

The Influence of Sports and Nutrition Combination on Improving Students' Immunity

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Abstract: College students are the hope of the country's development, the backbone of the country's future development, and an important pillar of social progress. The physical condition of college students affects the speed and quality of the country's future development to a certain extent. This article aims to study the effect of sports and nutrition on improving the immunity of students. In terms of body weight, compared with the control group, the status of the exercise group and the exercise + nutrition group is analyzed. When the energy supply rate of protein is higher than 25%, it will be close to the peak of the recommended value. However, the actual intake is low and the energy supply High rate, which leads to the undesirable phenomenon of low protein levels in the body. Scientific diet and exercise can help students lose weight, but unilateral diet control and physical exercise cannot achieve good results. Analyzing the reasons, this experimental study believes that this is mainly due to the subjects maintaining a certain amount of exercise and reasonable diet during the experiment. The experimental results showed that the body weight was significantly reduced after the experiment, with a very significant difference ($P < 0.01$); compared with the exercise group, the weight of the nutrition group increased significantly after the experiment, with a significant difference ($P < 0.05$). Compared with the exercise group, there was a significant increase in nutrition, and the difference was statistically significant ($P < 0.05$). The combination of exercise and nutrition has become more and more obvious in enhancing the immunity of students, which is mainly manifested in the following aspects: firstly, regulating the immune status of the human body, and secondly, enhancing the human body's exercise capacity and the ability to resist diseases to reduce The occurrence of infection.

1. Introduction

With the development of society and the progress of modern science and technology, human life

and learning have changed dramatically, and the way of social labor has also changed from traditional manual labor to intelligent, mechanized and informationized. The immunity of college students is closely related to physical exercise and reasonable diet in daily life. The situation of college students' physical exercise has a direct impact on their daily diet. A healthy lifestyle is conducive to the improvement of students' physical immunity. The impact of the two also reminds college students to improve their health awareness, take more physical exercises and rationally mix their diet.

Under the pressure of strenuous exercise for a long time, athletes consume too many nutrients and calories. If not supplemented in time, it may lead to immune suppression and affect athletic ability [1]. Athletes need comprehensive and reasonable nutrition, and the diet of ordinary people is not exactly the same. Athletes in different sports have different emphasis on strength, endurance, explosive force, coordination, reactivity and other aspects during training, so there are corresponding different characteristics and requirements in sports nutrition [2].

Li et al. studied and analyzed the changes of physical health standards in Japan, the United States and China. The effects of physical exercise on height and body mass index (BMI), vital capacity, body mass index (BMI), grip strength body mass index (BMI), cardiovascular function, and lower extremity explosive force were analyzed [3]. The nutritional intervention of F et al is an action to improve the nutritional status of individuals or groups, and nutrient supplement is one of the main nutritional interventions [4-5]. There are many kinds of nutritional supplements with different functions, which can be divided into minerals, vitamins, vegetable extracts, amino acids and so on. Athletes use them mainly to improve their health and prevent pathological changes.

In sports training, athletes consume a large amount of nutrients and heat, which will cause a decline in immunity and affect normal training and competition. Therefore, reasonable nutrition of athletes is very important. The purpose of this paper is to investigate the effects of major nutrients on the athletic ability and immunity of athletes and the rational nutrition of athletes in different events. The results showed that in terms of weight, compared with the control group, the weight of the exercise group and the exercise + nutrition group was significantly reduced after the experiment, with a very significant difference ($P < 0.01$). Compared with the exercise group, the weight of the nutrition group increased significantly after the experiment, showing a significant difference ($P < 0.05$).

2. Sports and nutrition collocation on improving students' immunity

2.1. Composition of Reasonable Nutrition of Human Body

The basic nutrients the human body needs are: protein, fat, vitamins, minerals, sugar and water. Protein is the basic building block of the human body, accounting for about 18% of the body weight, an adult needs about 80 grams a day, if less than 30 grams, will appear bloated. Protein sources mainly include animal protein and plant protein. Proteins must be broken down into amino acids before they can be absorbed. Undigested proteins cannot be absorbed. Fat is also an important component of body tissues. Both protoplasm and membrane of cells contain fat compounds. Fat is also the main raw material to supply calories. More than 95% of the lipids in food are triglycerides, in addition to cholesterol lipids and phospholipids. Vitamin is an indispensable nutrient for maintaining the physiological function of human metabolism. There are more than 30 kinds of vitamins, including fat-soluble vitamins such as vitamin A, D, E and K. Water-soluble vitamins B1, B2, B6, B12, C, etc.

