

Research Article

Research on Athletic Training and Nutritional Supplement of Sugar and Protein in Diet

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Abstract: The research has the significance of revealing that the human being originates from the sports and develops with the sports, the human being is closely related with the sports. Through exercise, the energy is consumed, but at same time, the health is enhanced. For professional athletic training, the energy replacement shall be made in a scientific, careful and comprehensive way. Through supplement of nutritional ingredients such as sugar and protein etc., in diet, the human metabolism will be enhanced and the cardio-pulmonary function can be improved. Therefore, how to realize the most effective athletic training and energy supplement is an important subject for long term study. By means of the methods such as documentary analysis, data comparison and case analysis etc., the issues existing in athletic training and supplement of sugar and protein in diet are studied, so as to realize the best athletic training and nutritional supplement. The research conclusion lies in that the athletic training and nutritional supplement of sugar and protein in diet not only make the athletes recover and improve their energy, but also play an active guaranteeing role for athletic training.

Keywords: Athletic training, diet, nutritional supplement, protein, sugar

INTRODUCTION

Athletic training in the United States began in October 1881 when Harvard University hired James Robinson to work conditioning their football team. At the time, the term "athletic trainer" meant one who worked with track and field athletes. Robinson had worked with track and field athletes and the name "athletic trainer" transferred to those working on conditioning these football players and later other athletes. Athletic trainers began to treat and rehabilitate injuries in order to keep the athletes participating. The first major text on athletic training and the care of athletic injuries was called *Athletic Training* (later changed to *The Trainer's Bible*) written in 1917 by Samuel E. Bilik. Early athletic trainers had "no technical knowledge, their athletic training techniques usually consisted of a rub, the application of some type of counterirritant and occasionally the prescription of various home remedies and poultices". In 1918, Chuck Cramer started the Cramer Chemical Company (now Cramer Products) that produced a line of products used by athletic trainers and began publishing a newsletter in 1932 entitled *The First Aider* (William, 2011).

An organization named the National Athletic Trainers' Association (NATA) was founded in 1938 and folded in 1944. Another NATA was founded in 1950 and still exists. The first athletic training curriculum approved by NATA was in 1959 and the amount of athletic training programs began to grow throughout

colleges and universities in the United States. In the early development of the major, athletic training was geared more towards prepping the student for teaching at the secondary level, emphasizing on health and physical education. This program was first introduced at an undergraduate level in 1969 to the schools of Mankato State University, Indiana State University, Lamar University and the University of New Mexico.

Through the years athletic training has evolved to be defined as "health care professionals who specialize in preventing, recognizing, managing and rehabilitating injuries". During the 1970s the NATA Professional Education Committee formed a list of objectives to define athletic training as a major course of study and to eliminate it as a secondary-level teaching credential. By June 1982, there were nine NATA-approved graduate athletic training education programs. On July 1, 1986, this study was used to implement athletic training as a major course of study in at least 10 colleges and universities and to only start the development of the major in a handful of others.

Without sports, the human being won't appear and exist. When the people get aware that the sports is an most effective way to improve health and fight disease, the sports has become the specific and pertinent activity of human being, even beyond the limits of the human body (Guo *et al.*, 2013). While a large amount of energy is consumed when doing sports, especially, the overloaded athletic training will consume more energy, so the training personnel should supplement their

energy and nutrition timely. The method of supplement by meat is not recognized by the people, so the nutrition harmless and without side-effect to the body is diet. In this study, research and analysis is made on basis of the nutritional supplement of sugar and protein among the three major kinds of basic nutrition. To absorb sugar and protein from diet has no impact to the human body; this will have scientific and long term guidance for the trainers to improve their physical health (Yang *et al.*, 2013).

MATERIALS AND METHODS

Overview of sugar and protein in diet: The diet generally includes: food, such as flour, rice; edible oil, such as peanut oil, soybean oil; dairy products, such as milk, goat milk; bean products, such as bean curd, soybean milk; vegetables and fruits, such as Chinese cabbage, potato, apple, banana; fungus, such as mushroom, *Agrocybe cylindracea*; nuts, such as chestnut, walnut etc. In such diet, there are many food containing rich sugar and protein. We are required to make reasonable food match, to obtain the best nutrition, so that the athletic training can be effectively guaranteed, therefore, we need to know well the content of sugar and protein in diet.

Food in diet: Sugar is also called as carbohydrate, its main function is to supply energy to the human body (Wang and Peng, 2006). The carbohydrate is stored in the liver and muscular tissues in form of glycogen. When the human being conducts intensive activities, sugar will replenish energy quickly and reduce muscle fatigue. The sugar in diet mainly comes from food, fruits and dairy products, as shown in Table 1.

