

# An exploratory study on alleviating sports fatigue with food in athletes

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**Abstract:** Keeping the level of physical exercise is very important to relieve fatigue. Scientific and reasonable diet and supplement sports nutrition are the first methods. Therefore, training high-quality talents has become an arduous task to be solved urgently in higher education. In the health movement is in the rise of today, more and more people begin to pay attention to and attach importance to the body can provide energy, reduce exercise fatigue and other functions of sports nutrition food, they have become an indispensable part of the realization of a healthy lifestyle. As a new functional health food, sports nutrition food has an important positive impact on improving the state of human function, improving physical fitness and enhancing self-confidence. At present, the standard of sports nutrition food in China is constantly improving, the market share is also rising year by year, the industry is also constantly maturing, and the situation is good in the future development. In this paper, to explore the mechanism of athlete fatigue as the purpose, in-depth analysis of the domestic and foreign sports nutrition food and anti-fatigue active ingredients research status, in the exploration of sports food to promote the role of athletes against sports fatigue at the same time, hope to promote the anti-fatigue function of sports food research and application development, so as to provide a reference for athletes to scientifically choose sports nutrition food.

**Key words:** sports food; Anti-fatigue ability; Promoting mechanism

## Foreword

Fatigue occurs under the influence of many internal and external factors, and can be caused by many etiologies or some physiological and pathological processes. Long-term high-intensity training of sports athletes body metabolic speed is faster than the average person, resulting in protein, trace elements, vitamins and other nutrients insufficient, and then induce exercise-induced fatigue, the specific performance is that after a period of exercise can not make the motor function to maintain a predetermined intensity and level, the body function appears temporary decline phenomenon. If we can take reasonable and scientific means to deal with it, we can avoid the negative impact of sports fatigue on health, so as to ensure that athletes successfully complete the training task and the goal of the game. At present, great progress has been made in the research on the mechanism of sports influence on human tissues and organs, but there are still many unsolved problems in the mechanism and prevention measures of sports fatigue. Therefore, it has always been the most important and hot topic in sports scientific research to improve the endurance level of sports athletes, delay the appearance of sports fatigue and promote the recovery of fatigue. At present, there are many ways to relieve fatigue, mainly massage, rest and supplement nutrition, in these methods supplement nutrition effect is better, can quickly adjust the athlete body state to enhance fatigue resistance. Sports food is a new kind of functional food, with its advantages of easy absorption and digestion has been widely paid attention to. In order to adapt to the physiological metabolism of sports people and the special needs of some nutrients, sports food has been developed. It is widely used to enhance the body's physique, improve health, maintain physical strength and vitality, and become an indispensable nutritional supplement for sports athletes. At present, domestic and foreign scholars have different research perspectives on its mechanism of action, but the lack of systematic summary, and most of the emphasis on theoretical discussion, did not form a perfect system. Therefore, in order to improve the athletes' anti-fatigue ability, it is very important to make a scientific and reasonable choice of sports food.

## 1. The mechanism of athlete fatigue

The mechanism of athlete fatigue is complex and diverse, and the difference of exercise mode and intensity also leads to the difference of fatigue mechanism, which can be generally summarized as the central and peripheral mechanisms. Because athletes need to respond quickly in sports or competitions, and the repetition of high-intensity exercise will lead to overexcitation of the cerebral cortex, which will destroy the original dynamic pattern of the athlete's nervous system, lead to cortical dysfunction, and finally induce central fatigue; The peripheral mechanism is that the exercise load leads to an increase in the human body's demand for nutrients, resulting in the imbalance of human nutrition, resulting in insufficient intake of sugar and fat and induce systemic metabolic diseases.

## 2. Research status of sports food at home and abroad

At present, there are many kinds of sports nutrition food, involving beverage, energy bar and many other fields, and there are innovations and development at home and abroad. Among them, functional health food mainly aimed at exercise-induced glucose metabolism disorders occupies a considerable proportion.

Although the domestic sports nutrition food varieties have more than 30,000, the number of enterprises has more than 400, but in terms of its development history, the foreign sports nutrition food industry is an early start and rapid development. Among them, the functional health food mainly for exercise-induced glucose metabolism disorders occupies a considerable proportion. In the early 1960s, the research of sports nutrition food in China had a climax, from the beginning of Jianlibao, Red Bull to today's Jianlodo, Combit and Merix listed, all witnessed the prosperity of sports nutrition market in China. In today's rapid economic development, there is more demand for sports

nutrition supplements. Sports nutrition food access and safety standards have not been explicitly stipulated by the relevant departments, resulting in most sports nutrition food safety standards are still implemented according to ordinary food standards, thus forming a certain confusion in the domestic market.

