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Research on sunlight sports from the angle of sports biochemistry

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ABSTRACT

The implementation of "Sunlight Sports" is a strategic program, which can strengthen the youth sports as well as adolescent physical qualities and physiques in the new century. This paper is based on the analysis from the perspective of sports biochemistry, with the help of the interpretation of sports biochemistry. It is combined with the implementation of current situation of sunlight sports in our country, and put forward the strategy of promoting the implementation of sunlight sports movement, so as to promote the scientific development of sunlight sports.

KEYWORDS

Sports biochemistry; Sunlight sports; Development.

INTRODUCTION

The sunlight sports is for the purpose of enhancing the students' health and physique with the physical training as the basic method. Thus, it must choose the way of physical exercises according to this aim. Since there are various ways for physical exercises, but not all of the methods can achieve the purpose of health. Some young people want to pursue for the stimulus and select the exercise incorrectly, which may cause the damages to the bodies and organs. Therefore, when people choose the way of sports, they must depend on their own situation to choose a safer sports, trying to avoid the intensified exercises and ensure the body without injury, so as to obtain the ideal effect of exercises.

The overview of sports biochemistry

Sports biochemistry belongs to the field of biochemistry and physiology of the human body, which mainly reveals the movement of material and energy metabolism as well as the regulation rules and characteristics. It can explore the mechanism of body function at the molecular level. So, the task is to explore the effects brought by the chemical changes of the body as well as the chemical composition and movement, understanding and mastering these rules to enhance physical fitness and scientific training, so as to improve the level of the specific sports. The study of sports biochemistry began in the early 1920's. Early work was about the chemical changes of glycogen, creatine phosphate on animal muscles during exercises, analyzing the changes of the athletes in blood, sweat, urine before the game and after the game or training. Through analyzing the components such as: blood sugar, salt, urine protein, sweat to make research. In 1940's, it had systematical studies, for example, in 1955, the Soviet Union published *Survey of Sports Biochemistry*. Which was a book introduced and analyzed the effects of sports on skeletal muscle, visceral organ, blood, nerve system, etc. It also illustrated the biochemistry characteristics of strength, speed and endurance,which also explained the application of super compensation rule in the arrangement of exercise, as well as the biochemical characteristics of the movement. In the late twentieth century, molecular biology technique was gradually applied in the researching field of sports biochemistry, including extraction, purification, the analysis of nucleic acid and protein, nucleic acid molecular probe labeling, hybridization, gene cloning, transgenic technology and polymerase chain reaction (PCR) technology, etc, which has improved the study to a new level with the research on the regulation of gene. In addition, with use of transgenic technology, people observed the regulation about the glucose metabolism in skeletal muscle movement; the application of Restriction Fragment Length Polymorphism technology (RFLP technology) can make people understand the individual difference of maximal oxygen consumption and the different mechanism of sports training, which may be associated with the variation of the mitochondrial DNA sequence. Therefore, the application of molecular biology technology in the research of sports biochemistry has greatly promoted the development of sports biochemistry.

In China, the biochemical studies began in the 1950's, with the development of sports undertakings in China, the study was also gradually strengthened, during the process of the the study, it particularly stressed the need to serve for the sports. Therefore, more researches on the area of the athletes body function evaluation and the training methods are studied, such as: the use of functional state of urinary protein, hemoglobin, serum creatine kinase, blood urea, serum immunoglobulin, blood lactic acid, lactate dehydrogenase, urine catecholamine and evaluation, the application of blood lactate in the training intensity, etc. Moreover, the method for the determination of some parameters was improved, such as: ultra trace determination of blood lactic acid,which can make it easier to accept and use in training for the athletes. In addition, the application of muscle biopsy was also put into practice and made some improvements. At the same time, the basic theory research got more attention such as: the effect on enkephalin barking, Y amino butyric acid, erythrocyte ATP, and so on. The relationship between the physical exercises and immunity as well as the reduction of serum cholesterol was also studied.

