

# EFFECT OF AEROBIC TRAINING ON PHYSICAL FITNESS AND CARDIOPULMONARY RESISTANCE OF UNIVERSITY STUDENTS



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EFEITO DO TREINAMENTO AERÓBICO SOBRE A APTIDÃO FÍSICA E RESISTÊNCIA CARDIOPULMONAR DOS ESTUDANTES UNIVERSITÁRIOS

EFFECTO DEL ENTRENAMIENTO AERÓBICO SOBRE LA APTITUD FÍSICA Y LA RESISTENCIA CARDIOPULMONAR DE ESTUDIANTES UNIVERSITARIOS

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## ABSTRACT

**Introduction:** The good performance of college students depends directly on their physical integrity, which is subordinated to good physical fitness and cardiopulmonary resistance. It is believed that aerobic training, an adaptation to the progressive increase of physical endurance, may benefit college students. **Objective:** Study whether aerobic training can affect college students' physical fitness and cardiopulmonary endurance. **Methods:** Through experimental comparison, the physical fitness and cardiopulmonary endurance of students in the aerobics elective class and the university athletics elective class were compared. Body indexes were measured before and after the intervention, statistically analyzed, and discussed according to the literature. **Results:** There were significant changes in the 50-meter run time for university students in the elective aerobics class from  $9.24 \pm 1.71$  to  $7.81 \pm 2.02$ , the five-meter run from  $11.56 \pm 1.03$  to  $7.87 \pm 0.23$ , the standing jump from  $156.92 \pm 14.79$  to  $170.56 \pm 19.93$ , and the sitting flexion from  $14.07 \pm 1.98$  to  $17.52 \pm 3.79$ . These changes accompanied the changes in cardiorespiratory endurance in the aerobics elective class. In contrast, the changes in student indicators in the track and field elective class were not as evident. **Conclusion:** Aerobic training positively impacted overall physical quality, including elevation of fitness indices and cardiopulmonary endurance in college students. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

**Keywords:** Aerobic Exercises; Physical Fitness; Cardiorespiratory Fitness.

## RESUMO

**Introdução:** O bom desempenho dos estudantes universitários depende diretamente de sua integridade física, que está subordinada a uma boa aptidão física e resistência cardiopulmonar. Acredita-se que o treinamento aeróbico, uma adaptação ao aumento progressivo da resistência física, possa trazer benefícios aos estudantes universitários. **Objetivo:** Estudar se a prática do treinamento aeróbico pode afetar a aptidão física e a resistência cardiopulmonar dos estudantes universitários. **Métodos:** Através de comparação experimental, a aptidão física e a resistência cardiopulmonar dos alunos da classe optativa de aeróbica e da classe optativa de atletismo universitário foram comparadas. Os índices corporais foram mensurados antes e após a intervenção, trabalhados estatisticamente e discutidos conforme a literatura. **Resultados:** Houveram alterações significativas no tempo de corrida 50 metros pelos estudantes universitários da classe eletiva de aeróbica, de  $9,24 \pm 1,71$  para  $7,81 \pm 2,02$ , a de cinco metros foi de  $11,56 \pm 1,03$  para  $7,87 \pm 0,23$ , o salto em pé foi de  $156,92 \pm 14,79$  para  $170,56 \pm 19,93$ , e a flexão em posição sentada de  $14,07 \pm 1,98$  para  $17,52 \pm 3,79$ . Essas alterações acompanharam as mudanças de resistência cardiorrespiratória na classe eletiva de aeróbica, enquanto as mudanças dos indicadores em alunos na classe eletiva de atletismo não foram tão evidentes. **Conclusão:** O treinamento em aeróbico mostrou um impacto positivo sobre a qualidade física geral, incluindo elevação dos índices de aptidão física e da resistência cardiopulmonar nos estudantes universitários. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

**Descritores:** Exercício Aeróbico; Aptidão Física; Aptidão Cardiorrespiratória.

## RESUMEN

**Introducción:** El buen rendimiento de los estudiantes universitarios depende directamente de su integridad física, que está subordinada a una buena forma física y resistencia cardiopulmonar. Se cree que el entrenamiento aeróbico, una adaptación al aumento progresivo de la resistencia física, puede aportar beneficios a los estudiantes universitarios. **Objetivo:** Estudiar si la práctica del entrenamiento aeróbico puede afectar a la forma física y a la resistencia cardiopulmonar de los estudiantes universitarios. **Métodos:** Mediante comparación experimental, se compararon la forma física y la resistencia cardiopulmonar de los estudiantes de la clase optativa de aeróbica y de la clase optativa de atletismo universitario. Se midieron los índices corporales antes y después de la intervención, se trabajaron estadísticamente y se discutieron según la bibliografía. **Resultados:** Hubo cambios significativos en el tiempo de carrera de 50 metros de los estudiantes universitarios de la clase electiva de aeróbica, de  $9,24 \pm 1,71$  a  $7,81 \pm 2,02$ , la carrera de cinco metros



