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## Analysis on the impact of aerobic exercise on college students

Jin Liu

ZhouKou Normal University, Henan, Zhoukou, 466001, (CHINA)

### ABSTRACT

According to the sixth Children's Physical Health Survey, Chinese college students' health parameters are all off-grade, which may have negative impact on their comprehensive physical quality. In order to improve college students' physical fitness, college teachers should adopt proper measures to lead students to participate physical exercises to improve their health. Aerobic exercise is a good way to improve physical fitness comprehensively. This essay focuses on three aspects of impacts on college students, namely the theories of aerobic exercise and its conduct range, the theory and the sample researches. In order to be more scientific, the essay adopted three research methods to explain that aerobic exercise has impact on blood pressure, heart, arteries and nervous system, including theoretical approach, experimental approach and data analysis approach. Both the theories of aerobic exercise and its conduct range and the theories are summaries of previous research materials and get our own results. To ensure the correctness of previous researches, the essay uses exact scientific experiments to show the impact of aerobic exercise on blood pressure, heart, arteries and nervous system. This essay will also explain aerobic exercise affects college students' fitness in the aspect of effectiveness, differences and sustainability. If college teachers have good understandings about aerobic exercise and lead college students to exercise effectively, college students' fitness will be improve comprehensively.

### KEYWORDS

College students; Aerobic exercise; Body.



## INTRODUCTION

Along with the development of society, college students' physical fitness, life style and eating habits weaken their fitness. Take the result of the sixth Children's Physical Health Survey as an example. 20% of Chinese college students have weight concerns, overweight or underweight; 60% of college students have unqualified blood pressure; 43% of students have cardiovascular and cerebrovascular diseases; 27% of students' reflex nerves are off-grade; 32% of students don't have enough explosive force. All these means Chinese college students have health problems now.

Aerobic exercise includes Long Slow Distance, Taekwondo, long-distance riding and swimming, which may impact college students' bodies. When college students begin to do these exercises, they need breathe much oxygen to help their bodies to complete the process of metabolism. In order to figure out the impact, the essay uses experimental research to find out the reach of aerobic exercises impact on college students. If college teachers have good understandings about aerobic exercise impact, they will be able to know how to lead students to exercise effectively and how to improve college students' fitness comprehensively.

### THE DEFINITION OF AEROBIC EXERCISE AND THE PRINCIPLE OF ITS IMPACT ON BODY

#### The definition and features of aerobic exercise

Aerobic exercise is the physical exercises only operated under the condition that people have breathed enough oxygen. Before college students do aerobic exercise, they should first breathe enough oxygen to help complete their exercises. The aerobic exercise needs relatively long time and its exercise intensity is relatively high.

#### The principle of its impact on body

Aerobic exercise is long-time and intensive exercises. When college students do these exercises, their heart rates will accelerate. In order to make the heart function normally and keep the body functioning, people need to breathe more oxygen. During the aerobic exercise, the energy in their bodies will be burnt and their metabolism will accelerate. If it can be organized constantly and properly, college students' fitness will be improved comprehensively. According to theories, when college students do aerobic exercise, their bodies will show some effects: when college students do aerobic exercise, the heart contraction will increase and the respiratory rate will rise. If they can keep doing aerobic exercise constantly, the heart endurance will be improved. The aerobic exercise has positive impact on arteries. During the exercises, oxygen moves from pulmonary alveolus to the blood circulation system and flow through all body cells by arteries, activating the arterial system. Aerobic exercise has positive influence on the cardiovascular system too. During the exercises, there is an anaerobic period during the absorption of oxygen. As the matter of fact, aerobic exercise makes bodies do aerobic exercise and anaerobic exercise alternately, which is good for the cardiovascular system. As for the nervous system, aerobic exercise exerts good effects on heart. If college students keep doing aerobic exercise for a long time, the number of hemoglobin will rise, which is good to improve their physical fitness and make them healthier and well-proportioned.

### ANALYSIS ON THE AEROBIC EXERCISE IMPACTS ON COLLEGE STUDENTS.

In order to know the aerobic exercise impacts on college students, the essay use the experimental approach to find out the aerobic exercise impacts on college students.

#### Experimental approach on aerobic exercise impacts on college students

##### Sample selection

The research selects 16 male college students and 16 female college students at random, who are in non-PE major. All these students have taken physical examinations and questionnaire, and they don't have hypertension, obesity, cardiovascular disease and other metabolic diseases. All these students' physical conditions are qualified for this research.

