

Research Article

Study on the Dietary Intervention of Wushu Sanda Athletes' After the Period of Recovering Fatigue

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Abstract: As for the symptom of the fatigue of Wushu Sanda Athletes' appeared after the competition, it must provide nutritional dietary intervention with the aid of scientific measures. In this study, it takes the characteristics of Sanda as the breakthrough point, analyzing the reasons and the physiological mechanism of generating the Wushu Sanda Athletes' fatigue as well as the area of fatigue and then it discusses the dietary intervention measures for the recovery of Wushu Sanda Athletes' fatigue.

Keywords: Dietary intervention, sports food, Wushu Sanda

INTRODUCTION

Sanda is an old and young sports, which is a form of the martial arts, with the development and popularization of Sanda as well as the international sports exchange of boxing, it gradually developed into a formal event. Sanda belongs to the item of competition project in the same field, which is a competition with strength, speed, stamina, skill and intelligence. Therefore, the level of athlete's physical ability has increasingly become the key to ensure the large load exercise intensity for the competitive games in multi period. In order to make the athletes achieve good sports performance, in addition to techniques and tactical training, the fatigue recovery problem of Sanda athletes' has received more and more attention (Martini *et al.*, 2006).

Sanda is a modern sports event that two people use martial arts such as kick, hit and other offensive and defensive techniques according to certain rules, so as to win the other only by hand, which is an important part of Chinese martial arts. From the definition of Sanda, we can know, it is the organic combination with kick, hit, or boxing, which also is a sports item with three confrontation in the form of project, with multiple structure and variation of action combined with techniques it requests the athletes to have better techniques, strength, speed, reaction and tactics, the time of Sanda competition for each game is two minutes, with a total of playing three games, one period of the game has one minute to have a rest, with the system of two victories three games. From the fighting time, the characteristics of energy supply is mainly based on the original phosphate metabolism, with anaerobic, aerobic, mixed oxygen metabolism as the auxiliary project (Romijn *et al.*, 1995). Thus, Wushu is a competitive game with skill dominant in the similar

project or field, with a pair of level a competitive game, according to the weight, with the absolute victory score or winning the games for the sports athletes, thus a high level of athletic ability and competition can become the important factors to influence the result of the competition.

MATERIALS AND METHODS

The part of Wushu Sanda athletes that caused the fatigue:

Regulation system: The central nervous system, the autonomic nervous system and hormone-fluid system.

Neuro-vegetative system can ensure the activities of muscles: Respiratory system, blood and blood circulation system.

Execution system: Motion (peripheral nervous system, muscle) organs.

Reasons of causing fatigue and physiological mechanism: Sports fatigue will cause the athlete's athletic abilities and cause physical strength declined sharply, which can affect the athlete's training quality seriously and make athletes competition results decreased greatly. Therefore, the coaches and athletes must understand the main reasons for the in-depth understanding of sports fatigue as far as possible to avoid motion fatigue (Hein *et al.*, 2009). The sport fatigue of Wushu athletes have their own characteristics and it can include muscle fatigue and nervous fatigue and psychological fatigue of three aspects.

Muscle fatigue: The mode of Sanda determines its energy supply with glycolysis primarily, with aerobic

Table 1: Subjective senses of sports fatigue

Content	Self sense	Amount of sweat	Attention	Breathing	Action
Mild fatigue	Without any un-comfortableness	Not so much	Executing instructions correctly	Moderately speed up	Light gait
Moderate fatigue	Fatigue, leg pain, palpitation	More	Executing password not accurately, appearing the wrong action technology	Significantly speed up	Swaying gait
Extreme fatigue	Headache, chest pain, nausea, vomit	Very much, especially for the body trunk	Executing password slowly, the technical movement is with deformation	Significantly speed up, Shallow breathing	The swing phenomenon is significant, appearing uncoordinated action

oxidation energy as subsidiary supply. In Sanda competition, the direct energy source of athlete is from ATP in skeletal muscle, the main synthesis of ATP is from the decomposition of CP as well as sugar glycolysis, the synthesis of ATP is mainly depended on the anaerobic glycolysis of sugar, with the increase of competition intensity, the muscle glycogen is depleted, muscle occurs the maximum accumulation of ATP and C P with maximum consumption. Thus appeared the increase of HL value, while pH value of blood is reduced, compensatory acidosis phenomenon, resulting in ATP synthesis reduced, affecting muscle movement, eventually leading to fatigue, so that the body cannot continue capable of work.