fue de  $11,56 \pm 1,03$  a  $7,87 \pm 0,23$ , el salto de pie fue de  $156,92 \pm 14,79$  a  $170,56 \pm 19,93$ , y la flexión en posición sentada de  $14,07 \pm 1,98$  a  $17,52 \pm 3,79$ . Estos cambios acompañaron a los cambios de la resistencia cardiorrespiratoria en la clase optativa de aeróbica, mientras que los cambios de los indicadores en los alumnos de la clase optativa de atletismo no fueron tan evidentes. Conclusión: El entrenamiento aeróbico mostró un impacto positivo en la calidad física general, incluyendo la elevación de los índices de condición física y resistencia cardiopulmonar en estudiantes universitarios.

**Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

**Descriptor:** Ejercicio Aeróbico; Aptitud Física; Capacidad Cardiovascular.

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## INTRODUCTION

Since the 21st century, aerobics has always been a popular sport chosen by college students in the optional courses of college sports in China. This sport integrates dance, gymnastics, fitness, entertainment and other sports.<sup>1</sup> The aerobics training in the optional courses of college sports is very enthusiastic. The purpose of this paper is to improve students' physical quality, skills of aerobics technology and heart and lung endurance through aerobics training.<sup>2</sup> Through the exploration of aerobics training, the theoretical significance of aerobics research is that this new method can be applied to college elective courses, and provides a detailed reference for the teaching methods of college aerobics elective courses. The practical significance is to improve students' learning enthusiasm through aerobics training, truly understand and master the sport actively, so as to improve the efficiency and teaching quality of the classroom.<sup>3</sup> At present, in China's universities, the number of college students who choose aerobics in sports selection is increasing rapidly. In the study and teaching of aerobics, most colleges and universities still use traditional teaching methods in the classroom, which can be seen from the teachers who pay attention to explanation.<sup>4</sup> Therefore, universities should explore more appropriate teaching methods to improve the enthusiasm and efficiency of students in the learning process, and college sports is now the key to selecting courses. Physical fitness is the foundation of the people and the key to the development of scientific, cultural and moral qualities.<sup>5</sup> Only by improving the physical quality of college students can their overall qualification level be improved. Therefore, this paper discusses the effect of aerobics training on improving the body, heart and lung functions of universities. As an important indicator of college students' physical health, cardiopulmonary tolerance is an important part of college students' physical health.<sup>6</sup> With the change of lifestyle, the heart and lung tolerance of Chinese students is declining, and their health is seriously threatened. Studies have confirmed that the level of cardiopulmonary tolerance is closely related to all-cause mortality, diabetes, chronic cardiovascular disease and hyperlipidemia, and is an important factor in predicting mortality, which indicates the importance of cardiopulmonary tolerance to health.<sup>7</sup> In addition to genetic factors, several factors such as gender, age, physical activity, family economic status, nutritional status and lifestyle also affect cardiopulmonary tolerance. In order to understand the level of physical activity of Chinese college students and its relationship with cardiopulmonary endurance, this study tested and investigated the cardiopulmonary endurance and physical activity of Chinese college students, in order to provide reference for improving the level of cardiopulmonary endurance of Chinese college students.<sup>8</sup>

## METHOD

### Research object

This experiment selected 12 college students from the aerobics elective class and 12 college students from the track and field elective class as the experimental subjects, and measured and recorded the physical basis of the two groups of college students, as shown in Table 1. The study and all the participants were reviewed and approved by Ethics

Committee of ChuZhou City Vocation College (NO.CZVTC20FD019). The age of the two groups of college students is about 21 years old, the height is about 165cm to 167cm, and the average weight is about 60kg. There was no significant difference in physical indicators between the two groups of college students.

In addition, before the beginning of the experiment, the training purpose of college students participating in the experiment was also investigated. The specific situation is shown in Figure 1. The score of college students' aerobics training purpose is based on the 5-point system. College students scored 4.68 points for weight loss, 2.34 points for physical and mental health, 3.46 points for the purpose of following others, 1.58 points for the purpose of exercising willpower, 1.38 points for the purpose of learning technology, and 1.45 points for other purposes.

## Experimental method

In this paper, aerobics training and track and field training were conducted for two groups of college students, and the aerobics elective class and track and field elective class were established. During the experiment, professional measuring equipment is used to accurately measure and record college students' physical fitness indicators and cardiopulmonary endurance indicators, so as to explore the effect of aerobics training on improving college students' overall quality.

