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Antioxidant Effect of Vitamin in Exercise and the Effect of Physical Supplement

Guido Cortelazzo*

School of Media and Communication, University of Westminster, London, England

**corresponding author*

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Abstract: Vitamins have become an essential trace organic substance in our body. Our daily life depends on eating a lot of fruits and vegetables. With the progress of science and technology, there are a lot of functional drinks and vitamin supplements. The purpose of this paper is to study the antioxidant effect of vitamins in exercise. Twenty mice with similar state and good exercise ability were selected as the research objects. The mice were divided into control group and vitamin supplement observation group. The mice in the observation group were given vitamin supplement before the competition, while the mice in the control group were not supplemented with vitamin. Put some exercise equipment in the space of mice, make the mice do the same exercise under our guidance, and observe the effect of vitamin supplementation on the body function of mice. Some mice were given vitamin supplement after the competition. The antioxidant effect of vitamins in exercise and the effect of physical supplement were compared and analyzed according to the test results. At the same time, the oxygen consumption in the space of mice and the antioxidant effect in mice were detected to observe the state of mice. The results showed that the exercise time of the mice with vitamin supplement before the competition was 15 minutes longer than that of the control group, and the recovery time of the mice with vitamin supplement after the competition was 10 minutes faster than that of the mice without vitamin supplement. Vitamin is the best for the physical recovery of mice, which is 10 minutes after vitamin supplement or 30 minutes before exercise. Therefore, the antioxidant effect of vitamins in exercise is obvious and the physical supplement is fast.

1. Introduction

The body needs 13 kinds of trace elements, that is to say, 13 kinds of essential vitamins. These 13 kinds of essential vitamins are all from different fruits and vegetables, not to say that we can get enough and sufficient vitamin content in one fruit or vegetable. At the same time, it is difficult for

us to integrate these 13 kinds of vitamins into a certain product. Therefore, vitamins are indispensable for our human body function and all aspects. And now we have taken vitamin supplement as a consensus. When we hold sports meetings, there will always be many people who buy some glucose and other functional drinks to supplement the human body with vitamins.

Vitamin is a kind of trace organic matter that people and animals must obtain from food in order to maintain normal physiological function, and plays an important role in the process of human growth, metabolism and development [1]. The vitamin nervous body is not involved in both the formation of human cells, but also does not provide energy for the human body [2]. The definition of vitamins requires that vitamins meet the following four characteristics before they can be called essential vitamins. The first is exogenous, human body cannot synthesize itself. It needs human beings to get supplement from daily food by eating. The second is trace, human body needs a small amount, but it can play a huge role. Vitamins must be able to regulate the metabolism or energy transformation of the human body. Finally, the most important is specificity. Without a certain vitamin, the human body will show signs of deficiency. It is a special morbid condition [3]. Specificity is the reason why all kinds of vitamin products emerge in an endless stream. Most of us will have the problem of picky eating, resulting in a certain vitamin deficiency. Therefore, vitamin supplement is very important.

In order to explore the antioxidant effect of vitamins in exercise and the effect of physical supplement, a large number of relevant data were consulted. Among them, Ebrowska introduced in detail the functions of 13 kinds of essential trace elements for human body, and pointed out that vitamin C and vitamin E are the two most common vitamins, most people don't know the functions and names of other vitamins, in addition, we compared and studied the vegetables with the most vitamins, and pointed out their respective functions and human needs [4]. Rankin put forward in his paper that the current way of vitamin supplement has been very common, and compared the important role of vitamin in our fight against free radicals through the sugar content and oxygen consumption of human body [5]. Yanita found through relevant research that vitamin supplementation before and after exercise can not only make us get better exercise performance, but also create a more comfortable internal environment for our body [6]. Li found through research that many elements in vitamins will be consumed a lot in exercise, in the physical consumption, aerobic exercise accounts for the majority of sports consumption proportion, therefore, it is concluded that antioxidant is very important for aerobic exercise [7]. Zhang in order to study the antioxidant effect of vitamins in sports, through the detection of oxygen consumption in the air, he concluded that vitamins can reduce oxygen consumption, and through experiments, it has been proved that the effect of vitamins on our sports consumption is mainly reflected in the recovery of physical fitness and spiritual stimulation, which can make us more clear headed and make the human body quickly recover various kinds of human body abnormal data [8].

In the research on the antioxidant effect of vitamins in sports and the effect of physical supplement, this paper summarizes and analyzes a large number of predecessors' research experience and achievements, and makes some innovations in the research content and detection methods. The specific innovations are as follows: first, the double detection of body function and oxygen consumption in the air of mice before and after exercise is used to ensure the accuracy and accuracy of the experimental results. Second, we adopt four groups of control strategy in the experimental method, which makes our analysis and horizontal comparison data more convincing. Thirdly, this paper also compared the recovery time of mice through some phenomena in life, which can more clearly show the best vitamin supplement time, and also provide certain reference for our daily life.