Neural fatigue: Sanda athletes need to require "full of emotion, looked focused, internal and external unity, unity of consciousness and respiration, unity with consistent actions" in the game. This makes the athletes of Sanda in the game, a large number of impulse excitation transferring to the cerebral cortex to the corresponding nerve cells, neural cell with long time impulse excitation can lead to the increased energy consumption of materials, when the consumption to a certain extent, the corresponding nerve cells produce protective inhibition, with imbalance of central nervous innervation, because of large energy consumption, it can result in the increase of lactic acid, while the increase of lactic acid and decrease of glycogen will cause central fatigue. In addition, during the process of high strength competition, Sanda athletes sweats a lot, the amount of body water is reduced, the amount of salt is also reduced, water and salt metabolism is disordered, the blood circulation reduce the internal environment of body with discorded metabolism, which can lead to fatigue. As shown in Table 1.

Mental fatigue: Sanda Athletes may bear enormous psychological pressures in the competition process psychologically. Once the result of the game is not ideal, it will generate resentment, lose the interests in training, if things go on like this, it is extremely easy for athletes to cause mental fatigue.

The physiological mechanism of fatigue: When athletes go on with the strenuous exercises, the muscle glycogen is consumed largely, the exercising captives

decreased, which is an important reason of sports fatigue. Lactic acid in the muscles is the product of sugar's anaerobic metabolism, in the muscle, the concentration rate can be increased to thirty times or so. The accumulation of lactic acid makes the osmotic pressure of muscle fiber increased (Matsumoto *et al.*, 2009). At the same time, because water can penetrate into the inside of muscle fibers, which can make muscles swelling, the physical compression pressed the pain sensing nerves in the muscle, which can produce muscles with soreness.

RESULTS AND DISCUSSION

The analysis of the dietary intervention of Wushu Sanda athletes' after the period of recovering fatigue:

Drug therapy: Using vitamins or natural medicine can effectively regulate the physiological function of human body, accelerate the metabolism, replenish energy, reduce oxygen consumption of tissue, improve blood circulation, provide muscle nutritional supplement. At present, the commonly used drugs for the fatigue recovery of Wushu Sanda are vitamin B1, B12, C, E, astragalus root, acanthopanax root, ginseng, *Cordyceps sinensis* and pollen, etc.

Energy recovery: The proper nutrition can make Sanda athletes keep good physiological function, body composition and exercise abilities, which also can promote the elimination of fatigue, prevent the fatigue induced by exercises. According to the characteristics of Sanda, adopting nutrition recovery method should pay attention to the following points.

Heat balance: The energy consumption of Sanda athletes' depends on training and competition intensity, duration, the weight level. Sanda Athletes should keep the dynamic equilibrium between calorie intake and consumption, so as to maintain weight (Elstner, 1990). According to a survey of Wuhan Institute of physical education with the heat consumption of one hundred and three players, the average is 4318 kcal/kg daily and the daily requirement is about 50~51 kcal/kg.

