Effect of physical activity level on intestinal flora of College Students

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Abstract: Sedentary behavior is closely related to the occurrence and development of many chronic diseases. Increasing the level of physical activity, such as physical exercise, is a tool for the prevention and treatment of chronic diseases. Recent studies have found that the occurrence and development of many chronic diseases are related to the changes of intestinal flora. Although it is not clear whether the imbalance of intestinal flora is the cause or result of the disease, studies have shown that probiotic intervention can improve the symptoms of the disease. Therefore, it is speculated that regulating the intestinal flora may be a feasible method for the treatment of diseases. There are many influencing factors of intestinal flora. As an environmental factor, whether physical activity level is an influencing factor of intestinal flora has not been fully evaluated. Intestinal flora, as a new target for disease treatment, is closely related to body health. As an intervention means, exercise can effectively regulate the distribution of intestinal flora, improve the diversity of flora and promote the balance of intestinal microecology.

1. Introduction

Sedentary behavior is closely related to the occurrence and development of many chronic diseases. Increasing the level of physical activity, such as physical exercise, is a tool for the prevention and treatment of chronic diseases [1]. Recent studies have found that the occurrence and development of many chronic diseases are related to the changes of intestinal flora. Although it is not clear whether the imbalance of intestinal flora is the cause or result of the disease, studies have shown that probiotic intervention can improve the symptoms of the disease, so it is speculated that regulating the intestinal flora may be a feasible method for the treatment of the disease [2].There are many influencing factors of intestinal flora, and whether physical activity level, as an environmental factor, is an influencing factor of intestinal flora has not been fully evaluated [3]. Intestinal flora refers to the huge microbial community living in human digestive tract, which coexists with the host to maintain health and metabolic stability [4]. Recent studies have found that intestinal flora imbalance plays an important role in the occurrence and development of chronic diseases, including obesity and type 2 diabetes [5]. Under normal circumstances, the microorganisms that parasitize the human digestive tract are harmless, and some can antagonize pathogenic microorganisms. The Escherichia coli colonized in the intestine can also provide the host with necessary thiamine, riboflavin, and smoke. Acid, vitamin B12, vitamin K and a variety of amino acids and other nutrients [6]. A small number of microorganisms can cause intestinal disease, called pathogenic bacteria. It does not cause disease under normal circumstances, but causes disease under specific conditions. This type of microorganism is called conditional pathogenic bacteria. The intestinal flora is not only related to the genetic background of the host, but also has a certain relationship with gender and occupation [7].

2. Effect of exercise on intestinal flora

Exercise can effectively prevent and treat the occurrence of chronic diseases. Most of these chronic diseases are found to be related to intestinal flora disorders, such as obesity, hypertension, depression, diabetes, respiratory diseases, cardiovascular diseases and so on [8]. At present, most studies on exercise and intestinal flora at home and abroad think that exercise is beneficial to intestinal flora, but there are also inconsistent results. It may be related to the differences in exercise

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intervention mode, age difference of subjects before exercise intervention, exercise intervention cycle and intensity. Physical activity is a protective factor for chronic diseases such as coronary heart disease, hypertension and obesity. Appropriate physical activity can reduce the relative mortality of population. Adequate moderate-intensity physical activity can reduce the risk of mental health problems such as depression and dissatisfaction in school life [9]. In 2009, the WHO identified physical activity as an important factor in the prevention and control of chronic non-communicable diseases. At the same time, different countries and regions have formulated physical activity recommendation standards for different groups of people based on the physical activity of their citizens. See Table 1.

Table 1 Recommended standards of physical activity for 18-64 year-olds in different countries/regions

Country / region	5～17 years old	18～64 years old
United States	Participate in at least 60 minutes of moderate to heavy physical activity every day	Participate in at least 60 minutes of moderate to heavy physical activity every day
Canada	Participate in 60 minutes of moderate-intensity physical activity and 30 minutes of high-intensity physical activity every day	Participate in 30-60 minutes of moderate-intensity physical activity every day (adults aged 55 and above)
Australia	Participate in at least 30 minutes of moderate-intensity and above physical activity every day	Participate in at least 30 minutes of moderate-intensity physical activity every day
Pacific region		Participate in at least 30 minutes/day of moderate-intensity physical activity at least 5 days a week. Regularly engage in high-intensity physical activity that is good for your health
Global wide	1. Participate in moderate to high-intensity physical activities for a total of ≥60 min every day. 2. Most daily physical activities should be aerobic activities. At the same time, you should participate in high-intensity physical activity at least 3 times a week. Including activities to strengthen muscles and bones.	1. At least 150 minutes of moderate-intensity aerobic physical activity per week, or at least 75 minutes of high-intensity aerobic exercise per week, or a combination of medium and high-intensity activity equivalents. 2. In order to obtain more health benefits, aerobic exercise should be increased to reach 300 minutes of medium-intensity or 150 minutes of high-intensity aerobic exercise per week, or a combination of medium and high-intensity activities. 3. At least 2 days a week should be engaged in strong muscle physical activity involving large muscle groups.