Minerals refer to inorganic salts and are also important components of the human body, accounting for about 5% of the body weight. Mainly calcium, potassium, sulfur and trace elements such as iron, zinc. Water accounts for about 65% of an adult's body weight and plays an important

role in regulating body temperature, transporting nutrients and removing waste.

2.2. Energy Consumption and Nutrition Supplement During Exercise

Movement in the process of the body's energy consumption increased, therefore, the energy supplement materials are necessary to ensure that the body's energy balance, at the same time, in the fierce energy metabolism in the process, many enzymes, hormones, blood have formed grading is also involved in energy metabolism and oxygen transport, so many regulation nutrients (vitamins, minerals, etc.) also with consumption. The first thing to supplement after exercise is energy materials, mainly sugar and fat [6]. In static or daily activities, the main energy supply substance of the human body is fat, and when exercise, glucose participate in energy supply, and depending on the different intensity of exercise, glucose and fat participate in the proportion of energy supply is different, the greater the intensity, the greater the proportion of glucose.

The muscle of human body is composed by protein, be engaged in big exercise, be engaged in especially the person of muscle strength training, strong and handsome training needs to add a few protein food more. A normal adult's daily protein intake should be 0.8 grams per kilogram of body weight, compared with 1.5 grams per kilogram for a person engaged in heavy exercise. Although there are many high-priced protein supplements on the market, none has been scientifically proven. In fact, excessive protein supplementation can involve the excess protein in energy metabolism or conversion to fat, so a normal diet does not require special protein supplementation, even for muscle strength or fitness training.

Too much added amino acids (proteins) there may be some dangerous, too much of a single amino acid or a group of similar chemical properties often hinder the absorption of other amino acids, amino acids, therefore, too much added amino acid supplements may not be able to control the kinds of amino acid composition, which could cause the kinds of amino acids in the uneven and produce toxicity.

In the process of sports and exercise, vitamin supplement is a problem worthy of attention. In competitive sports training, some vitamins will directly affect the athletic ability of athletes, so it is found that exercise may lead to the consumption of some vitamins [7].

2.3. Nutrition Supplement and Immunity

Immunity is important physiological function in human body, "exercise, nutrition, immune", has a complicated relationship between learning about their relationship, to grasp the function of nutrition, exercise in the whole body and the external environment has important value, ability to adapt will help people use nutrition means to regulate the body's immune status, enhance athletic ability, maintain a healthy body. It has been reported that skeletal muscle exercise can cause changes in immune function. Moderate and regular exercise can improve the body's immunity, while vigorous exercise can impair the body's immunity. Long-term intensive exercise (refers to oxygen consumption exceeding 80% of the body's maximum oxygen consumption) will reduce the number of immune cells in human peripheral blood and the immune activity of immune cells, thus reducing the body's resistance to disease [8].

Scientific studies on competitive sports science show that the nutritional status in the body, such as protein, amino acid, essence, zinc, iron, and nutrients such as maintenance A and maintenance C, will have an impact on the immune function of the body, thus affecting the athletic ability. It has also been shown that insufficient protein intake will lead to low number and function of T, B cells and phagocytes, decreased synthesis and secretion of cytokines, and increased incidence of infectious diseases. It has been reported that athletes with limited intake of protein, for example, when athletes lose weight, the phagocytic function of phagocytic cells will decrease if their weight

is reduced by 4% [9].