The implementing status of sunlight sports

The Background of Having Sunlight Sports. Since the reform and opening up policy, the growth of Chinese economy was very rapid, and the people's material living standards have been greatly improved. But the associated lifestyle such as "diseases of civilization"and the students' physical problems have aroused extensive concern all over the country.[1] According to 2005 National Student's Fitness and Health Survey, the result showed us that the level of student's vital capacity and physical quality was declining. Among them, the quality of speed and strength, as well as the physical quality has been declined for ten years, while the quality of endurance has been declined for 20 years, the rate of overweight and obesity in the proportion of students has increased rapidly,among them,the rate of city boys has reached 24%.

In order to overcome this situation, the Ministry of education, the State Sports General Administration and the Communist Youth League Central Committee, launched a nationwide comprehensive "Sunlight Sports Physical education" timely. In some degree, "Sunlight Sports" is a strategic program to strengthen the youth sports and enhance the physiques of teenagers in the new century (shown in Figure 1). The purpose of sunlight sports activity is to promote all types of schools at all levels to form good campus sports atmosphere and full participation atmosphere in the mass sports exercise, which can attract young students to play in the playground, walk into the nature, go under the sun, and actively participate in physical exercises, so as to develop their physical training interests and habits and effectively improve the physical health of students.

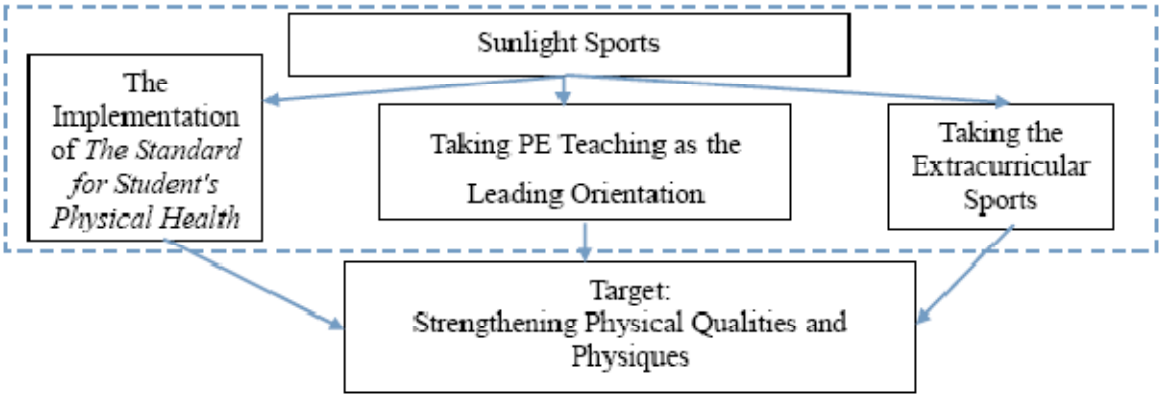

Figure 1 : The implementing mode of sunlight sports

The Operating Situation of Sunlight Sports. From the current situation of the sunlight sports movement, the sunlight sports is not developed as we wished from quantity to quality. All levels of governments and the leaders of the schools did not pay much attention to the sunlight sports, since most of the school leaders concerned more about the large sports scores, graduating rate, the rate of doctoral students, as well as the rate of employment or some other aspects. Therefore, from this perspective, some of them carried out this activity only superficially, after that, they still concerned little and recover the original situation.

The strategy of promoting the sunlight sports

Anaerobic Exercises. Anaerobic exercise generally refers to a short period of intense exercises, which requests the athlete to have good ability of anaerobic metabolism. Anaerobic metabolism refers to the ability of anaerobic exercise with "non lactic acid" and "lactic acid" energy. According to the "non lactic acid energy", the characteristics of energy supplied by TP and CP, we can know, every strenuous exercise within 10 seconds should be based on "non lactic acid energy" supply. The development of high speed quality refers to "non lactic acid energy" ability, namely, the development of reserving the metabolic capabilities of ATP and CP in muscle.