##### Preparation before the experiment

In order to ensure these students' physical conditions are qualified for the experiment, there was a process of observation before the experiment to eliminate unqualified experiments candidates; second, every candidate took a series of questionnaires including health questionnaire, medical questionnaire, family history questionnaire, sports history questionnaire and experiment information questionnaire. Based on the results of these questionnaires, qualified candidates were selected. In the end, the experimental process was elaborated to candidates, and all candidates were required not to intake any stimulating drink (including coffee, cocoa, tea and soda), and not to eat any vitamins and other medications (such as anti-allergic agents, contraceptive pills and antibiotics). By a thorough screening, all experimental candidates were qualified for the experiment. The equipment for experiment on the definition of aerobic exercise and its impact on bodies is shown as TABLE 1.

**Experimental research equipment**

**TABLE 1 : The equipment for experiment on the definition of aerobic exercise and its impact on bodies**

Experimental research equipment	Equipment type and place of origin
pulse wave analyzer	Sphygmocor Px; Atcor Medical, Australia
Color Doppler ultrasound	ProSound SSD-10; Aloka, Japan
Cardiopulmonary function analyzer	Quark b2; Cosmed, Italy
Automatic blood pressure monitor	HEM-907 XL; Qmron, Japan
Treadmill	FreeMotion; Fitness Blowout, USA

**Category of experiment activities**

There are two phases in this experiment. In the first phase, candidates had 20 minutes warm-up activities, and then ran for 30-60mins. Treadmill’s initial slope was set at 10 degree and the initial speed was set as 1.7MPH. After 48 hours of the first phase, candidates would enter into the second phase.

Prior to the second phase, candidates should take a comprehensive physical examination until the candidates’ physical conditions met the standards. Treadmill’s settings in the second phase were kept the same as those in the first phase. After running for 30-60 min, candidates laid down on the test bed to take body tests.

During both two phases, there were monitors and care personnel for protection. These experiment activities would meet the requirement of this experiment.

**Data analysis approach**

The experimental data was processed by the SPSS17.0 and data was gained by average value  $\pm$  standard deviation ( $\bar{X} \pm SD$ ). The basic indicator of the comparison of independent samples is: 2×3 repeated measures ANOVA (two genders × 3 time spots), to find out the difference between female students and male students’ physical conditions in the rest or after doing sports. Values  $p < 0.05$  were taken as significant difference value.

**Results of experiments of aerobic exercise impact on college students**

**Aerobic exercise impact on blood pressure**

The data analysis on aerobic exercise impact on blood pressure is shown as TABLE 2.