2. Functions and Principles of Vitamins and Antioxidants

2.1. Essential Vitamins in Human Body and Their Respective Principles and Functions

At present, there are 13 kinds of essential trace elements in vitamins for human body, but the vegetables and fruits only through our daily life are not comprehensive or enough [9]. Although these 13 essential vitamins are trace elements, it is still difficult to obtain them completely. This may be due to the fact that vitamin A contains β-Angelica daturic ketone, and the ring VA is the first line of defense against peroxides. Improving vacuum immunity is an important antioxidant in biofilm. This is an important antioxidant. VC increases the association between bacteria and respiratory epithelial cells and its impact on human health. In the Oh free radicals of VC, the production of IgA secreted is stable, which induces a high incidence of spontaneous infection [10]. VD attacks cell membrane and free radicals outside the membrane, and forms a reduction system, so as to achieve the effect of VC on some diseases of human body. The method, capacity and speed of oxidation of VC free radicals. Carbon monoxide and hydroxyl groups remove peroxide anion and hydrogen peroxide from the body. The main VC is a key enzyme that can release free radicals. VC can significantly improve the activity of myocardial sodium, reduce the level of ADM, reduce the damage to myocardial cells, significantly prolong swimming time until fatigue, and improve exercise ability.

Vitamins are divided into two categories: one is fat soluble vitamins, which are not required every day because they can be stored in human adipose tissue [11]. Vitamin A and vitamin are mainly stored in the liver, vitamin E is distributed in the whole body's adipose tissue, and only a small part of vitamin K is stored in liver tissue. Fat soluble vitamins are mostly obtained from the oil of food. Eating nonfat food will accelerate the insufficiency of these vitamins. The lack of liposoluble vitamin C generally takes years to show up. The other is water-soluble vitamins, which have a small molecular disk and combine with large proteins to form active biochemical enzymes, thus promoting the transformation of compounds. Water soluble vitamins because of its water-soluble, so there will not be vitamin retention in the human body, absorb the right amount followed by the human body's circulatory system. After intake, it takes 8-14 hours to play its role, and then the effect begins to decrease. We need to keep vitamin supplement to avoid the symptoms caused by vitamin deficiency. At present, the loss of water-soluble vitamins along with the excretion of sweat and urine has not attracted enough attention, especially in the large amount of exercise, the problem is more serious.

In the process of our research on vitamin supplement to sports physical strength, we will inevitably encounter the subject of sports fatigue. The solution of sports fatigue is inseparable from vitamin supplement and antioxidant effect. Exercise induced fatigue can be understood as the phenomenon that the physical and biochemical changes lead to the decrease of exercise ability in the process of exercise. Due to the emergence of sports fatigue, the participants can reduce the intensity of exercise, even stop the exercise, which can prevent excessive consumption of the body, and is also the comprehensive performance of physical fatigue and mental fatigue. Therefore, the subject of our study is mainly aimed at the great effect of vitamins on the physical recovery and antioxidant of sports fatigue. Due to the popularization and development of using mice for experiments, mice with good varieties, short growth cycle, good physique and strong physical fitness are gradually favored by various scholars. Because different experiments may be done in mice, it is necessary for mice to have a more powerful system. Therefore, it is very important to solve the problem of exercise-induced fatigue in mice. Therefore, this experiment selected mice to carry out the experiment, so as to solve the problem of sports fatigue and the effect of vitamins on physical supplement and antioxidant in sports.

2.2. The Specific Meaning of Antioxidation and the Function and Application of Vitamins in Antioxidation

It is known that vitamin A, as an antioxidant, does not inhibit lipid peroxidation. This may be due to the fact that vitamin A contains β - Angelica daturic ketone, and the ring VA is the first line of defense against peroxides[12]. Fat can prevent the attack and destruction of unsaturated fatty acid free radicals in various biofilms and biofilms before the attack of free radicals. Improving vacuum immunity is an important antioxidant in biofilm. This is an important antioxidant. VC increases the association between bacteria and respiratory epithelial cells and its impact on human health. In the Oh free radicals of VC, the production of IgA secreted is stable, which induces a high incidence of spontaneous infection. The dehydration process of ascorbic acid and dehydroascorbic acid is reversible and a reduction system is formed. The method, capacity and speed of oxidation of VC free radicals. Carbon monoxide and hydroxyl groups remove peroxide anion and hydrogen peroxide from the body. The main VC is a key enzyme that can release free radicals. VC can significantly improve the activity of myocardial sodium, reduce the level of ADM, reduce the damage to myocardial cells, significantly prolong swimming time until fatigue, and improve exercise ability.

