has been recognized by many experts both at home and abroad, which has been widely used. The reason of causing sports fatigue is the movement, after a rest it can be restored. Fatigue is a normal physiological phenomenon, the purpose of study on fatigue is to delay the appearance of fatigue during the motion and try to get recovery as soon as possible after the elimination of fatigue, so as to promote the process of recovery (Dioszeghy and Mechler, 1988). Sports fatigue can be divided into physical fatigue and mental fatigue, physical fatigue can be reflected by the objective index, which is focused on the subjective feeling of mental fatigue.

The parts that appeared sports fatigue: Any forms of human fatigue are always occurred on a certain part of the body or some parts. In general, the parts that are more prone to have fatigue are the center of nerves moving node plate muscles, etc., according to the different occurrence positions, it can be divided into central fatigue, the fatigue of the nerves muscle's junction and the peripheral fatigue.

Central fatigue: During the developing period of sports fatigue, central nervous system can play a dominant role, the occurrence of fatigue is a maintenance inhibition of the central nervous system, which can prevent the excessive body's failure that is occurred in the body (Jayasri and Narayanan, 2006).

The fatigue of the nerves muscle's junction: The fatigue of the nerves muscle's junction is also called sports central fatigue, sports center is the key part between nerves and muscles, which is the connection and transmission of nerves impulses and muscle

Table 1: The lost amount of inorganic elements in one liter of sweat

The temperature of dry ball	The relative humidity	K	Na	Ca	Mg	Zn	Cu
39.3±1.6	53.1±6.2	250.6±11.1	1011.2±177.4	72.0±14.9	6.9±0.8	0.97±0.26	0.46±0.14

contraction, it is also an important part of causing fatigue.

Peripheral fatigue: Peripheral fatigue including the changes of all various organs during motion besides nervous system and the muscle's junction. Muscle is the main motion tissue, which can become the research focus and form of the peripheral fatigue.

The characteristics of badminton: Badminton is a comprehensive anaerobic sports item with high strength, high load and changeable intense in the competition. Athletes must keep pace moving continuously in the field, having quick start in a short time, jump and stop abruptly, therefore, it can increase the muscle strength of the upper and lower limbs as well as the waist and abdomen. According to statistics, high strength and intense badminton exercise can make the athlete's heart rate reach 160 to 180 times/min, or even higher which must have relatively higher requirements on the function of respiratory system and cardiovascular system. A fierce confrontation requests the athlete to have higher physical quality in terms of stamina, strength, flexibility, agility, speed and so on.

The reasons of causing sport fatigue by playing badminton: The characteristic of badminton match such as quick start, abrupt stop and turn, high strength and intense, large load and so on, which belongs to the anaerobic exercise, thus, it must consume a great deal of physical energy.

The fatigue of energy in the body: Some scholars think that the causes of fatigue is due to the large consumption of body's energy substance during having sports, with the enhancement of exercise load, if people cannot receive timely supplement, it will cause imbalance by energy supply.

The accumulation of metabolites in the body: The metabolites caused by the movement are largely accumulated in the body, which cannot be cleared up in time. These metabolites are including lactic acid, ammonia, carbon dioxide (Perrin and Meyer, 2002). When people have high intensity exercise, the concentration of lactic acid in the body will raise, which will cause the muscle's fatigue.

The internal environment is disordered: In the fierce competition of the sports item, the muscle will release a large amount of lactic acid and pyruvic acid as well as some other substances, which can be piled up more and more in the body, when people have the external exercise, the catabolic process of human motion is strengthened, the consumption of energy and various

nutrients is increased significantly, the hormone effects in the body and the process of enzymatic reaction is very strong, which can emit a lot of water, inorganic salt, electrolyte and lose other trace elements, finally make the body's internal environment changed dramatically, causing the internal environment disordered and occur fatigue.

The fatigue of central nerves system: When the amount of ATP is reduced during having exercise, amino acid and tea phenol ammonia is increased, the blood glucose is also decreased and people will have other kinds of fatigue. The lost amount of inorganic elements are as shown in Table 1.

Diagnosis of sports fatigue for badminton athletes: Methods to diagnosing sports fatigue, according to the review of the relevant literature, it can be divided into the following kinds: One method is according to the sense of self evaluation. When players have sports fatigue, they generally have the feeling associated with limb weakness, muscle pain, wanting to stop the movement, some people have the feeling with thirst, palpitation, shortness of breath, chest tightness and the feeling of collapse, the serious may have fever, hematuria, proteinuria and other symptoms; The second method is education and observation. Observing the athletes reaction, such as the emergence of pale, dull eyes. For example, the reaction becomes slow, the blood pressure is decreased, the body temperature is raised, the heart rate turns fast with occasionally arrhythmia, when it gets more serious there is variation in the thought and consciousness; the third method is the physiological index determination. When people have fatigue, the function of each organ's system of the human body will decline and the decreased degree is related with the depth of fatigue. Therefore, people can use the available physiological index determination method to determine fatigue, the commonly used method is the skeletal system fatigue measurement, the diagnosis of cardiovascular system and nerves system fatigue, the diagnosis of nerves and feelings; The forth method is the biochemical index assessment. Including hemoglobin, blood lactic acid, blood urea, proteinuria; the fifth method is the saliva pH value. Due to the long time after strenuous exercise, the production of HL is increased, the pH value of blood is dropped, which makes the saliva pH value also decreased. Therefore, we can judge the sports fatigue through the determination of saliva pH value, after having exercise, the saliva PH value is low, which showed that the body's function had fatigue; The sixth method is the endurance of the respiratory muscle. Continuously checking out the vital capacity five times (every 30