**TABLE 2 : The data analysis on aerobic exercise impact on blood pressure**

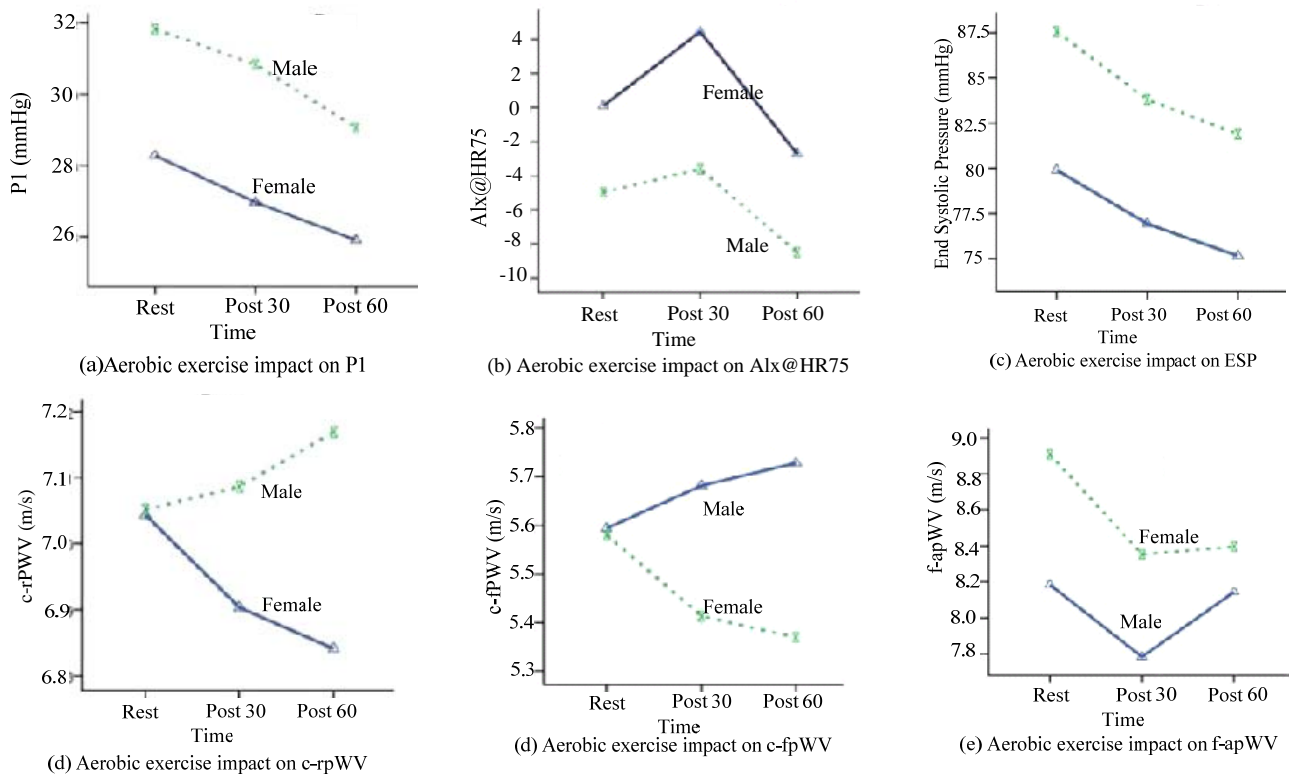
Race		Girl's blood pressure test	Boy's blood pressure test	P		
Time		Girl’s blood pressure difference between blood pressure value in the rest and blood pressure value after 30 min aerobic exercise	Boy’s blood pressure difference between blood pressure value in the rest and blood pressure value after 60 min aerobic exercise	Boy’s blood pressure difference between blood pressure value in the rest and blood pressure value after 30 min aerobic exercise		
		Girl’s blood pressure difference between blood pressure value in the rest and blood pressure value after 60 min aerobic exercise	Boy’s blood pressure difference between blood pressure value in the rest and blood pressure value after 30 min aerobic exercise	Boy’s blood pressure difference between blood pressure value in the rest and blood pressure value after 60 min aerobic exercise		
Brachial artery pressure	SBP	-2.0± 5.7	-3.7± 6.6	-3.3± 7.2	-6.1± 7.2	
	DBP	0.9± 5.0	1.3± 4.9	-0.4± 5.3	-1.7± 5.9	*
	MBP	1.2± 4.9	1.1± 5.0	0.6± 6.2	-1.2± 6.2	*
	PP	-2.6± 5.4	-5.0± 6.1	-2.7± 6.8	-4.4± 7.0	
Carotid artery pressure	SBP	2.9± 10.6	0± 10.4	1.8± 10.9	-4.0± 11.2	
	DEP	1.2± 5.2	-0.1± 5.7	-1.0± 6.1	-1.7± 5.6	
	MBP	0.7± 4.9	-1.0± 5.2	-0.6± 5.2	-2.5± 6.0	
	PP	1.4± 11.1	0± 10.7	2.8± 9.9	-2.2± 11.4	
Central aortic pressure	SBP	-2.0± 4.3	-2.5± 8.7	-1.6± 7.1	-4.7± 6.8	
	DBP	2.7± 5.3	0.8± 6.1	0.2± 6.4	-1.2± 5.7	
	MBP	1.2± 4.9	-1.3± 6.3	-1.1± 6.6	-3.5± 6.0	
	PP	-2.8± 4.4	-4.1± 4.3	-1.9± 4.8	-3.6± 5.3	

The chart above shows the experiment results. SBP is the abbreviation for Systolic Blood Pressure; DBP is the abbreviation for Diastolic Blood Pressure and PP is the abbreviation for Pulse Pressure. \* stands for two genders  $\times$  two time spots.