There are two antioxidant mechanisms of VE: releasing active hydrogen and binding with roof to inhibit lipid free radical chain reaction and using free tocopherol naphtha circulation. Collapse in most cases, surface VC is the key to directly eliminate free radicals. The antioxidant effect of vitamin E in the reaction with lipoxin or lipid peroxide ensures the chain reaction of lipid peroxidation, as well as interruption, especially repeated centrifugal contraction, leading to muscle cell necrosis of the ear. Bone, which leads to low immunization frequency and increased susceptibility to infectious diseases, has been reported that mass vaccination campaigns are leading to the spread of HIV / AIDS. Apoptotic mother cell is the main cell group of immune system, including T, B, NK and so on. In order to maintain the stability of the internal environment, we should work together to control the immune response and common antigen recognition, reaction and removal. In addition, through improving humoral immunity, pentachloro benzene can improve cell-mediated immune response and damage cell function, thus changing the immune state of the body. 60-80 mg / L phage was added. This study shows that PECB can control the production of intracellular peroxides and neutrophils and collect them in some parts of muscle injury for improvement. In addition, protein renewal background improved mechanical injury refers to the inflammation in which white blood cells immerse into tissues[13-14]. Tissue generation and cell absorption contribute to the release of free radicals and stimulate the decomposition of tissues. Neutrophils and macrophages in damaged tissues can lead to secondary muscle injury. Some information can increase the number of neutrophils with an average mass movement of 1b30 and produce free radical induced at 0.3 pressure. The results showed that free radicals could damage lipid membrane, lead to cell necrosis, trauma and decrease of cellular immune function. Have also observed in history that VC is an effective method to treat local tissue injury of thigh muscle. Reduce inflammation and improve muscle regeneration, which helps regenerate, vote on your website settings. The invention relates to the protection of cell membranes and other lipid membranes from erosion attack. Free and rapid intake of vitamin E can greatly reduce the concentration of free radicals after training, thus reducing the concentration of free radicals after training. Free radical damage and improvement of antioxidant enzyme activity showed that the content of ADM in serum increased, SOD activity increased, vitamin E supplement became very important and decreased.

3. Study on the Antioxidant Effect of Vitamin in Exercise and the Effect of Physical Supplement

3.1. Selection and Design of Experimental Animals

In this experiment, 20 mice with little difference in body shape were selected as the research objects, with an average age of 6 to 7 months and a body weight of (52 ± 5.0) g. The experimental site was disinfected without pollution, and the laboratory temperature was maintained at about 24 ℃. During the experiment, the mice were first raised according to the same standard to ensure the same internal environment of mice. The oxygen content in the experimental site of mice was controlled at the same level as the outside, and closed to maintain the only way of oxygen delivery. The physical condition and physical condition of mice were tested before the experiment, and the physical fitness of 20 mice was almost the same as possible to ensure the accuracy of the experiment. The mice were randomly divided into four groups, which were the mice that were supplemented with vitamin before exercise, the mice with vitamin supplement after exercise, the mice without vitamin supplement and the group with vitamin supplement before and after exercise. The data obtained from the four groups were compared horizontally to get our final conclusion. In addition, we also tested the performance of several different vitamins to complete this test. An experimental report on the antioxidant effect of vitamins in exercise and the effect of physical supplement.

3.2. Experiment Related Equipment

The main reagents used in the experiment are as follows: YSI blood lactic acid detector (YSI company of the United States). Eppendorf semi-automatic biochemical analyzer (Taiwan native Biotechnology Co, Ltd.), hemoglobin meter (Shanghai Yujun Medical Instrument Factory). 721 spectrophotometer (Shanghai Kevin Biological Technology Research Institute), electronic analytical balance (Shimadzu company of Japan), glutamic acid peroxidase (GSH-Px) test box, glucose test box (Jiangsu Biotechnology Co, Ltd.), catalase (CAT) test box (Nanjing Jincheng Bioengineering Research Institute), lactic acid test box, organic ethanol 300ml, physiological saline 800ml (laboratory inventory), vitamin E Oil 500ml (Shanghai Yuan Biotechnology Co, Ltd.), glucose 800ml (Yunnan Enron Chemical Co., Ltd.). Lactic acid test kit (Nanjing Jincheng Bioengineering Research Institute), 500ml vitamin E oil (Shanghai Yuan Biotechnology Co, Ltd.), 800ml glucose (Yunnan Enron Chemicals Co, Ltd.), and precision hand-held micropipette (Shanghai Precision Scientific Instrument Co, Ltd.).

