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*Original Research Article*

# Observation on the Improvement of Cardiopulmonary Function in Children by Increasing Load Exercise

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**Abstract:** Objective: To investigate the effect of increasing load exercise on the improvement of children's cardiopulmonary function.Methods: 80 students from a primary school were selected as experimental subjects and randomly divided into two groups, namely control group (40) for routine exercise training, and experimental group (40) for increasing load exercise training. After training for 6 months, the scores of heart function and lung function of the two groups of students were compared.Results: Before training, there was no significant difference in each index of heart function between the two groups (P>0.05).After 6 months of follow-up training and observation, the results showed that the heart function index of the experimental group students was significantly better than the control group, the difference of data comparison was statistically significant (P<0.05), the change of lung function of the students in the control group was not statistically significant (P>0.05);The difference of lung function in the experimental group was statistically significant (P<0.05).Conclusion: Incremental load exercise can help enhance the cardiopulmonary function of children, which is worth popularizing.

**Keywords:** Children; Cardiopulmonary function; Increasing load motion

Childhood is the most important stage of physical and mental development. With the continuous improvement of people's quality of life, health has become one of the most concerned things in the growth of children. The cardiovascular system is the basis for the function of the body's organs. The lungs exchange gases with the outside world and carry oxygen to every cell in the body. So the higher the performance of heart function and lung function the better the physical fitness of the child[1].Studies have found that moderate exercise can improve patients' hemodynamic status, improve the activity of oxidase in heart cells and promote neuroendocrine effects[2-3]To improve heart function, such as heart rate, maximum cardiac output and stroke volume, improve shortness of breath and other symptoms, and enhance students' cardiopulmonary function.In the process of proper sports training, the main application of power bicycle, in the management of the whole process, the need for professional supervision and management, according to the actual situation of the research, to choose the corresponding training intensity, and according to the situation of their movement, appropriate adjustment of exercise intensity.Increasing load movement with conventional contrast analysis of this study on the effect of improving the cardiopulmonary function in patients with sub-health, through the study found that using the incremental load exercise intervention after quiet heart rate, systolic pressure, diastolic blood pressure, pulse pressure and heart function indices were significantly improved, and the lung function of patients with determination, patients of VC, FVC, MVV is also improved obviously, than regular movement significantly;In this experiment, we will verify whether incremental load exercise can effectively improve the cardiopulmonary function of children. The experimental results are now reported as follows:

## 1. Materials and methods

### 1.1 General information

The subjects of this experiment were 80 pupils from a primary school, who were randomly divided into two groups according to the double-blind principle. In the control group, there were 40 students, including 23 boys and 17 girls, aged between 7 and 12 years old, with an average age of (9.0±0.4) years old.There were 40 students in the observation group, including 21 boys and 19 girls, ranging in age from 6 to 10 years old, with an average age of (8.2±0.5) years old. There was no statistically significant difference in the basic information between the two groups (P>0.05).

### 1.2 Research Methods

(1) group. First of all, the heart rate and vital capacity of each student in the experimental group were detected. On the test day, each student sat quietly in the laboratory for about 15 minutes, and the oxygen consumption and heart rate of the students in the calm state were measured.Then do warm-up exercises for 3-5min. After the warm-up exercise, take a rest until the heart rate is lower than 90 times /min. Ride a power bike (EC3000, produced by Spain CUSTO Sports Brand Company) for increasing load exercise training under the guidance of the teacher.The initial power of the movement starts from 0W, and the power increases by about 25W every 3min. The maximum load power is determined according to the tolerance of students (generally, the power of children is about 100W), and continues to increase according to this frequency. In the process of riding, the wheel speed must be maintained at about


doi: 10.18282/l-e.v10i5.2761

60rpm. After each exercise training, let each student sit quietly and rest for about 5min, 4-5 times a week.Training for six months.

(2) the control group.This group of students do not need to carry on the special increasing load exercise training, order according to the school's arrangement to participate in the normal weekly physical education courses, complete all the courses taught by the physical education teacher.