### 3. The promotion effect of sports food on athletes' ability to resist sports fatigue

#### 3.1 Sports food can provide energy substances

When the glycogen in the muscle fiber is gradually exhausted, the body's ability to control and coordinate movement is also gradually reduced, so the blood sugar level of athletes is closely related to the exercise ability and exercise fatigue, so strengthening the supplement of sugar can effectively prevent and reduce fatigue. With the improvement of people's living standards and the change of consumption concept, sports have become more people's choice, but also make people's demand for sports nutrition food gradually rise, and then promote the rapid development of sports nutrition food industry. Studies have shown that immediately after the supplement of carbohydrates after sports is conducive to the rapid recovery of muscle glycogen level. Therefore, the supplement of high-calorie and high-sugar carbohydrates has become the development trend of modern sports. This paper summarizes the function and mechanism of oligosaccharides in athletes' glycogen metabolism. A study showed that after continuous supplement of oligosaccharide drinks, the blood glucose level of athletes during exercise was always maintained in the appropriate range (5mmol/L -- 6mmol/L), which was significantly higher than that of the control group, and the blood glucose level in the recovery period was 20% higher than that of the control group, which further confirmed the important role of oligosaccharide supplement in promoting glycogen recovery during and after exercise.

#### 3.2 Sports food accelerates the removal of accumulated metabolites

Lactate accumulation is a key factor in athlete fatigue. In the exercise training, if the athletes can supply the right amount of sugar in time, it can make the athletes get greater strength and endurance, so as to improve the performance of the game. Athletes muscles in the long-term high-intensity "hypoxia" energy metabolism process will produce a lot of lactic acid, so that the pH value of the human body is reduced, not only the glycolysis key enzyme activity and energy supply decline, and the organ to the reaction impulse and the sensitivity of the external environment decline, so that the muscle contraction force is weakened, and eventually cause sports fatigue. Therefore, the elimination of lactic acid accumulation in the process of exercise has become a link that cannot be ignored to improve competitive performance. Many sports foods have been shown to accelerate the elimination of lactic acid accumulation after exercise. Among them, Lycium LBP and tea saponin have antioxidant effects and good biocompatibility, can promote lipolysis, enhance insulin sensitivity, improve glucose metabolism disorders and other diseases. In the animal fatigue test, the researchers also found that lycium barbarum polysaccharide and tea polyphenols can effectively reduce the blood lactic acid level of mice by 16%-26%, the weight-bearing swimming time can be extended by 30%-35%, and improve the fatigue resistance of mice. At the same time, it can enhance the immune function of mice and improve the antioxidant performance.

#### 3.3 Sports food can stabilize the internal environment

Maintain the activity of a variety of biological enzymes in the body, maintain normal physiological metabolism, maintain the best state of exercise, delay the occurrence of fatigue and promote the recovery of fatigue, etc., are inseparable from the stability of the internal environment. The human body consumes a lot of nutrients every day in order to meet its own needs, but it is inevitable that there will be some waste products, such as proteins, hormones and some enzymes. As the athletes exercise and body metabolism level is significantly higher than normal, resulting in trace elements, vitamins and other losses increased accordingly, so to maintain the stability of the athlete's internal environment must be supplemented with sports food. From the point of view of trace elements, vitamins and so on, summarize its impact on improving athletic ability. Manganese and magnesium play an indispensable role in energy metabolism enzymes, which are not only stimulants, cofactors, but also the most important factors to promote energy metabolism of organisms; Zinc is essential for human growth and development, cell membrane function maintenance, appetite regulation, vision maintenance, immune system development and central nervous system activity, and is also closely related to human muscle mass and growth, muscle strength and endurance.