People can adopt some methods such as in a short period of time (about 10 seconds) to practice high intensity exercises with strength and speed, the intermittent time should be no less than 30 seconds.

For example, developing the ability of athlete's "non lactic acid energy" ability with class training program (l.5 hours): (1) preparation can be 20 minutes. (2) moving fast or run 50 meters with 60 seconds in each batch. (3) 10 minutes to have a rest (including technical explanation). (4) the starting and sprint exercise, 30 m x15, each interval should have 30-60 seconds. (5) the relay race, 4 times 50 meters, 5 groups. (6) relaxation.

The athletes can use a lot of 20~60 meters moving or fast running and 30-60 meters starting practice, which is one of the most effective methods to develop ATP and CP energy, but it should be noted that the intermittent time should no less than 30 seconds, so that the ATP and CP of the muscles can recover completely.

Anaerobic exercises for more than 10 seconds of energy supply is mainly depended on anaerobic glycolysis of sugar. After the sugar began glycolysis, the lactate level is increased gradually, it increased the most obviously within 30-50 seconds. That is to say during this period, the movement is mainly depended on sugar anaerobic glycolysis resulted from "lactic acid". For example, the sports items such as 400 meters running and 100 meter swimming projects, the energy is mainly depended on "lactic acid". In order to improve the students' "the ability of athletes lactic acid energy", generally, it should choose the intensity exercises, and the exercising time should be within 1 minute.[2] The purpose of exercises is to improve the capacity for glycolysis, generating as much lactic acid in the muscles as possible and improve the ability with the lactate tolerance. The more the lactic acid is, the more energy it supplied, and the movement ability an be better. According to the most obvious characteristic that the blood lactic acid value increased in 30 seconds, during the period of the teaching and training, the training methods can be used for 30-60 seconds of motion with 1-3 minutes of intermittent, which can extract the "lactic acid" energy produced by the glycolysis.

From the perspective of sports biochemistry, the energy supplying system in human body can be divided into three kinds: phosphoric acid (ATP-CP) functional system,glycolysis energy supplying system and aerobic energy supplying system. The muscles of the body can contain a variety of energy sources, according to the motion of the sports required the energy supply, exercising intensity, exercises duration and some other factors. Therefore, the different energy sources for energy metabolism started with the three ways to supply energy, according to a certain order and the corresponding ratio. It can not be existed only by a single energy supplying system.

Generally speaking,during a short period of time, with high intensity exercise,the body is mainly depended on the phosphate and sugar glycolysis for energy. As the movement time goes on, the sugar, fat, protein in the body starts to decompose capacity in the presence of oxygen. In the system of aerobic metabolism function, the high intensity exercises within 1-2 hours, the muscle glycogen was nearly exhausted. If the fat reserves are abundant, it can maintain a longer movement time,in theory, the time is not limited (shown in Figure 2).