Under normal circumstances, free radicals are produced in the body tissues. When excessive free radicals are produced or the ability of the body to eliminate free radicals is reduced, extensive damage to the structure and function of cells will result. The body scavenging free radicals relies on an antioxidant system composed of several enzymes. These enzymes include superoxide dismutase (SOD), glutathione peroxidase and catalase. They maintain the dynamic balance of free radical generation and scavenging in the body through their respective action pathways. Acute exercise disrupts this balance, leading to free radical accumulation. Several nutrients are known to have strong free radical scavenging effects and are called natural antioxidants. They are vitamin E, vitamin C, beta-carotene and selenium. Therefore, in daily life, especially during exercise or training, pay attention to supplement the food containing the above substances.

2.4. Regulate the Immune Status of the Body

Exercise prescription in the 1950 s was the first American biologist card, hospitals, since the 1960 s brought to the attention of the people gradually, especially in recent years, with the appropriate movement to improve the immunity of human body oneself point of view more and more get people's attention, has the close relationship between the body's immune function and sports such as view is more and more people. Exercise prescription refers to a way of getting people to exercise in a purposeful, planned and scientific way [10]. A large number of medical studies have shown that physical exercise can improve the body's immune parameters, increase the vitality of macrophages and natural killer cells, improve the body's resistance and self-repair ability, improve the body's immunity, and prevent the occurrence of some infectious diseases. It is generally agreed that long-term moderate intensity physical exercise can improve the body's immune ability, but long-term high intensity physical exercise can suppress the body's immune ability. Different exercise intensity and exercise time have different effects on human immune status. Regular participation in sports can make students' body more balanced and promote the coordinated development of body organs and systems. Proper sports play an important role in improving the immunity of college students. The frequency, duration and intensity of each physical exercise are closely related to the students' constitution and their immunity status. Lack of good exercise habits, lack of sufficient exercise time, and lack of appropriate exercise intensity are the main reasons that affect the current college students' generally weak physique and low immunity [11].

Not only exercise can improve the immune status of the human body, reasonable nutrition diet also has an impact on the immune status of the human body. However, in modern society where the pace of life is accelerating, people only pursue speed and efficiency, and ordering take-out food has become a normal part of people's life. Diet and exercise are complementary to the promotion of human immunity, so we should pay attention to the reasonable combination of nutrition and exercise. Studies have shown that sugar supplementation can directly or indirectly regulate the body's immunity and reduce the exercise-induced immune mechanism through endocrine pathway, and is a safe and effective means of immune nutrition [12].

2.5. Enhance the Body's Ability to Exercise and Defend Against Diseases

This paper finds that the proportion of students who insist on eating breakfast every day in the college students is about more than 50%, and the proportion of students who almost never eat breakfast is about 10%. The proportion of college students who eat breakfast in the morning is largely determined by whether there is enough time in the morning. If the time in the morning is too short, students will have no time to eat breakfast, or students stay up later in the evening and get up later in the morning, which will also lead to many college students not to eat breakfast. In addition,

with the rapid development of information technology, businesses have moved restaurants to online platforms, providing more convenient conditions and more diversified choices for students to eat. Students often order takeout and eat fast food, resulting in a relatively simple diet structure, easy to lead to students' nutritional imbalance. In addition, the human body through a large number of regular movement, can make the body's nervous system exercise, promote the growth and development of muscles, make the human body's bones more firm and strong, promote the body's blood circulation more smooth, regulate the nervous system, respiratory system function, more importantly, improve the body's oxygen metabolism capacity. The size of the body's vital capacity depends on age, sex, elasticity of the lung wall, ventilator development, and the size of the chest, but acquired exercise can also affect these bodily functions. Through physical exercise, can make people's breathing capacity to strengthen, strengthen the strength of the lungs, lung breathing volume increases, lung elasticity improves, these changes in the body will make the vital capacity become larger.

In addition, studies have shown that regular physical exercise and no physical exercise compared to the people, the difference in vital capacity; What's more, there is a difference in vital capacity between people who exercise and those who don't. The volume of the lungs increases, the maximum oxygen intake increases, and so does the volume of vital capacity. Regular physical exercise can make people's heart muscle more developed, can also improve the function of each organ of the body, promote the improvement of physical quality, and reduce the incidence of a variety of diseases such as cold, hypertension.