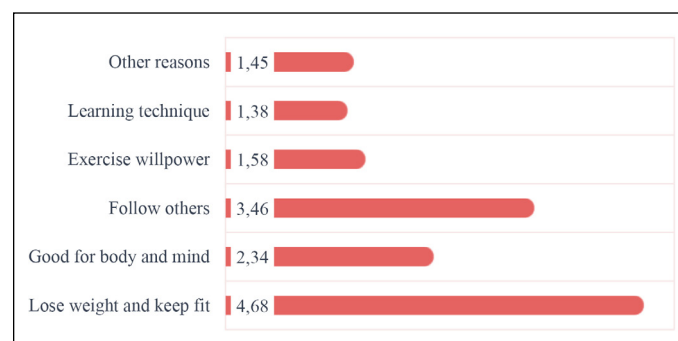
## RESULTS

### Effect of aerobics training on college students' physical quality

As shown in Table 2, the specific changes of the physical quality indicators of college students in the aerobics elective class before and after the experiment.

**Table 1.** Comparison of the basic situation of the two groups of college students.

Basic information	Aerobics Elective Class	Track and Field Elective Course	P
Age	21.043±1.584	21.664±1.600	P>0.05
Height	167.766±7.036	165.902±6.360	P>0.05
Weight	61.753±8.980	62.545±8.654	P>0.05



**Figure 1.** The purpose of college students' participation in aerobics training.

According to the change of various data of physical fitness in the table and the difference standard of P value, it can be seen that the P value of the 50 meter run time, the 5 meter turn back run time, the standing long jump distance, the 800 meter run time, the number of sit-ups in 60 seconds, the number of vertical and horizontal supports in 10 seconds and the number of cross quadrant jumps of college students in the aerobics elective class are all less than 0.01. It can be seen from this that after the aerobics training, the physical quality of college students has changed significantly.

As shown in Table 3, the changes of various indicators of physical fitness of college students in the track and field refresher class before and after the experiment.

According to the changes of the physical quality indicators of the students in the track and field elective class before and after the experiment, it can be seen that the changes of the physical quality indicators of the students in the track and field elective class are also relatively obvious, but not as obvious as the changes of the physical quality indicators of the students in the aerobics elective class. From this, we can see that aerobics training has a very good effect on the physical quality of college students. We can continue to promote aerobics training among college students, so as to improve the physical quality of college students, so that they can maintain good physical condition while studying normally.

### Effect of aerobics training on college students' cardiopulmonary endurance

As shown in Table 4, it is the change of cardiopulmonary endurance index of college students in aerobics elective class before and after the experiment.

**Table 2.** The Effect of Improving the Physical Quality of College Students in Aerobics Elective Class.

Physical fitness index	Before experiment	After experiment	Rate of change	p
50 meters (S)	9.243±1.715	7.813±2.021	-18.292%	P<0.01
5m turn-back run (s)	11.565±1.033	7.874±0.237	-46.879%	P<0.01
Standing long jump (cm)	156.926±14.794	170.560±19.936	7.994%	P<0.01
Forward flexion in sitting position (cm)	14.077±1.986	17.525±3.796	19.674%	P<0.05
800m (S)	263.422±55.481	238.206±49.449	-10.586%	P<0.01
60 Seconds Sit-up (PCS)	32.255±5.869	39.026±5.284	17.349%	P<0.01
10 seconds vertical and horizontal support (times)	12.541±1.984	14.345±0.866	12.572%	P<0.01
Select reaction time (s)	11.743±4.525	10.478±3.063	-12.071%	P<0.05
Cross quadrant jump (times)	15.296±2.966	17.111±1.807	10.603%	P<0.01

**Table 3.** The Effect of Improving the Physical Quality of College Students in Track and Field Elective Class.

Physical fitness index	Before experiment	After experiment	Rate of change	p
50 meters (S)	9.253±1.844	8.640±2.142	-7.098%	P<0.01
5m turn-back run (s)	11.930±0.982	11.173±0.119	-6.775%	P<0.01
Standing long jump (cm)	156.140±15.575	163.109±21.552	4.273%	P<0.05
Forward flexion in sitting position (cm)	14.543±1.758	15.829±3.260	8.125%	P<0.01
800m (S)	264.183±57.292	245.615±51.221	-7.560%	P<0.01
60 Seconds Sit-up (PCS)	33.095±5.442	35.898±4.302	7.807%	P<0.01
10 seconds vertical and horizontal support (times)	11.974±2.045	13.353±0.866	10.330%	P<0.05
Select reaction time (s)	11.286±3.053	11.138±3.529	88.457%	P<0.01
Cross quadrant jump (times)	16.189±3.354	17.111±0.792	5.388%	P<0.01

According to the difference standard and change rate of P value, it can be seen that the P value of quiet heart rate, systolic blood pressure, vital capacity and maximum oxygen uptake of aerobics elective class are all less than 0.01, indicating that the changes of these four data before and after the experiment are very significant. From this, it can also be seen that aerobics training can effectively improve college students' quiet heart rate, systolic blood pressure, vital capacity and maximum oxygen uptake, and the impact on college students' diastolic blood pressure is not obvious.