### 1.3 Statistical Methods

SPSS20.0 statistical software was used for processing and analysis, and the counting data was represented by % and $x^2$The measurement data was indicated by ± and t test, and the difference was statistically significant when P<0.05.

## 2. The results

### 2.1 Changes of cardiac indexes before and after exercise training of the two groups of students

Before training, there was no significant difference in each index of heart function between the two groups, P>0.05.After 6 months of follow-up training and observation, the results showed that the heart function indexes of students in the experimental group were significantly better than those in the control group, and the difference was statistically significant (P<0.05).

### 2.2 Pulmonary function scores of the two groups of students before and after training

In the control group, students were followed up for 6 months, and there was no significant difference in pulmonary function (P>0.05).The difference in lung function of the experimental group was statistically significant (P<0.05).

### 2.3 Comparison of cardiovascular functions between the two groups

from which it can be seen that the resting heart rate, systolic blood pressure, diastolic blood pressure, pulse pressure and cardiac work index of the experimental group were significantly better than those of the control group, with statistical significance (P < 0.05).

## 3. Discuss

In the adolescent stage, through scientific and appropriate physical training can promote the improvement of heart function, the heart rate gradually increases, the blood flow of the heart is also increasing, the corresponding body tissue blood supply is sufficient. Through the increasing load exercise mode, the teachers guided the use of power bicycle to exercise every week. In the long-term exercise process, the children's heart muscle is increasingly developed, the heart volume is gradually increased, and the ventricular wall is also significantly thickened. The exercise that common enhancement cardiopulmonary function ADAPTS to level ability should have walk, canter, ride a bicycle and swim to wait, the movement that always has big muscle group to participate in slow rhythm can serve as exercise method. In the choice of exercise, first of all, you should choose the exercise you like, only in the exercise you like, you will easily stick to it, and then we should take into account the feasibility and safety. Exercises with high impact are more likely to cause injuries than those with low impact (such as swimming and cycling).For people who are prone to injuries, it is best to exercise with a low impact, while people with few injuries can exercise at will. In the past, people often chose a single form of exercise, which was boring and injury-prone. It is recommended that you use a comprehensive workout, preferably one that includes different exercises at a time.

According to the related sports medicine research report results show that the regular planned sports training time more than 6 months of teenagers, their heart volume will be significantly increased, the students who often participate in physical exercise their heart beats per minute is significantly higher than the average teenager. Exercise twice a week can enhance the ability of cardiopulmonary function adaptation, exercise 3 ~ 5 times can make the cardiopulmonary function to reach the maximum adaptation level, and the possibility of permanent reduction, but exercise more than 5 times a week can not cause the cardiopulmonary function adaptation level further improvement.When the exercise intensity is close to 50%VO2max, the ability of cardiopulmonary function can be enhanced. Therefore, this intensity is often called the exercise threshold, and the recommended range of exercise intensity is 50% ~ 85% of VO2max.In determining exercise intensity, the heart rate index is more practical than the maximum oxygen uptake index, so the heart rate is often used to represent exercise intensity indirectly. Only more than a certain intensity of exercise can effectively cause the adaptation of the body, the intensity of the corresponding heart rate is called the target heart rate. The principle of incremental resistance is the application of overload in the exercise of muscle strength and endurance. Although the principle of overload and the principle of increasing resistance are interchangeable, the principle of increasing resistance is commonly used in strength exercises. The principle of progressive resistance refers to the increase of muscle strength and endurance due to overload training, but due to the growth of strength and endurance, the original overload becomes non-overload or low load, at this time if no increase in load, then strength and endurance can not increase, so strength training must follow the principle of progressive resistance. In this experiment, the experimental group students' heart rate, blood pressure, lung function and other aspects were significantly improved, and the improvement degree was better than that of the control group students, the difference of data comparison was statistically significant (P<0.05).

To sum up, increasing load exercise in children can effectively improve the heart function and lung function of children, improve their physical quality and health status, so it is very worthy of promotion and popularization in primary and secondary schools.

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