The level of physical activity is affected by individual physiological function, exercise ability, psychological condition and living habits, etc. in a certain period of time, there will be different changes. A lot of research has proved that the self-efficacy of people is significantly positively correlated with the level of physical activity. The higher the self-efficacy, the more likely the higher the level of physical activity. After entering university, students will have a significant change in life and learning. Love beauty heart everyone has, girls will soon for the body and health to continue to exercise. Secondly, personal and dormitory hygiene will promote girls' physical activities in housework and gardening to be higher than boys'. In addition, it may also be related to different majors and grades. Senior graduates will run through various examinations and enterprises when faced with problems such as graduation and employment, and their physical activity level is relatively high, while their physical activity level may be low for majors such as fine arts and computer science. Physical activity may also be affected by emotional factors. However, in real life there are quite a few adults, especially females, who have irregular exercise habits, but the amount

of physical activity they complete during work, transportation, and housework far exceeds the amount of physical activity recommended by ACSM. In this part of the population with irregular exercise habits, it is not known whether there are differences in the intestinal flora between those with adequate physical activity and those with insufficient physical activity.

3. Effect of physical activity level on intestinal flora of College Students

Intestinal flora is a huge and complex ecosystem, which accounts for about 80% of the total bacterial flora in the whole body. The latest research results show that the total number of cells in the intestinal flora is more than the number of cells in the human body, which weighs about 1.5 kg and is known as the "second organ of the human body". The metabolites produced by these bacteria in the growth process can enter the human blood, and play a vital role in the nutrition, metabolism and immunity of the human body. Constipation, diarrhea, indigestion, acne on the face from time to time, poor sleep, fatigue, depression ... In life, we are always troubled by some such symptoms from time to time, and the illness is caught off guard and inexplicable. You can't imagine that more than 95% of our diseases are related to the imbalance of intestinal flora.

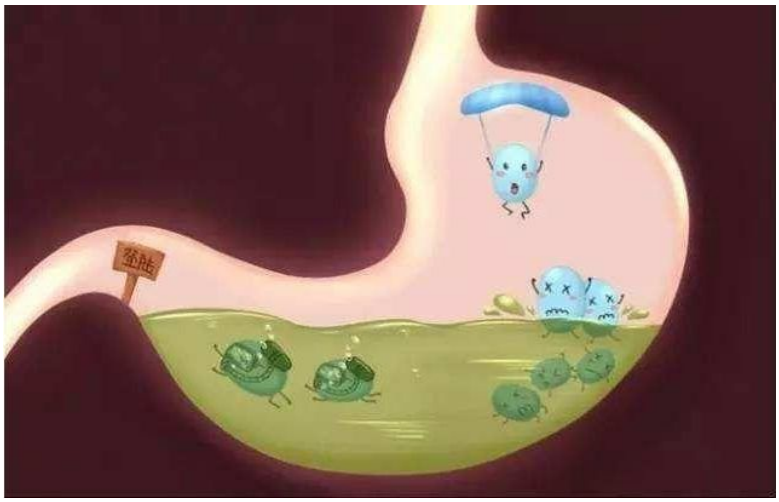

Figure 1 Imbalance of intestinal flora

The intestinal flora as a new target for disease treatment has gradually attracted the attention of scholars. Studies have confirmed that the intestinal flora is closely related to the health of the body. It is not only the inducement of various metabolic diseases, such as obesity and diabetes, but also a direct factor leading to various acute and chronic intestinal inflammations. Exercise as a means of intervention can effectively regulate the distribution of intestinal flora, increase the diversity of the flora, and promote the intestinal micro-intestinal flora that can secrete a series of metabolites to the body's ecological balance of exercise energy, thereby improving the body's health. Intestinal flora can affect the body's exercise ability by secreting a series of metabolites. Exercise can not only make the intestinal flora more diversified, but also promote the growth of beneficial flora and inhibit pathogenic bacteria. This will produce a virtuous circle, that is, exercise can inhibit pathogenic bacteria and make beneficial bacteria grow better. In turn, beneficial bacteria secrete various factors beneficial to exercise and constantly improve the body's exercise ability.