2.6. Relationship Between Protein Nutrition and Exercise Ability and Immunity

(1) Protein requirements of athletes and their influencing factors

There is no consensus on how much protein an athlete should take daily. The reason is that protein supply is affected by training type, training load status, weight control, age, nutritional status, environment and other factors. In general, the daily protein requirements for endurance athletes when sugar and/or energy intake is adequate are 1.0 -- 1.8 g/kg BW. The higher the level of training, the more you need. Strength athletes have more protein than the average person. Up to 2.0g - 3.0g/kg body weight. Athletes in weight-control programs need to choose foods with high protein nutrient density, which can account for 18 percent of their total energy intake. The sports meeting causes the human body protein to use increase and the tissue damage, the athlete must increase the protein intake, in order to recover the tissue protein consumed in the sports, repairs the damaged tissue; or maximize protein synthesis, develop muscle strength and volume, and prevent exercise anemia. In addition, by ensuring that a certain amount of protein is consumed at each meal, the body stabilizes blood sugar levels and maintains a stable mental and physical state. Insulin is the regulatory hormone of blood glucose level and amino acid metabolism in the body. Protein has a good and stable stimulating effect on insulin secretion in the body.

(2) The relationship between protein nutrition and sports ability

80% of amino acids are found in skeletal muscle, among which alanine, glutamic acid and glutamine are the most abundant. It is generally believed that reasonable supplementation of amino acids can promote exercise. It was found that supplementing branched amino acids can relieve central fatigue. It can save muscle glycogen consumption during exercise; Reduce lactic acid production during exercise. This is because most amino acids have a dynamic role in promoting anabolism. Through nutrition supplement, the growth hormone, insulin, testosterone and related hormones secreted by the body can be improved, and the optimal hormone environment for adaptive stress, excessive recovery and sports ability growth can be obtained, so as to promote anabolism and increase muscle strength.

(3) The relationship between protein nutrition and immune ability

From the point of view of the human body fatigue mechanism, in the normal activities and movement of the human body, energy consumption will produce a large number of acid substances, produce too much free radicals; When the supply of amino acids is insufficient, that is, the raw materials for the synthesis of antioxidant enzymes and antioxidants are insufficient, and the accumulation of free radicals and acidic substances will accelerate the cell division and the aging of tissues. Base overmuch, small is fatigue mechanism, is the mechanism of aging, the specific experiments show that can eliminate free radicals of antioxidant enzymes, antioxidants, such as lysine, methionine, once to complement, antibody ability to use fatty acid oxidation increases, the fatigue appeared to prevent abnormal fast recovery after the fatigue effect and has obvious.

After a long period of training, athletes, especially after intensive training, tend to suffer from persistent fatigue, decreased athletic ability and weakened immunity, which is called "overfatigue syndrome". If excessive fatigue syndrome occurs, it will seriously affect the athletic ability of athletes. Some experiments have shown that supplementing branched chain amino acids can relieve athletes' chronic fatigue and improve their immunity. It has a positive effect on relieving exercise fatigue syndrome. In addition, glutamine is one of the most abundant amino acids in human muscles, accounting for more than 50% of the total amino acids inside and outside the cells. It plays an important role in the liver and is an essential substance for the synthesis of amino acids, proteins, nucleotides and other important biological macromolecules. Glutamine is an essential nutrient for athletes to build muscle and strength. It is also an important immune nutrient. Glutamine is needed for replication in all cells of the immune system. Sports research has found that it has the effect of enhancing immunity, and has a positive recovery effect on the decrease of immune system function of athletes caused by intensive training. The relationship between protein nutrition and exercise ability and immunity is shown in Figure 1:

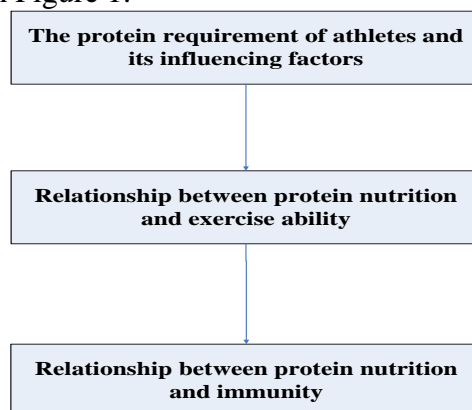


Figure 1. Relationship between protein nutrition and exercise ability and immunity