The proportion of pyrogen material should be proper: The energy supply of Sanda athletes is mainly

Table 2: Common Chinese herbal medicine for the recovery of athletes' fatigue

Type of fatigue	Chinese herbal medicine	Effect
The nervous system	Ginseng	Invigorating Qi, Refreshing nerves
	American ginseng	
	<i>Salvia miltiorrhiza</i>	
	Velvet Antler	
The cardiovascular system	<i>Chinses angelica</i>	Nourishing blood, Invigorating blood
	Rehmannia	
	Red dates	
	Donkey hide gelatin	
The muscular system	<i>Ganoderma lucidum</i>	Strengthening gluten abd bones, Increasing physical power
	Trichosanthin	
	<i>Cornus officinalis</i>	

characterized by muscle glycogen glycolysis and aerobic oxidation of glucose. Therefore, in the diet of Sanda athletes, the proportion of energy from three major sources: sugar, protein and fat should be followed by the principle: high sugar, high protein, low fat, namely, the proportion of sugar should be 60~70%, the proportion of protein should be 15~20%, while fat should be 10~20%.

Vitamins and minerals should be adequate: When Sanda athletes take part in the completion, the metabolism is increased, the activity of the enzyme hormone secretion is also increased, at the same time, because of the large number of sweat, the required amount of vitamins and minerals is also increased, therefore, the diet should contain more vitamin C, vitamin B, vitamin B2, which also should provide sufficient phosphorus and iron. Especially when the athletes have a rest between the games, drinks that are arranged for Sanda athletes should be rich in minerals and vitamins. Food should be easier to digest, which can be conducive to acid-base balance: Sanda athletes are often in stressful state with excitement of sympathetic nerve during training and competition, the gastrointestinal blood is less, digestive function is weak. Therefore, they should eat foods that are easily to digest, moreover, they should eat more vegetables, fruits, so as to increase the reservation of body's base.

The dietary system should be reasonable: In addition to breakfast, lunch, dinner, early, it also can increase desert one or two times. Do not drink, do not eat irritating food, paying attention to the hygiene of food. Enough water: because during the movement, people will sweat a lot, body's dehydration is more, therefore, the nutrition should also be added with water. At the same time of adding water, it also should pay attention to add a variety of trace elements, it is better to provide special drinks for Sanda athletes to drink in the competition and training.

The human body can cause function decline or variation by the extreme fatigue when they have intense training and competition. In order to eliminate fatigue timely and improve body function. The arrangement of diet should pay attention to the following points: do not drink cool drinks too much, such as cold water, fruit

juice and so on; select easily digestible food to eat; eat eggs, sausage and fish that contains animal protein; in order to add salt, drink salt tasty soup or eat salty preserved fruit; eat more fruits, vegetables as the source of vitamin, which can regulate appetite; use milk, milk powder, pig liver and so on to add more vitamins, iron and minerals; add ice cream, chocolate and other desserts; it can be added with some fragrant spicy foods to increase appetite; when the body is tired and idle with fatigue with the appetite significantly decreased, the staple food can be changed to eat noodles, porridge and some other foods.

There are many methods to eliminate sports fatigue by Chinese medicine, using a single method is limited, it must be used comprehensively to receive good effect. Because there are a lot of reasons to cause fatigue and exercising capacities are different individually, so the analysis on fatigue must be considered comprehensively with target. Wushu Sanda as a sports item, the fatigue is systemic and all rounded. As for the athletes who takes part in continuous games with excessive fatigue can be diagnosed by doctors, they can use the rational drugs to have recovery. After the experiment, the discovery of drugs for Sanda athletes recovery had a significant effect. The commonly drugs that are used by Sanda athletes can be divided into western medicine, Chinese medicine. Now, as for the athletes with excessive fatigue often use injection of ATP, testosterone to accelerate muscle glycogen recovery and stimulate the generation of erythropoiesis. The common Chinese herbal medicine for fatigue recovery is shown in Table 2.

CONCLUSION

According to the fatigue symptom of Wushu Sanda Athletes' appeared after the competition, it must fully realize and master Sanda athletes fatigue with information of time, part, physiological mechanism, reasons, which can fully help athletes to prevent fatigue and delay fatigue, as soon as possible to eliminate fatigue, so as to restore physical and mental state of athletes, then athletes can take part in the competition with the best competitive state and finish the competition smoothly.

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