According to the data analysis on aerobic exercise impact on blood pressure, aerobic exercise has more intense impact on girl's carotid artery, while have more obvious impact on boy's brachial artery and central aortic pressure. However, aerobic exercise has obvious impact on all blood pressure indicators on both girl and boy's. It means when people do aerobic exercise, their arteries will dilate rapidly, when the ventricular elasticity will be improved and the improvement of ventricle will enhance the skeletal muscle blood flow. In the same time, the adrenal level will rise and blood metabolism will accelerate which can improve cardiovascular capacity and make bodies more vigorous.

### Aerobic exercise impact on arteries

Figure 1 shows the changes of some arterial indicators after doing aerobic exercise



**Figure 1: Aerobic exercise impact on artery indicators**

Indicators like P1, ESP, c-f PWE are related to artery indicators. The essay will use the data in Chart 3-1 to explain aerobic exercise impacts on artery. According to the curve charts, both female students and male students experience a great change on their artery indicators when they do aerobic exercise for 30 minutes. Here is the regular pattern: after 30 min aerobic exercise, girls' arterial changes decline, while after 60 min exercises, their energy bounce back as the beginning. However, for boys, their arterial changes decline after 30 min exercises while their energy bounce back and exceed the original state after 60 min exercises. It means that aerobic exercise can improve college students' arterial capability. As for male college students, exercises have more apparent effects. If their purpose is to improve arterial capability, the exercise period should be set at 60 min to achieve the best results.

### Aerobic exercise impact on heart

Figure 2 shows the changes of some heart indicators after doing aerobic exercise

HR is the left ventricular wall parameter and E/A is the mitral valve parameter, both of which determine the health of heart. According to the charts above, there is a great change on parameters for both boy and girl who have done 30 min aerobic exercise. After 30 min, heart conditions recover, but the recovery condition is not as the same as the original state even after 60 min exercises. However, from these curve charts above, aerobic exercise have relatively non-intense effect on girl's heart conditions whose recovery is faster; by contrast, male college students' heart conditions have a small impact, but if their hearts reach the limit, their heart conditions cannot recover to the original state.

Therefore, aerobic exercise should be organized differently based on the features of female and male students.

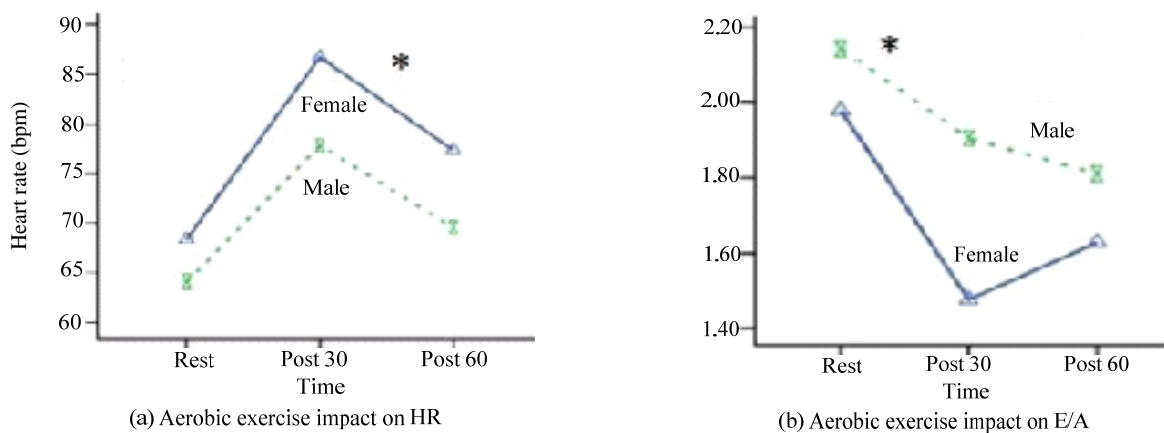


Figure 2 : Aerobic exercise impact on heart indicators

**Aerobic exercise impacts on nervous system**

Figure 3 shows the changes of some nervous system indicators after doing aerobic exercise.