2.7. Reduce the Incidence of Infection

The problems of irregular diet, reduced exercise time and unbalanced diet and nutrition among college students are also prominent. Under such circumstances, it is of vital importance to pay attention to the national physical exercise of college students and the combination of nutritious and healthy diet. The first foreign famous scientist to prove that life style can affect people's physical health and immune level through investigation. According to the survey, a healthy lifestyle includes six aspects: eat three meals regularly and eat fewer snacks. Do moderate exercise three times a day; Sleep 8 to 9 hours a day; Do not smoke; Maintain a normal level of weight; Don't drink too much. People with these good habits live about 33 percent longer on average than those who don't. In addition, people who like to eat sweet foods, carbonated drinks, fat meat and other foods will have a

weakened immune system and face great threats to their health, which may even cause hypertension, diabetes, obesity and a series of health problems. Through many follow-up investigations, it is found that a reasonable diet has a great effect on regulating the body's immunity and reducing the incidence of infection: vegetables, fruits, whole grains, defatted foods, low-sugar and low-salt foods should be regularly eaten in daily life, especially those containing vitamin B6 and vitamin E. The balance of all kinds of nutrition in human body makes people have a stronger body resistance, which can effectively fight against the phagocytosis of some infectious diseases and improve their ability to fight against infection.

3. Experimental study on the combination of sports and nutrition

3.1. Formulation and Implementation of Sports Plan

(1) The purpose of physical exercise

In order to improve the subject's physical health level for the purpose.

(2) Project type

In the selection of sports items, combined with the research needs, it is determined that the project is mainly aerobic exercise, strength exercise as a supplement, combined with games and other parts of anaerobic exercise interlaced training. Aerobic exercise includes regular running for 15min, jogging for 3000m, basketball dribbling run, jogging, swimming, slow rope skipping, and elementary long boxing. In the 5th week, aerobics will be added to improve the difficulty and interest of the exercise. Strength training combined with equipment to do pull-ups, push-ups, sit-ups and other items; Sports games not only improve the interest, but also exercise its flexibility, coordination and other physical qualities.

(3) Intensity

The intensity of exercise refers to the amount of exercise per unit of time, which is the key quantitative factor to ensure the best effect of exercise. The formulation is not absolute, but varies from person to person according to the individual's age, gender and physique. Exercise intensity too much or too little can not make the effect of exercise to meet the requirements, and sometimes even bring harm to the body. The physiological index of exercise intensity is commonly used to represent its value. In this paper, the physiological index is determined as heart rate in combination with literature and research needs.

3.2. Experimental Time

General motion period can be according to the meal time and rest time is divided into four periods, respectively in the morning, that is up in the morning to eat in front of the time, the specific time to 5:30 - at 6:30, so that in the light exercise can make sympathetic nerve received stimulation, the body quickly get excited, make the body produces a series of changes, but at this stage to exercise is easy produce hypoglycemia, is mainly due to the person's blood sugar at this stage is in a lower level, and physical exercise will accelerate the consumption of blood sugar, which can lead to hypoglycemia, moreover because this article subjects for students, Do not exercise during this period considering the effect on their mental state.

4. Discussion on the influence of Sports and nutrition on improving students' immunity

4.1. Subjects' Total Calories and Intake of Three Major Nutrients

(1) The daily intake of carbohydrates, proteins and other nutrients and total energy of the

subjects are all lower than the recommended amount, with a difference of 3.12g/kg, 0.57g/kg and 0.62g/kg respectively, indicating that the daily diet of the subjects is not very reasonable. The proportion of carbohydrate in total energy supply is within the recommended value, and the proportion of fat energy supply has exceeded the maximum of the recommended value, indicating that excessive intake of fat should be reduced in the diet. The energy supply ratio of protein is higher than 25%, which is close to the recommended line. There is an imbalance between the actual intake and the energy supply ratio, which will lead to the decrease of protein level in the body for a long time. The data are shown in Table 1 and Figure 2:

Table 1. Statistical table of total calories and three nutrients of the subjects

	Carbohydrates (g)	Fat (g)	Protein (g)	The total energy
Intake	3.88±1.92	1.95±0.49	1.06 ±0.37	28.13±12.56
Recommended intake	6.82 ±1.38	1.56 ±0.27	1.64 ±0.33	58.320±16.47
The proportion of energy supplied(%)	52.92±6.96	16.85±4.56	29.72±4.39	
Recommended energy supply ratio(%)	48-62	11-17	25-30	

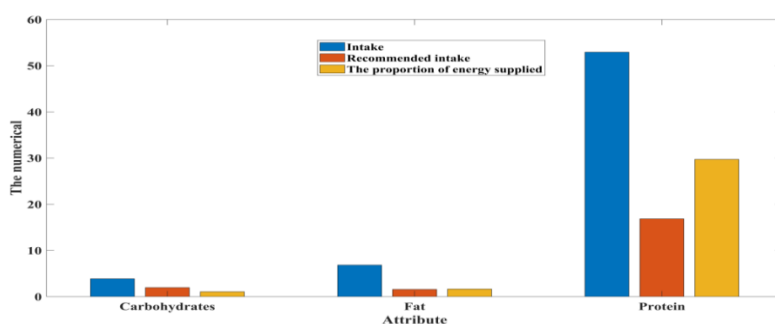


Figure 2. Statistical table of total calories and three nutrients of the subjects

(2)According to the experimental study, compared with the control group, the vital capacity of the exercise group was significantly increased, with a significant difference ($P<0.05$); after the exercise + nutrition group, the vital capacity was also significantly increased, with a very significant difference ($P<0.01$). Compared with the exercise group, the vital capacity of the exercise + nutrition group was significantly increased ($P<0.05$). Compared with the nutrition group, the vital capacity of the exercise + nutrition group was significantly improved after the experiment ($P<0.01$). The specific data of vital capacity of the two groups after the experiment are shown in Figure 3.

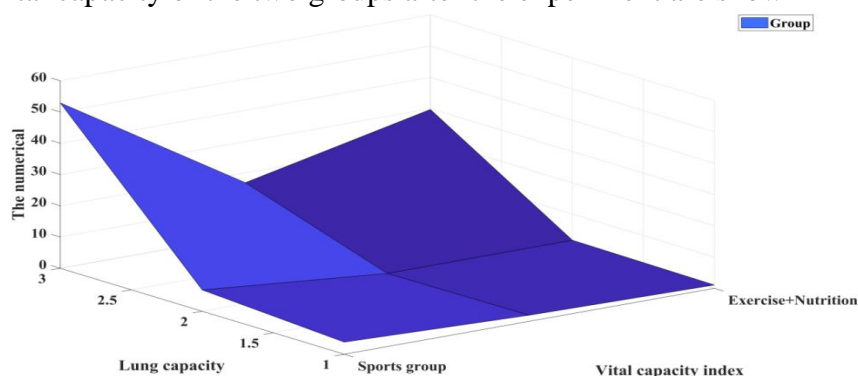


Figure 3. Specific data of vital capacity after two groups of experiments

4.2. Influence of "Exercise + Nutrition Group" on Students

(1) As can be seen from Table 2, there was no significant difference in height indicators among the control group, the exercise group and the exercise + nutrition group after the experiment. It can be concluded that 12-week aerobic exercise intervention program with heart rate maintained at 120-170 beats/min, combined with diet and nutrition education, has little influence on the height of college students. The main reason is that 70% of the height of teenagers is affected by innate factors, while acquired factors such as environment, nutrition and exercise have little influence on height. Specific data are shown in Figure 4.