The main equipment used in the experimental research: all kinds of small toy models are used for mouse movement detection, animal ventilator (Shanghai Hexi Analytical Instrument Co., Ltd.), digital display thermostatic water bath pot, visible spectrophotometer (Jinan Fuqua Instrument Co, Ltd.), automatic blood analyzer (Shanghai Roji Biotechnology Co, Ltd.). HH-6 frozen centrifuge (Beijing Medical Centrifuge factory). High speed freezing centrifuge, constant temperature water bath box (Shanghai Anting Scientific Instrument Factory). It can be seen that there are 9 kinds of auxiliary reagents and auxiliary instruments needed in this experiment, other auxiliary equipment and reagents in this experiment are shown in Table 1.

Table 1. Laboratory auxiliary equipment and auxiliary reagent

Group	Usage amount	Source
Hemoglobin meter	15	Shanghai Kevin Institute of Biotechnology
GSH-Px test box	10	Nanjing Jincheng Bioengineering Institute
Glucose test box	10	Nanjing Jincheng Bioengineering Institute
Catalase (CAT) test box	20	Nanjing Jincheng Bioengineering Institute
Lactic acid test box	10	Nanjing Jincheng Bioengineering Institute
Organic ethanol	300ml	Laboratory Inventory
Normal saline	800mg	Laboratory Inventory
Vitamin E Oil	500ml	Shanghai Yuan Biotechnology Co. Ltd
Glucose	800ml	Yunnan Enron Chemical Co. Ltd

3.3. Preparation of Mice before the Experiment and Preparation of Experimental Conditions

Prepare 20 varieties of similar body shape mice, and in the selection of them for the same physical experiment, select similar physical fitness mice to carry out this experiment. First of all, the mice were cultured in a constant temperature and humidity space for a period of time. During this period, the work and rest of mice were kept the same as much as possible, and the diet was also fed the same. The mice were divided into four groups, which were put into the prepared space to detect the oxygen consumption rate. Different vitamins were injected at different times and the same activities were carried out in different spaces. The mice could be placed in the prepared round cage, and the amount of exercise in the same time could be the most identical through the continuous running of mice. We also need to prepare the related protein and free radical detection reagent, in order to determine the impact of exercise on mice and antioxidant effect.

3.4. Establishment of Model

First of all, we divided the mice into four groups in the previous experiment, and carried out several exercise experiments to explore the antioxidant effect and experimental detection of vitamins in the exercise of mice. We conducted multiple experiments on the four groups to explore the common effects of different vitamins, and obtained the optimal solution by comparing multiple data with the experimental results. Therefore, this experimental model is established on these four groups of mice. On this basis, we carry out multi-dimensional and multi-dimensional experiments, and compare the results to complete this project, that is, the antioxidant effect of vitamins in exercise and the effect of physical supplement. After half an hour in a room with constant temperature and humidity, the mice were warmed up for 5 minutes under a load of more than 60 W. Then they were trained for 30 minutes with a constant load of 90 w on the power car, and then increased by 20 W per minute to exhaustion. The AMS score at the end of 30 minutes of oxygen consumption was observed to evaluate the effect of antioxidant vitamins on the prevention of AMS. Spss10 software was used to conduct paired sample t test for different groups of data, and the significance levels were set as 0.06 and 0.02. The DPPH radical elimination method we used in this experiment is a simple and fast free radical analysis method. Its principle is to use stable free radical DPPH to replace the free radical with short duration in ordinary organisms. DPPH radical is dark in ethanol solution and has a strong absorption at 517nm wavelength. After adding antioxidant, the maximum value can be obtained by single electron pairing with DPPH radical. The absorption at the absorption wavelength is weakened and the color gradually disappears. Therefore, the ability of antioxidant to scavenge free radicals can be measured by the change of absorbance value. In this

experiment, vitamin alleviates physical fatigue in mice. The results showed that: the vitamin dose group had no effect on the exercise of mice ($P > 0.05$). The weight-bearing swimming time of the middle dose group and high-dose group was longer than that of the control group ($P < 0.05$), and the content of free radicals in the low-dose group, middle dose group and high-dose group was higher than that of the control group ($P < 0.05$). The levels of blood urea nitrogen and blood lactic acid were lower than those of the control group, and the detection of vitamin residue was also lower than that of the control group.