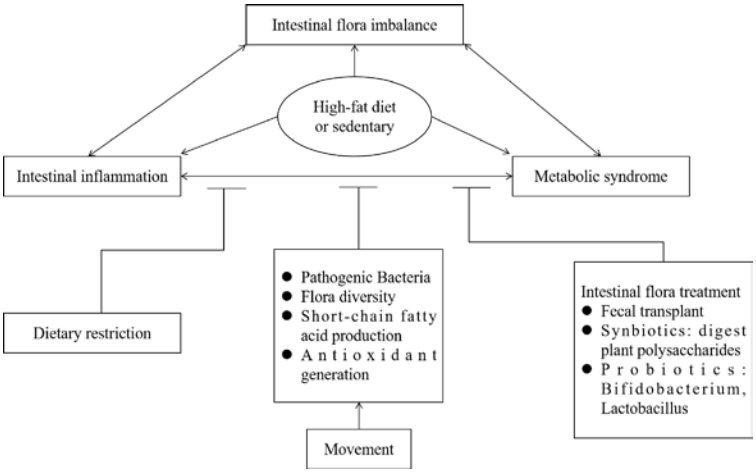

Figure 2 Exercise affects intestinal flora and promotes body health

The increase of intestinal flora diversity, the decrease of pathogenic bacteria and the improvement of exercise ability can also effectively reduce the risk of various diseases. The intestinal tract is an extremely complex microecosystem. At present, it is known that the intestinal flora includes at least 500 different species, of which 99% are obligate anaerobic bacteria, and a few are aerobic bacteria. The relatively constant species and quantity of these bacteria are the basis for maintaining the ecological balance of intestinal bacteria. The normal flora affects human immunity, nutrition, metabolism and other functions, which is closely related to human health. With the rapid changes in human lifestyles, the evolution of human intestinal flora has been difficult to adapt to modern lifestyles to a certain extent. Various stresses, changes in dietary structure and eating habits all have a direct impact on the intestinal microecological balance. Produced adverse effects, which in turn affected the normal function of the intestinal tract. Physical activity during college is a major way to maintain physical and mental health. It not only affects the current stage, but also affects the future life. In addition, the university campus has an ideal atmosphere to promote individual participation in physical activities. Lack of physical activity is usually formed in youth or early adulthood. Although the lifestyle of lack of physical activity can lead to adverse health consequences, it still exists in most young people (including college students). Exercise can also effectively prevent and treat other chronic diseases through intestinal flora. Physical activity during college is a major way to maintain physical and mental health, which not only has an impact on the current stage, but also has an impact on the future life. In addition, the university campus has an ideal atmosphere to promote individual participation in physical activities.

4. Conclusions

College is the key stage to cultivate consciousness and ability, and college life is directly related to students' future development. Besides compulsory physical education courses, college students should take the initiative to carry out extracurricular sports activities, and simple walking, shopping and cleaning will improve the level of physical activity. Although increasing the level of physical activity can not cause obvious changes in the abundance and diversity of flora, it can optimize the structure of intestinal flora and inhibit harmful bacteria, which is consistent with the hypothesis that physical activity promotes health by regulating the changes of intestinal flora. The level of physical activity has no effect on the abundance of the intestinal flora of female college students, but it can cause changes in the composition of the intestinal flora. As a kind of non-pharmaceutical intervention with great potential and effective, exercise can adjust the number and diversity of the host's intestinal microbes, so as to achieve the purpose of improving the host's physiological and pathological state and promoting health. The level of physical activity of college students is generally low. Participating in low, medium and high physical activity can reduce the risk of sub-health status of college students. However, frequent physical activity does not reduce the risk of sub-health of college students. Exercise can affect the intestinal flora, and the intestinal flora can

also affect the body's exercise ability. Different forms and intensity of exercise intervention have different effects on the intestinal flora, and the underlying mechanism needs to be studied. The relationship among exercise, intestinal flora and human health suggests that intestinal flora can be used as a new target for disease treatment, which is a new research trend in the future.

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