Table 2. Comparison of changes in body shape indicators among each group after the experiment

	The control group(n=25)	Sports group(n=25)	Nutrition group(n=25)	Exercise + nutrition(n=25)
Height(cm)	160.0±5.58	160.35±5.48	160.22±5.56	160.88±5.42
Weight(kg)	55.78±8.01	48.21±4.97	52.01±6.83	50.05±5.45
BMI	23.45±3.02	26.55±3.01	25.12±2.71	25.71±2.56

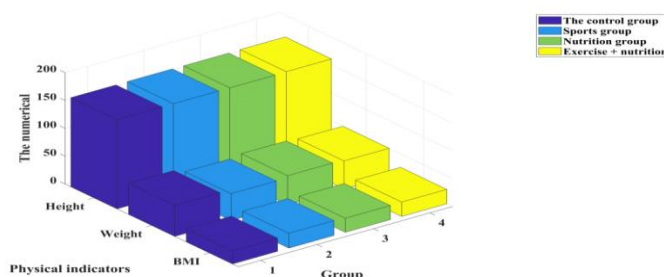


Figure 4. Comparison of changes in body shape indicators among each group after the experiment

(2) As can be seen from Figure 5, compared with the control group, the weight of the exercise group and the exercise + nutrition group decreased significantly after the experiment, showing a very significant difference ($P < 0.01$). Compared with the exercise group, the weight of the nutrition group increased significantly after the experiment, showing a significant difference ($P < 0.05$). The experiment shows that scientific diet and physical exercise can help to lose weight, while unilateral diet control and physical exercise can not have a good effect. Analysis its reason, think this is mainly due to the subjects are studied in this experiment during test always keep a certain amount of exercise and reasonable diet, in this paper, experimental study, the human body in just during physical activity, weight loss, this is because in sports consumption the moisture and fat in the body, and then tends to slow, difference between each group differences as shown in Figure 5.

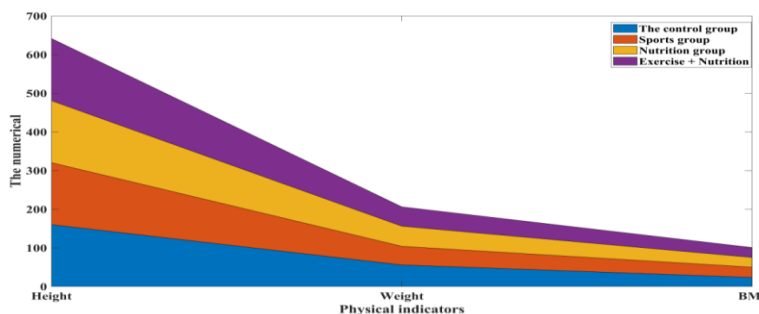


Figure 5. Differences among groups

5. Conclusion

(1) To strengthen the publicity of college students' reasonable diet, guide college students to establish a reasonable diet structure, so that college students can not only eat, but also eat nutritious. Schools should also invest more in public infrastructure for sports, so that students can not only go to the playground to run, but also enjoy more colorful sports. The improvement of college students' physique has a great influence on the development of national economy and society, which affects the development and progress of the society. The combination of sports and nutrition is very important to improve students' immunity and should be paid more attention to.

(2) Athletes under the pressure of strenuous exercise for a long time will consume more nutrients and calories. If they are not replenished in time, it may lead to immune suppression and affect their athletic ability. Athletes need comprehensive and reasonable nutrition, and the diet of ordinary people is not exactly the same. The level of immunity plays a very important role in organism survival and adaptation to the environment. Exercise and nutrition have been shown to have important effects on the body's immunity. In terms of diet, it can provide more basic guarantee for college basketball functional training, such as fat nutrition intake and protein nutrition supplement, which are highly valued.

(3) In recent years, with the improvement of people's living standard and health awareness, sports and nutrition have become two aspects that college students pay more and more attention to in order to improve their immunity and keep healthy. The results showed that in terms of weight, compared with the control group, the weight of the exercise group and the exercise + nutrition group was significantly reduced after the experiment, with a very significant difference ($P < 0.01$). Compared with the exercise group, the weight of the nutrition group increased significantly after the experiment, showing a significant difference ($P < 0.05$). Through relevant studies, this paper finds that athletes consume large amounts of nutrients, especially in the post-exercise blood glucose reduction and muscle fatigue. Therefore, pay attention to adequate intake of carbohydrates, protein and methionine-rich foods such as cheese, beef and mutton. At the same time need to replenish water, electrolytes, vitamins and so on.

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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.

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