3.5. Experimental Procedures and Post Test Detection

After the experiment, blood was taken from the abdominal cavity of mice, and frozen tissue was taken out from liquid nitrogen. The blood extracted from mice was treated with anticoagulant treatment according to the need to test blood bun, Hb and CK. The frozen tissue was taken out from liquid nitrogen and homogenized at low temperature (temperature controlled at 4℃ and rotating speed of 3000 rpm) for 10 minutes. The supernatant was taken and the concentrations of SOD. MDA and GSH-Px were measured respectively. The data were expressed by mean value and standard deviation, and t test was conducted. $P < 0.05$ was regarded as significant difference. Exercise training and antioxidant test have little effect on the recovery of free radicals and physical strength in mice. The results show that vitamin E can effectively eliminate the free radicals produced in the process of exercise, reduce the lipid peroxide, thereby reducing the oxidative stress and muscle damage caused by exercise, reducing the quality of vitamin C water-soluble antioxidant additive, the exercise of mice leads to the increase of free radical content, and the affinity between free radical and unsaturated fatty acids in cells is very strong, it is used as antioxidant. It can prevent lipid peroxidation in mice.

4. Correlation Analysis of Antioxidant Effect of Vitamin in Exercise

4.1. Analysis on the Results of Antioxidant Test of Vitamins in Exercise and the Effect of Physical Supplement

The results showed that the activities of SOD, GSH-Px. And GST in cerebral cortex and cerebellum were significantly decreased in mice without vitamin supplementation. The results showed that GSH-Px, GST and GR decreased significantly in the mice that had not been cultured in the laboratory. This shows that the stress ability of mice without vitamin supplementation is poor. When the body is in exercise state and the free radicals in various tissues in the body increase, the antioxidant enzymes cannot be activated in time, on the contrary, the free radical activity is inhibited. The GR activity of the training group and the untrained group has no significant change after exercise. After swimming for 30 minutes, the activity of SOD in myocardium increased and the level of MDA decreased, but the changes of SOD and MDA in brain tissue were not obvious[15-16]. Compared with the control group, the average speed of the mice with and without vitamin supplementation showed an increasing trend ($P > 0.05$), 20.29% and 23.57%. The heart rates of the experimental group and the experimental group were lower than those of the control group, reaching a very significant level (pg0.01), the monitoring data are shown in Table 2.

The results showed that the heart rate of the experimental group was significantly lower than that of the control group (pg0.01, 47.19% and 43.69% lower than that of the control group, respectively) ($P > 0.05$). There was no significant difference between the two groups ($P > 0.05$). The respiratory rate of the experimental group was significantly different from that of the control group (pg0.05), and was 16.96% lower than that of the control group ($P > 0.05$). The glucose concentration of the experimental group was 8.71% higher than that of the control group, the difference was significant

(pg0.05), the experimental group was slightly lower than the control group (P > 0.05), the difference between the two groups was not significant (P > 0.05), the plasma lactic acid concentration of the experimental group and the experimental group was slightly lower than that of the control group, and the difference was not significant (P > 0.05). Compared with the control group, pg0.01 was 37.89% and 56.77% lower in the control group (P > 0.05). The specific data is shown in Figure 1.

Table 2. Cerebellar activity after quantitative exercise in mice

Group	Activity of SOD in cerebellum	GSH-PX activity	GST activity	GR activity
No vitamin injection	52.2±2.34	45.3±3.34	56.3±4.78	48.4±5.36
After exercise	68.5±3.45	56.4±7.45	61±5.78	56.7±7.11
Before exercise	76.4±1.92	67.6±3.21	33.2±3.95	65.3±5.76
Both before and after	87.7±2.25	77.9±4.56	79.7±3.32	85.6±7.87
P	P<0.05	P<0.05	P<0.05	P>0.05

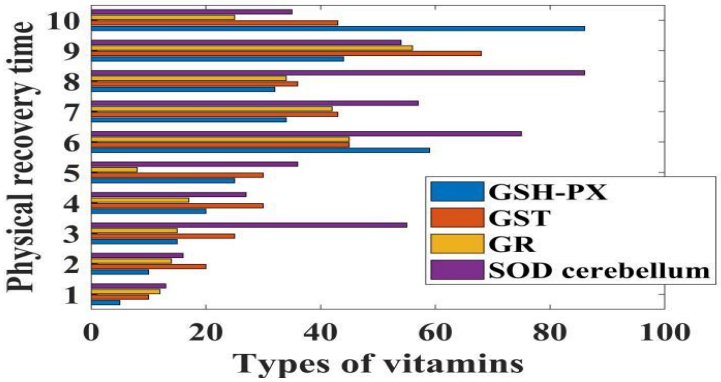

Figure 1. The results were compared between the types of vitamin supplementation and the recovery time of exercise ability in mice

It can be seen from the data in Figure 1 that the plasma free radical acid concentration of vitamin supplement group and non-vitamin supplement group was significantly lower than that of control group (pg0.01), and was 37.89% and 56.77% lower than that of control group, respectively. There was no significant difference between the two groups (P > 0.05). Compared with the control group, the plasma free radical concentration and the cell activity concentration of the experimental group and the experimental group were decreased (P > 0.05).