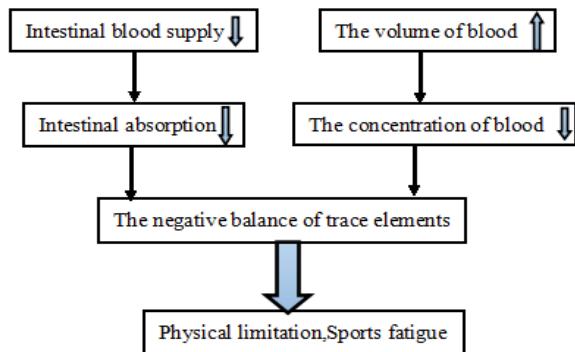


Fig. 1: Sports fatigue of athletes brings about the decline of body's function

sec), if the value of the five times vital capacity is continuously declined, it indicates that the body is in the state of fatigue. As shown in Fig. 1.

RESULTS AND DISCUSSION

The supplement of common nutrition: Nutrition is one of the important factors for athletes to have physical recovery and create success, therefore, it can have very important function in promoting the movement and improve the performance of athletes by using the scientific methods of supplementing the nutrients as well as the materials that are consumed because of the movement, which also can repair the damage of the internal structure and help to eliminate the internal fatigue. Nutrition supplement means to supply the required materials for the human body, as well as the supplement of vitamins and trace elements, which can regulate the physiological functions of the body with having sugar, fat and other substances that are required. During having badminton match, because the level of the opponent, the time of the match and the intensity of the match, as well as the playing method is quite different, thus, the means of recovery is also slightly different. Generally speaking, it is believed that after having the long period of match with small intense, players should be promptly added starch foods, so as to promote the synthesis of the consumed glycogen. As a badminton player, before the match, it is beneficial for the body to have enough amount of carbohydrates (carbohydrates are the major material and energy for human body, the daily amount of glycogen is approximately to 250-350 g that is provided to the body, which are generally stored in the liver and muscle's tissue (during having physical activities, according to the intense, glycogen is used to maintain the activities of motion system, which can not only reduce the level of glycogen, but also can affect the glucose metabolism, making each muscle group alert, sensitive, with fast speed of reaction, proper coordination without losing the accuracy, therefore, it is very beneficial to the human body to have proper amount of carbohydrate (glycogen).

After having long period of match with large intensity, because the massive accumulation of lactic acid, players should add more vegetables, fruits and some other basic foods, so as to accelerate the clearance of lactic acid and eliminate the sports fatigue as soon as possible. Both players are belonging to the powerful type in the match, after having match, players should increase the amount of meat and some other protein nutritional supplements, on one hand, it can promote the elimination of fatigue, on the other hand, the more important thing is to increase the synthesis of protein, so as to increase the volume and strength of muscles and improve the effect of exercise.

Nutritional supplements: With the rapid improvement of the level of sports competition, people are paying more and more attention to the diet for athletes, especially paying more attention to the physiological active substances with the adjustment function. During the process of badminton competition, the athletes can consume a large amount of water and energy substance in the body. Thus, during the period of having rest, players need to have some water or sports drinks. Although, at present, the safe and effective sports supplements are still not more, which can not only improve the function of movement in the hypoxia environment, but also can improve the ability of resisting fatigue. However, many sports drinks can maintain or improve exercise ability in the competition now, which also can speed up the elimination of fatigue but also can speed up the physical recovery.

CONCLUSION

Sports fatigue is a temporarily phenomenon that human body's exercise capacity and body's function is declined at a certain time, when they have sports exercises. The training without fatigue is not an effective training, while the training without recovery is a dangerous training, which is a complex process. It can have a great impact on the improvement of performance and techniques for athlete to play badminton, which will be a serious impact on the health of badminton athletes. So coaches and some related scholars have put focus on the study of sports fatigue, who have paid attention to eliminating the fatigue of the badminton players and took it as a part of an overall sports training. It is very necessary and important for them to learn more about the reasons for fatigue, to grasp the method of judging the occurrence of the fatigue, to understand the degree of the athlete's fatigue, who also should choose several methods according to the different situations of having fatigue, trying to accelerate the recovery of the fatigue, so as to improve the sports ability of badminton players as soon as possible.

REFERENCES

- Avrhama, Y., 2001. Tyrosine improves appetite, cognition and exercise tolerance in activity Aorexia. *Med. Sci. Sport. Exer.*, 33: 104-110.
- Carpenter, S. and G. Karpati, 1984. Pathology of Skeletal Muscle. Churchill Livingstone, New York, pp: 415-710.
- Dioszeghy, P. and F. Mechler, 1988. The significance of simultaneous estimation of serum creatine kinase and myoglobin in neuromuscular diseases. *J. Neurol.*, 235: 174-176.
- Jayasri, D. and S. Narayanan, 2006. Electro catalytic oxidation and amperometric determination of BHA at graphite-wax composite electrode with silver hexacyanoferrate as electrocatalyst. *Sensor. Actuat. B-Chem.*, 119: 135-142.
- Perrin, C. and L. Meyer, 2002. Quantification of synthetic phenolic antioxidants in dry foods by reversed-phase HPLC with photodiode array detection. *Food Chem.*, 77: 93-100.