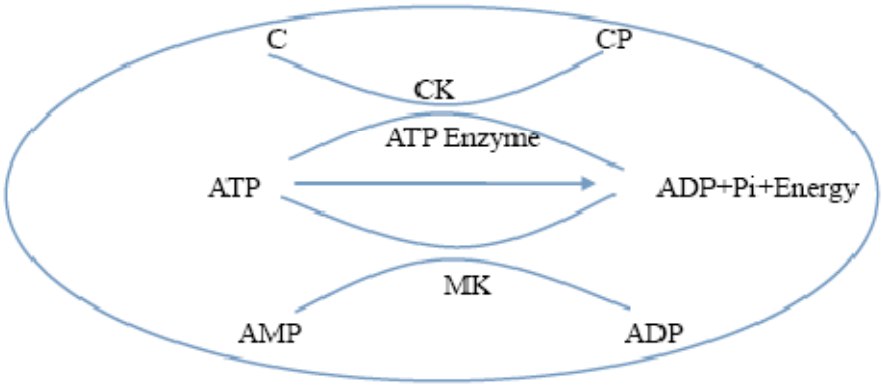

Figure 2 : The process of phospagen energy supplying

Aerobic exercises

The so-called aerobic exercise is also called as aerobic metabolic exercise,when the exercise intensity is relatively small, the supplying condition of oxygen is sufficient, the body will release energy substance such as glucose or glycogen and transmit them into CO_2, H_2O and release a large amount of energy (32ATP), proving energy for the activities, namely, having aerobic exercise. The most effective and scientific exercise for human is aerobic exercise. Adolescence is a second growth peak, the changes of the body are very obvious. Relatively speaking, the development of thoracic, cardiac and pulmonary function is lagging, the ability of aerobic metabolism for energy supply is poor, the negative oxygen ability is low, and the regulatory function of cerebral cortex on respiration is not fully mature, who usually are suffered with less perseverance, and the endurance exercise is limited.

Thus, the aerobic exercise is for the sake of enhancing the cardiopulmonary endurance. During the period of the movement, the muscle contraction needs a lot of nutrients and oxygen, the cardiac contraction frequency will increase, and every time the blood is more than usual, at the same time, oxygen demand also increased, the breathing time is more than usual. So when the movement can keep a longer time wit the muscle contraction, the heart and lung must work harder to supply oxygen to the muscles, and take the waste away in the muscle. And this kind of persistent demand can improve the cardiopulmonary endurance. When the cardiopulmonary endurance is increased, the body can be engaged in longer or higher intensity exercises with less fatigue.

Planing the exercise intensity scientifically

Aerobic exercise needs to keep a certain duration time,only in this way, can it achieve a certain effect. In general, if there is no congenital disease or related exercise contraindication disease, the general requirements for each aerobic exercise should reach the appropriate rate, sustained for at least 20 minutes or more. Research showed that, the pulse rate resulted from (220 minus age) x (60%-85%) wis moderate exercise intensity. The length of the movement duration can have a great influence on the effect of exercise[3]. For the people who just started to exercises, it is not an easy thing to keep exercises for more than 20 minutes.

Thus, it should have gradual exercise, and gradually extended the exercising time, in case of causing the body fatigue. With the continuous improvement of body function, the time of having exercises can gradually from 0.5-1 hour.

Avoiding damages, mastering the sports rehabilitation method scientifically

During the period of having sunlight sports, it must follow the step by step training and follow the scientific training principle, trying to avoid excessive training. At the same time, people should make full preparations before exercises and pay much attention to the stretching exercises. Since the stretching exercises can make muscle, ligament and joints softer, which can reduce the possibility of the injury on joint and muscle, and reduce the possibility of the occurrence of back problems. In daily life, there often will be occurred, after a day of hard work, on the second day, people are particularly vulnerable to have problems of lumbar acerbity backache, which is because the body did not stretch. If people can do some predation before a large amount of exercise, who can spend about 20 minutes for the body to stretch, it can ease the soreness of muscle and keep the joints healthy. It is better to stretch before and after exercises, which can take 30 or 20 minutes or divide it into two 10 minutes, thus, it will make the effect of exercises better.

In addition, people who always have sports exercises can know that too much tension can bring certain harm or damage to the body, it is easy to cause muscle aching, especially knees that is particularly vulnerable to be injured, and the muscle is also easy to be strained. Over-stretched may cause more possibility of injury. So, everything can not be excessive. After grasping it,moderate exercises can be beneficial to the health of the body.

Scientific restoration for sunlight sports

Participants who take part in sunlight sports may have physical recovering problem. If the exercise intensity is too large, students can not get active recovery, which will not only affect their normal learning and cause harm to the health as well. The new starters who just started the training movement may have relatively strong reaction. For example, they will have problems such as: leg cramps, muscle aches, poor quality of sleep, etc. All of this is lack of exercising experience who did not pay much attention to the exercising recovery.