The results showed that in vitamin supplement group, SOD did not change significantly immediately after exercise, and remained stable after 18 h (P > 0.05), while MDA level decreased slightly immediately after exercise, but had no significant difference (P > 0.05). After 18 h, it showed an upward trend and was significantly higher than that in the quiet state. The GSH-Px of myocardium decreased significantly immediately after exercise (P < 0.05), but did not recover completely after 24h. In the group without vitamin supplement, SOD increased significantly immediately after exercise (P < 0.05), and the level of MDA in myocardium decreased significantly immediately (P < 0.05). After 20 hours of exercise, the level of myocardial GSH-Px decreased significantly (P < 0.05). The relevant data is shown in Figure 2.

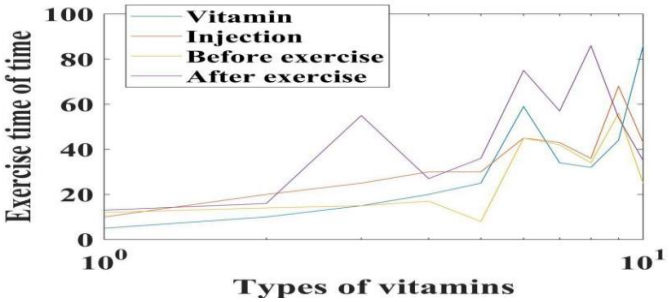

Figure 2. Effects of vitamin supplementation on SOD and MDA levels in myocardium of mice

It can be seen from the data in Figure 2 that the SOD of myocardium in vitamin supplement group did not change significantly immediately after exercise, and remained stable after 24h ($P > 0.05$). The level of myocardial MDA decreased slightly immediately after exercise, but had no significant difference ($P > 0.05$). After 24h, it showed an upward trend, which was significantly higher than that in the quiet state. The GSH-Px of myocardium in vitamin supplement group decreased significantly immediately after exercise ($P < 0.05$), and it still did not recover completely after 24h.

4.2. Analysis of the Effect of Exercise and Vitamin on the Antioxidation of Cells

The results showed that sp02 values of AMS + group and AMS group were lower than nonmovie value ($P < 0.05$). After vitamin supplementation, the LLS score of AMS + group was significantly lower ($P < 0.05$). Compared with AMS group 1, the free radical concentration of AMS + group was significantly higher than that of AMS group 1 ($P < 0.05$). The free radical energy supply ratio of AMS + group in acute hypoxic exposure exercise was higher. The heart rate and free radical concentration of the two groups under hypoxia were higher than those under nonmonic quiet ($P < 0.05$), and there was no significant difference between the two groups. After vitamin supplement, the lactic acid concentration of the two groups decreased, and the increasing load exercise time of AMS + group was prolonged. The specific data is shown in Figure 3.

As can be seen from the data in Figure 3, vitamin supplementation is the best for the physical recovery of mice, which is 10 minutes after vitamin supplement or 30 minutes before delivery.

Compared with tst1.0 and tst1.01, both of them were significantly higher than that of tst1 (0.01). After 6 hours of recovery, tst2 and tlt2 were significantly higher than those of TC2 ($P < 0.05$). After recovery to 24 h, tst3 and tlt3 increased compared with TC3, but there was no significant difference in tlt3. Tst3 was significantly higher than TC3 ($P < 0.05$), and there was no significant difference between tst3 and ft. After 10 days of exercise observation, there was no abnormal performance in feeding, water intake, defecation and defecation in the three groups. The growth and development of mice in the three groups were good, and there was no obvious abnormal behavior, poisoning and death. At the end of intragastric administration, the liver, heart, lung, kidney, stomach, jejunum, spleen, thymus, ovary, Zhao wan and other organs of mice were examined by microscope. The results showed that vitamins played an important role in antioxidant activity of mice in the three groups. There was no significant difference between the two groups. However, the ratio of thymus to body weight was significantly different from that of control group, which indicated that vitamin had the effect of improving immunity of mice. The mice were given intermittent training immediately after exercise, and the comparison was made between the two groups ($P<0.05$). The Hb of the group without vitamin supplement immediately after exercise decreased significantly. The level of blood lactic acid increased to 9.9 ± 5.2 mmol / 1 immediately after aerobic interval training, which was almost the same as that after one-time aerobic exercise. The two groups were given

vitamin supplement and aerobic endurance training. The oxygen consumption immediately after exercise was 2.7 mmol / 1 compared with that at rest. The oxygen consumption at 18 h and 24 h after exercise was at normal level. Taking antioxidants had no significant effect on blood lactic acid level immediately after exercise (P > 0.05). The oxygen consumption of the two training modes increased significantly immediately after exercise. The activity of mice decreased 18 hours after recovery, and the antioxidant activity recovered after 24 hours, but it still did not return to the quiet level. Taking antioxidants can reduce the oxygen consumption immediately after exercise, but there is no significant difference after 24 hours.