For the food combinations of athletic trainers, these food rich in sugar should be considered: for example, when playing ping-pong, as it is a kind of anaerobic exercise, the athletes need to have good explosive power, so the glycogen in the liver and muscles should be transformed into energy quickly, therefore, in the diet of ping-pong athletes, the food such as noodles and rice should be considered as the main source of sugar (Zeng, 2009).

Protein in diet: We all know that beans are the food richest in protein. The human body should absorb sufficient protein to ensure the normal metabolism. While for the athletes, the synthesis of hemoglobin can be promoted only if the protein in the body is kept balanced and the fatigue caused by exercise can be removed quickly, the muscle strength can be improved. It shall be noted that the human body can't consume an unlimited amount of protein, that's to say, negative nitrogen balance is not allowed, nor increase of urinary nitrogen is permitted, since it will increase the discharge burden of liver and kidney. The daily protein intake of general athletes is 0.8 g/kg (weight), among which, the protein intake from diet occupies 35-50%.

Table 1: The representative food of main source of sugar

Main source of sugar	Representative food
Grain	Wheat, rice
Meat	Fish, beef, egg
Fruit	Apple, grape, pear
Dairy products	Milk, goat milk

RESULTS AND DISCUSSION

Analysis on function of sugar and protein on athletic training: The athletic training requires good physical health. The reasonable dietary nutrition is the basis to improve the training efficiency and as well as good for removing fatigue, recovering physical strength after games and preventing some sports diseases. In addition, it is good for entering next stage training and competition smoothly. Therefore, the dietary nutrition of sugar and protein is having a more and more important function in modern athlete training (Wang and Peng, 2006).

Maintain body functions: Sugar and protein are the important substances essential for the body function, especially, during athletic training, more sugar and protein need to be consumed so as to ensure the normal body function and avoid any disorder of certain systems. During athletic training, the human body is in highly excited status, the brain is under high pressure and the muscle gets intensively contracted, so the energy stored in the body is quickly consumed, the metabolism is accelerated, then sugar, protein and other substances need to be supplemented timely to keep the body function in a normal status (Zhang and Han, 2006).

Supplement energy: As we have mentioned above, sugar mainly serves to provide energy for the human body. The muscle glycogen can supply energy through anaerobic metabolism at a high rate of 1500 kilocalorie/h and allow for maintaining intensive movement for 1 min; or at the rate of 700~800 kilocalorie/h through aerobic metabolism, supply high quality fuel to muscles enough for maintaining long time up to 2-3 h of medium intensity training. While protein is not only the main substance to maintain the vigorous metabolism of the body, but it also supplies energy. The athletic training requires more protein intake to recover his tones consumed during sports, repair the injured tissues, stimulate the synthesis of protein to a maximum extent and develop the muscle strength and volume. At same time, the reasonable protein intake can also maintain the stable concentration of blood sugar and keep stable spirit and physical status.

Reduce fatigue: It requires to intake sugar and protein for quick supplement of energy, recovery of various organs, especially the supplement of nutrition to heart

and lungs. For example, during the training course, the Marathon athletes feel very tired due to energy consumption for long term, the glycogen consumption causes fatigue of central nerve system, the balance and stability of metabolism is destroyed, so in order to remove fatigue, protein should be supplemented while sugar is replenished. By this way, the fatigue can be removed quickly and the body function can be recovered.

Improve training efficiency: Athletic training is a kind of long lasting and uninterrupted physical activity and it is a course to challenge the body limits. Only through athletic training can the athletes make their muscle tissues richer, stretching ability enhanced, endurance strengthened, cardio-pulmonary function improved and finally the body health and various functions reinforced. Sugar and protein are the substances necessary and essential for maintaining athletic training. The supplement of sugar and protein is an important part to improve athletic training efficiency.

Current misunderstanding on athletic training and nutritional supplement of sugar and protein in diet:

It requires scientific definition and constant study on the quantity of food to be consumed and the quantity of sugar and protein to be supplemented during athletic training. Some training participants always ignore the reasonable and scientific supplement of sugar and protein in their diet during athletic training. They fail to obtain adequate supplement of nutrition in the aspects of diet combinations, nutrition intake, energy consumption, recovery from fatigue and increase of muscle force etc. This is not good for maintain and improving the efficiency of athletic training. There exist some misunderstandings.