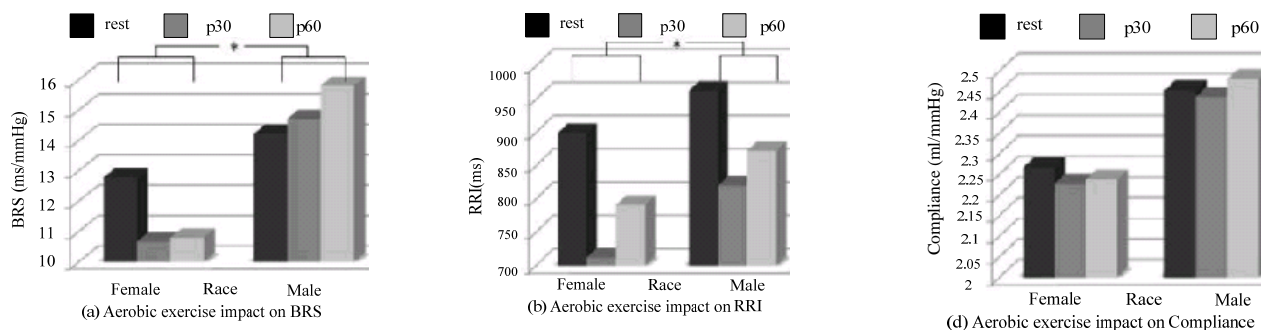


Figure 3 : Aerobic exercise impact on nervous system parameters

Figure 3 shows aerobic exercise impact on nervous system parameters. As we can see from the tables above, aerobic exercise has an obvious impact on female college students' nerve stimulation and has an obvious effect on male students' nerve. It tells us that the purpose of nerve stimulation will be achieved when female college students have done aerobic exercise for 30 min, while as for male students, aerobic exercise needs to be more than 60 min to reach the goal of nerve improvement. However, both female and male students can improve their nerve system if they participate in aerobic exercise.

**Analysis on experiment of aerobic exercise impact on college students' bodies**  
**Effectiveness of aerobic exercise impact on college students' bodies**

According to researches above, college students' physical fitness will be improved as long as they participate in aerobic exercise, which exert positive impact on blood pressure, arterial system, heart and nervous system. Different exercise time may give different influence to bodies. The theory of aerobic exercise impact on college students' bodies is the basis for college teachers to lead college students to engage in aerobic exercise.

**Differences of aerobic exercise impact on college students' bodies**

According to results above, there are some differences between male and female students about aerobic exercise impact on bodies. In general, as for female college students, their physical functions will be stimulated rapidly when they participate in aerobic exercise, with quick changes and slow recovery. Over 60 min aerobic exercise may harm their bodies. By contrast, for male college students, aerobic exercise can simulate their physical functions quickly. Their stimulation range is wide and the amplitude is simple. More than 60 min aerobic exercise doesn't cause much burden for their bodies. For the aspect of physical function, female students' exercises should be limited above 30 min, while male students' exercises may exceed 60 min, and the exact time can be made according to different physical conditions.

**Sustainability of aerobic exercise impact on college students' bodies**

As we can see from the experiments above, aerobic exercise can simulate college students' bodies. If their bodies kept being stimulated, the cardiovascular elasticity, the load capacity of the heart, the arterial resilience and the nervous reflectivity will be improved. Aerobic exercise can work out students' bodies and improve their physical fitness

comprehensively. Due to the sustainability of aerobic exercise impact on college students' bodies, college teachers should transfer the thought and encourage students to do exercises constantly.

## CONCLUSION

### Main results and conclusion

The essay focuses on the definition and the range of aerobic exercise. It also conducts experiments on aerobic exercise impact on bodies to find out aerobic exercise impact on college students' bodies. The essay adopts experimental approach to research on aerobic exercise impact on bodies and finds out that aerobic exercise has impacts on blood pressure, heart, arterial system and nervous system. In order to know more about the regular pattern, the essay uses the data analysis approach to work out the effectiveness, differences and sustainability of aerobic exercise impact on college students' bodies.

### Characteristics of the research

In the past, although people conducted experiments to explain the aerobic exercise impact on bodies, these researches treated college students as a whole without distinction. However, for this research, experimental samples are divided as male and female students differently to find out aerobic exercise impact on different genders.

Inadequacy in the research

The research only analyses the aerobic exercise impact on different genders. If the research can be conducted by different ages, the result will be more accurate.

The research focuses on two time spots (30 min and 60 min) of aerobic exercise. If cyclical approach were used, the longitudinal change of aerobic exercise impact on college students' bodies will be revealed.

The research mainly analyzed four parameters (blood pressure, heart, arterial system and nervous system), so the experimental range is limited.

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