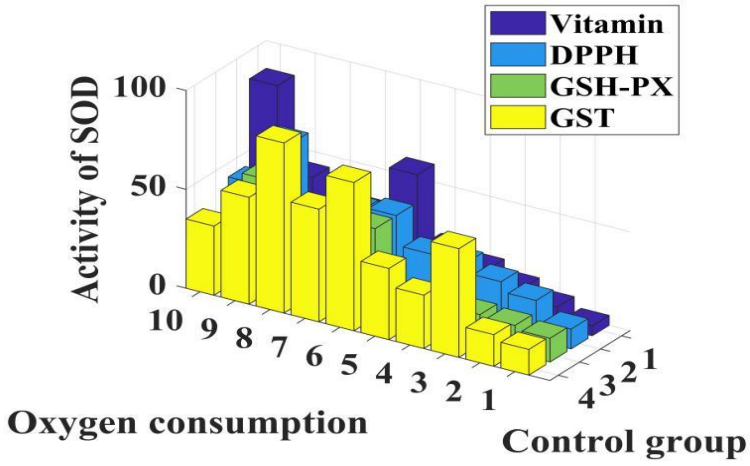

Figure 3. Exercise value and antioxidant effect in mice

The results showed that the exercise time of the mice with vitamin supplement before the competition was 15 minutes longer than that of the control group, while the mice with vitamin supplement recovered 10 minutes faster than those without vitamin supplement. At the same time, the oxygen consumption of mice without vitamin supplement was 5 times, 10 times and 20 times higher than that of other groups. Therefore, the antioxidant effect of vitamins in exercise is obvious and the physical supplement is fast. In the process of high-intensity exercise, the production of free radicals in the body increases, and its antioxidant system is difficult to remove excess free radicals, which breaks the redox stability of the body, and a large number of free radicals attack the biofilm system, which is an important reason for sports injury and fatigue. The relevant data is shown in Figure 4.

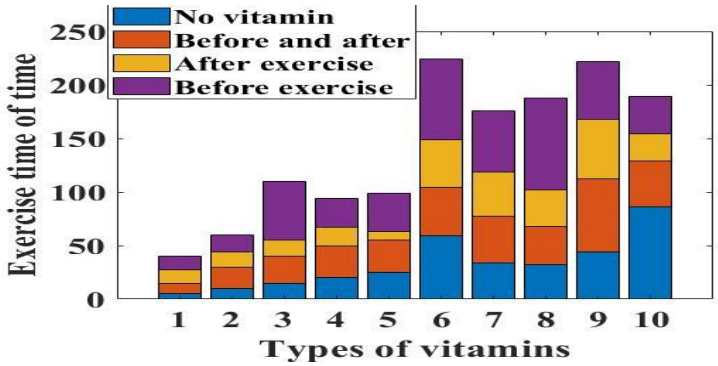

Figure 4. Exercise of mice before and after vitamin supplementation

It can be seen from Figure 4 that in the four groups of control groups, the mice with vitamin supplementation in advance have 5 minutes more exercise limit than those in the control group. The recovery time was 5 minutes less than that of other mice.

5. Conclusion

(1) At present, people pay more and more attention to vitamin supplement. In our experiment, the average speed of mice with and without vitamin supplementation increased compared with the control group (P > 0.05), 19.27% and 24.67%, respectively. The Min heart rate was lower than that of the control group, reaching a very significant level (pg0.01). Vitamins are indispensable to our human body functions and all aspects, and we may not be able to meet our needs for vitamins in different situations by relying on daily food intake. In the exercise of physical fitness consumption, vitamins against free radicals perform well.

(2) The results showed that the exercise time of the mice with vitamin supplement before the competition was 15 minutes longer than that of the control group, while the mice with vitamin supplement recovered 10 minutes faster than those without vitamin supplement. At the same time, the oxygen consumption of mice without vitamin supplement was 5 times, 10 times and 20 times higher than that of other groups. Therefore, the antioxidant effect of vitamins in exercise is obvious and the physical supplement is fast.

(3) The study found that vitamin supplement is also very important for mice. After huge physical consumption, it is urgent to supplement the right number of vitamins to maintain the balance of body functions in mice and maintain aerobic respiration, so as to reduce the oxygen consumption rate of mice. Similarly, for us, vitamins also play an important role in antioxidant and physical supplement.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

References

[1] Eslami L, Isazadehfar K, Karami M. (2015). "The Effect of 12 Weeks Regular Physical Activity and Vitamin E in the Treatment of Non-alcoholic Steatohepatitis: A pilot study", Govaresh, 20(1), pp.57-65.