Generally speaking, the types of physical recovery can be divided into two kinds: one kind is the passive recovery, the other is active recovery. There are more diversified means of active recovery including massage, proper nutrition, mental relaxation after finishing sports activities. Sports activities after finishing can help the body keep a normal state after the intense activities and the venous blood can return to the heart as soon as possible, which can accelerate the recovery of the whole body, so as to prevent the acute cerebral anemia and decrease the blood pressure and other undesirable phenomena. These activities include deep breathing and moderate activities, such as jogging, limbs relaxed swing, etc. While, massage can make the lactic acid in the muscles discharge or conversion as soon as possible, which also can make muscle get enough relaxation and eliminate the fatigue. Massage is generally kept on at the end of the exercise for 20-30 minutes or before sleeping in the evening.

Moreover, appropriate vitamin supplements should be provided after training. It needs to add balanced protein and carbohydrate, otherwise the body does not get enough physical energy, and the muscle recovering process will not store more glycogen in the form of energy. Therefore, before the next training, the energy reserves can not recover to the original level, it will continue to cause muscle fatigue (shown in Figure 3).

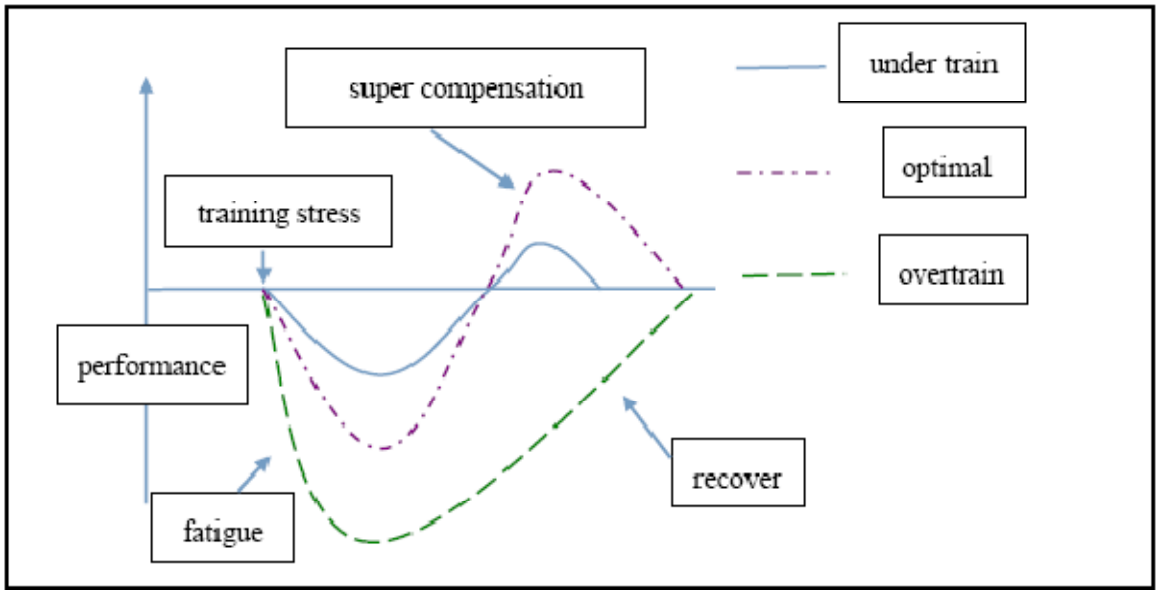

Figure 3 : Super compensation

CONCLUSION

In order to avoid the accidents during the the students have sports, so as to make students can really get benefits from the sunlight sports, the PE teachers must take on the responsibility which should be based on the concept of sports biochemistry. Thus, the teachers must prepare themselves well for the prevention of the accidents and try their best to reduce the rate of accident. But it doesn't mean to cancel the antagonism project, which may ignore the feelings of students. Security issues in the sports are the factors that may hinder the development of sunlight sports in schools that can't be ignored. If the accident can not handle well, both the school's, the teacher's and the students' legitimate rights and interests are infringed. Preventing the occurrence of the accident must firstly strengthen the education of

safety awareness, which can strengthen the students' organization and discipline education; At the same time, putting up posters about safety, establishing the system of safety responsibility of physical education can improve the whole system such as: the health care system, the facility system, and so on.

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