#### 3.4 Sports foods stimulate the synthesis of muscle protein

The strength and endurance of an athlete is directly affected by the action of protein and water in the muscle tissue, so the ability of the muscle tissue to work has a direct impact on it. Therefore, attention must be paid to the type and amount of protein required for each part of the human body. At present, soy protein, casein and so on are widely used in the field of protein supplement food. These proteins are rich in nutrients, but lack sufficient amino acid balance and are easy to cause allergic reactions, which limits their application in the field of sports. A study has shown that after resistance training, the systematic use of protein sports food can significantly increase the levels of insulin and auxin in the body, so as to provide the optimal hormonal environment for the body, promote the synthesis of skeletal muscle protein, enhance the thickness of muscle fibers and increase muscle strength.

#### 3.5 Sports food regulates the central nervous system

Neurotransmitter disorder is an important cause of athletes' long-term, high-intensity exercise fatigue. Therefore, we must pay full attention to the type and amount of protein required by each part of the human body. The use of amino acid exercise supplements can inhibit neurotransmitter disorders and adjust central nervous function to relieve central fatigue symptoms. From the perspective of neurobiochemistry, the role and application of some commonly used neuropeptides and non-neuropeptides in the function of the body nervous system were reviewed. Muscle branchchain amino acids such as valine, leucine, isoleucine, etc. participate in oxidation and energy supply, while aromatic amino acids (AAA) such as tyrosine, tryptophan, phenylalanine, etc. are important precursors for the synthesis

of monoamine transmitters. They are metabolized in the liver and compete for neutral amino acid carriers when crossing the blood-brain barrier. Supplementation of amino acid sports food with high BCAA/AAA ratio can not only correct the excessive content of AAA in the brain tissue of athletes, but also play a role in reducing central fatigue.

### 3.6 Sports food can resist oxidative stress

The mass production of free radicals in the body's energy metabolism reduces the activity of antioxidant enzymes, which makes athletes prone to increase the degree of lipid peroxidation, which may induce and aggravate fatigue. In addition, excessive oxidative stress will also destroy the immune function of the human body, make the nervous, endocrine and immune network coordination disorder, and then induce fatigue and other diseases. American scholars believe that the use of antioxidant-rich sports food can significantly improve the degree of lipid peroxidation in athletes and the function of the immune system, so as to reduce the body pressure, delay the appearance of fatigue, and promote the recovery of athletes. At present, a lot of research has been done on the antioxidants and antioxidants of sports food at home and abroad, but there are still many problems that need to be solved in how to supplement antioxidants to reduce or avoid the high level of free radicals in the body after exercise.

## 4 Summary

The spiral growth process of repeated training to improve the athletic ability of sports players conforms to the law of development of physiology: training-fatigue recovery - retraining-fatigue - rehabilitation. Therefore, promoting the improvement of the fatigue endurance level of sports athletes is also an important link to strengthen the learning of sports skills of athletes. As a new functional substance, sports food has the functions of improving body physiological function, regulating blood sugar level and maintaining normal metabolic balance. The fatigue endurance of sports athletes can be enhanced by a variety of mechanisms, the reason is that sports food provides a variety of supplementary forms and rich functional components. Through the practice of sports, it is found that sports food can improve the fatigue resistance of sports athletes. Therefore, according to the characteristics of athletes of different kinds, ages and genders, scientific and reasonable application of sports food can effectively promote the improvement of athletes' anti-fatigue ability, so that they can be put into the training in the best state to get the maximum benefits.

## References:

- [1] Xiaojie Liu, Xiaoyi Zhang, Chunhua Wang. Study on anti-fatigue effect of whey polypeptide complex powder on exercise mice [J]. Food Research and Development, 2019, 42(15) : 119-123. (in Chinese)
- [2] Yi Cheng, Yanyun Zhang, Ting Huang, et al. Effects of Codonopsis polysaccharide on fatigue in mice exhausted by exercise [J]. Chinese Journal of Gerontology, 2019, 41(16) : 3498-3501. (in Chinese)
- [3] Cheng Liu. Effects of agaricus Blazei Antler branched-chain amino acids on exercise fatigue [J]. Chinese Journal of Edible Fungi, 2019, 39(2) : 61-63. (in Chinese)
- [4] Xiaochen Yu, Zhen Li, Jiani Hu, et al. Study on the anti-fatigue effect of peanut peptide on mice [J]. Food and Nutrition in China, 2019, 27(4) : 63-67. (in Chinese)
- [5] Zhangfeng Wang, Junxue Xue, Weihang Zhong, et al. Development of anti-fatigue herbal tea beverage of Honeysuckle of White Maoroot [J]. Beverage Industry, 2019, 23(5) : 34-36. (in Chinese)