[2] Rodriguez I, Diaz A, Vaamonde D. (2016). "Assessment of the Effect of Prolonged Forced Swimming on CD-1 Mice Sperm Morphology with and without Antioxidant Supplementation", Andrologia, 48(3), pp.277-281. https://doi.org/10.1111/and.12443

[3] Sadowska D , Stemplewski R, Szeklicki R. (2015). "The Effect of Physical Exercise on Postural Stability in Sighted Individuals and Those Who are Visually Impaired: An Analysis Adjusted for Physical Activity and Body Mass Index", Journal of Applied Biomechanics, 31(5), pp.318-319. https://doi.org/10.1123/jab.2014-0228

[4] Ebrowska A, Hall B , Aleksandra Kochańska-Dziurowicz, Janikowska G. (2018). "The Effect of High Intensity Physical Exercise and Hypoxia on Glycemia, Angiogenic Biomarkers and Cardiorespiratory Function in Patients with Type 1 Diabetes", Advances in Clinical and

Experimental Medicine, 27(2), pp. 207-216. https://doi.org/10.17219/acem/66354

[5] Rankin P, Stevenson E, Cockburn E. (2015). "The effect of milk on the attenuation of exercise-induced muscle damage in males and females", European Journal of Applied Physiology, 115(6), pp.1-17. Rankin P, Stevenson E, Cockburn E. (2015). "The effect of milk on the attenuation of exercise-induced muscle damage in males and females", European Journal of Applied Physiology, 115(6), pp.1-17.https://doi.org/10.1007/s00421-015-3121-0

[6] Yanita M L , Stephen S , Matthew B. (2015). "The Effect of Taurine on the Recovery from Eccentric Exercise-Induced Muscle Damage in Males", Antioxidants, 6(4), pp.79-80. https://doi.org/10.3390/antiox6040079

[7] Li Zhuohua, Wu Xueshi, Cui mintao. (2016). "Effects of Exercise Combined with Calcium Carbonate and Vitamin D on Bone Markers in Early Postmenopausal Women", International Journal of Laboratory Medicine, 37(04), pp.452-454.

[8] Zhang Jianwei. (2016). "Effects of Arctium Lappa L Supplementation on Immune and Antioxidant Function of Exhausted Exercise Mice", Journal of Tangshan Normal University, 38(2), pp.88-90.

[9] Gao Zhao, Yang Xingping, Zhang Yuan, Lin Wenchen. (2017). "The Level of Oxidative Stress after Exercise and the Scientific Evaluation Method of Reasonable Antioxidant Supplement", China Tissue Engineering Esearch, 21 (28), pp.4577-4584.

[10] Zhang Qianfeng, Xu Xiaoyang. (2015). "Sports People Need to Strengthen Vitamin Nutrition", Sports Teachers, 38 (6), pp.53-55.

[11] Han Yu, Liu Siqi, Zheng Xuan, Zhang Qingyu, Jiang Zhenger. (2015). "Effects of Vitamin C and Vitamin B Complex on Exercise-induced Fatigue in Mice", Western China Science and Technology, 14(12), pp.92-95.

[12] Yang Xuewei, Wang Siyuan, Xu Jinjiang, Zhao Jia. (2019). "Protective Effect of Exercise Combined with Vitamin D on Experimental Autoimmune Thyroiditis in Mice", Journal of Southeast University (Medical Edition), 38(2), pp.323-327.

[13] V. Christianto , F. Smarandache , M. Aslam, How we can extend the standard deviation notion with neutrosophic interval and quadruple neutrosophic numbers, International Journal of Neutrosophic Science, 2020, Vol. 2, No. 2, pp: 72-76.https://doi.org/10.54216/IJNS.020202

[14] Malath F. Alaswad, A Review On Some Neutrosophic Algebraic Linear Structures, International Journal of Neutrosophic Science, 2021, Vol. 14, No. 2, pp: 104-114. https://doi.org/10.54216/IJNS.140204

[15] Hu, Mandong, Yi Zhong, Shuxuan Xie, Haibin Lv, and Zhihan Lv. "Fuzzy System Based Medical Image Processing for Brain Disease Prediction." Frontiers in Neuroscience (2021): 965. https://doi.org/10.3389/fnins.2021.714318

[16] Kim, Tae-Yeun; Kim, Sung-Hwan; Ko, Hoon. (2021)Design and Implementation of BCI-based Intelligent Upper Limb Rehabilitation Robot System. ACM Transactions On Internet Technology,21(3). https://doi.org/10.1145/3392115