The more nutrition supplement, the better: Many people consider subconsciously that it would be better with more nutrition, while ignoring the correlation between the nutrient element and intense level of body movement, as well as the body function and metabolism. During athletic training, the training personnel always supplement sugar before training, for example, eat chocolate, have drinks of high sugar content and even eat sweets directly. Such unbalanced supplement will always cause excessive intake of sugar. Once the body can't transform such sugar into energy and make the energy released, sugar will be saved in the body and become fat. This is absolutely opposite to the purpose of athletic training. Likewise, excessive intake of protein will bring more burden to heart, lungs and kidneys, not good for the coordinated development of body functions.

Improper supplement method of sugar and protein in diet:

During athletic training, the nutrient

supplement of sugar and protein through diet should conform to the life law, sports law and food characteristics. Lack of understanding of the content of sugar and protein in diet, unreasonable combinations of diet will all lead to problems of intake of sugar and protein. Before, during and after training, sugar should be supplemented, but the intake amount is different and the intake time is also different. The training personnel always ignore the intake amount and time of sugar, this is incorrect. Likewise, there lacks the most authorized reference about the adequate intake quantity of protein for athletic training, because the supply amount of protein is affected by the various factors including training type, training load status, weight, age, nutrition status and environment etc. If the supplement amount of protein can't be measured according to the amount of exercise, more and less supplement are all harmful and incorrect to athletic training.

In order to enhance the body health, realize the reasonable match of athletic training and the supplement of sugar and protein, it should be started from the following aspects.

Define the items of athletic training in a scientific way:

For athletic training, it is necessary to make scientific definition, such as, whether explosive force training for endurance training, light level training or high load training, aerobic exercise or anaerobic exercise. Sprint, weight lifting and high jump are explosive force training and anaerobic exercise; while in sprint, high load training is adopted, so the result is different, the explosive force and endurance are trained at same time. Marathon, bicycle and foot racing trainings are endurance ones, most of them are aerobic exercise. Therefore, to have nutrition supplement of sugar and protein in diet needs the scientific definition according to the exercise item and the need of body function. For example, the bicycle athletes need a daily intake of protein about 1.5 g/kg weight. When the athletes have high load endurance training for a several days continuously, the daily supplement amount of

Table 2: Diet combinations of 3 meals and 2 desserts

3 meals and 2 desserts		
	Diet combinations	
Breakfast	Noodles	Whole-wheat bread, white bread, noodle with soup
	Dairy products	Low fat milk, five grains milk
	Meat	Ham, egg
	Fruit	Apple, watermelon, navel orange
Lunch	Noodles	Rice, steamed bread
	Meat	Steak, pork chop, lean meat, fish, poultry
	Vegetables and fruits	Green or dark color vegetables, bananas, apples and pears
Supper	Same as the lunch combinations	
2 desserts	Biscuit, bread, fruit juice, water and milk	

protein is 5 g/kg weight and negative nitrogen balance appears, it means that the protein decomposed is more than supplemented. When the intake amount of protein is 1.8 g/kg weight, the body is under positive nitrogen balance.

It is very important to make diet combinations in order to obtain scientific and reasonable nutrition supplement of sugar and protein through diet during athletic training. The three meals should be matched in a scientific way according to the sugar and protein content of various kinds of foods, vegetables and fruits, ensuring balanced diet structure, increase of sugar intake from diet, high energy and high nutrition density diet, less food but more meals and paying attention to the color, aroma and taste of diet etc., as illustrated in Table 2.

Control correct meal time: The athletic training strength and time length are closely related with the intake time of sugar and protein in diet. Generally, when doing large amount of exercises, the meal time should be anticipated with longer time, while shorter time for small amount of exercises. This is scientifically related to the absorption and metabolism of sugar and protein by the body. The athletic training and dietary nutrition supplement should conform to the motion law of the organs. The specific meal time is as follows: for training of large amount of exercises: 4 h before exercises; for training of medium amount of exercises: 3 h before exercises; for training of small amount of exercises: 2 h before exercises; for training of very few amount of exercises: 1 h before exercises. Likewise, the meal time after training should be also well controlled. It should be noted that in 2 h after training, 15 g/kg body weight of sugar should be supplemented.

CONCLUSION

How to realize supplement of sugar and protein through reasonable diet during athletic training is an important subject for long term study. Through continuous explorations to the wonders of body, the relation between training and dietary nutrition, the most scientific and reasonable intake of sugar and protein will be realized, so as to provide reliable nutrition to athletic training and make contributions to enhance the physical health.

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