As shown in Table 5, the changes of cardiopulmonary endurance indexes of college students in the track and field elective class before and after the experiment. The cardiopulmonary endurance indexes include the measurement of five indexes: resting heart rate, systolic blood pressure, diastolic blood pressure, vital capacity and maximum oxygen uptake.

According to the change of various data in the table, the P value of the four indexes of the optional course of track and field, such as resting heart rate, diastolic blood pressure, vital capacity and maximum oxygen uptake, are all less than 0.01. It can be seen that the data of these four items change significantly before and after. It can be seen that track and field training has a certain effect on improving college students' cardiopulmonary endurance. However, compared with aerobics training, the changes of various data after track and field training are not so significant. Therefore, it can be concluded that aerobics training can effectively improve college students' cardiopulmonary endurance.

### DISCUSSION

Nowadays, aerobics is popular with the public and can meet the needs of various groups. Aerobics also includes a variety of dance styles, requiring coordination of hands and feet. The flexibility of the body, the strength of the hands, the bounce of the legs, the explosive force of the feet, all of which include the strength of aerobics. The music of aerobics is full of vitality and excitement, which can greatly move people's atmosphere and help people's flexibility and coordination. Aerobics is aerobic endurance exercises under rhythmic dynamic music, in which

**Table 4.** The Effect of Improving Cardiopulmonary Endurance of College Students in Aerobics Elective Class.

Cardiopulmonary endurance index	Before experiment	After experiment	Rate of change	p
Quiet heart rate (times/minute)	84.592±6.777	80.141±5.892	-5.553%	P<0.01
Systolic blood pressure (mmHg)	128.817±5.435	121.513±5.186	-6.011%	P<0.01
Diastolic pressure (mmHg)	80.940±4.711	79.570±3.584	-1.721%	P<0.05
Vital capacity (ml)	2,255.923±448.601	2,566.923±382.004	12.116%	P<0.01
Maximum oxygen uptake (ml)	36.110±4.455	39.223±5.046	7.935%	P<0.01

**Table 5.** The Effect of Improving Cardiopulmonary Endurance of College Students in Track and Field Elective Class.

Cardiopulmonary endurance index	Before experiment	After experiment	Rate of change	p
Quiet heart rate (times/minute)	85.583±7.133	88.203±7.572	2.971%	P<0.01
Systolic blood pressure (mmHg)	129.487±3.792	126.127±3.623	-2.664%	P<0.05
Diastolic pressure (mmHg)	80.742±4.894	83.893±4.687	3.756%	P<0.01
Vital capacity (ml)	1,986.114±612.713	1,964.125±608.256	-1.120%	P<0.01
Maximum oxygen uptake (ml)	37.092±4.851	36.096±5.016	-2.762%	P<0.01

the cardiorespiratory ability can be effectively applied to the whole body exercise and provide effective exercise for the whole body. Moreover, women like aerobics most because it can not only exercise the heart and lungs to strengthen the body, but also gain the benefits of weight loss. It is not boring to train with the rhythm of music. You can adapt and improve yourself when exercising. The population of college students is a special part of the population. Improving the quality of the population of college students is very important for improving the quality of the population of the whole country. With the development of economic globalization, knowledge economy innovation and social undertakings, the society has put forward high requirements for the quality of college students, and college students need higher quality standards. However, nowadays, there are often voices questioning college students in the media: poor mental resistance, lack of teamwork spirit, lack of social responsibility, lack of sense of mission of the times, destruction of ideals and beliefs, lack of physical exercise, physical and mental collapse, lack of hard-working attitude, etc. It also shows the uneven physical and mental development of college students. College students bear the expectations of society and family, and shoulder the historical responsibility of realizing the great rejuvenation of the Chinese nation. If they do not have firm and correct ideals and beliefs, positive and enterprising confidence, good psychological quality and strong courage, they will inevitably affect the historical process of socialist modernization with Chinese characteristics in the 21st century. The large population base of Chinese college students, the problems of college students' mental health and concepts, the problems of college students' moral beliefs, and the problems of college students' physical quality are all related to national development and social progress.

Cardiopulmonary endurance is an important part of physical health. It is the ability of circulatory, respiratory and skeletal muscle systems to provide oxygen and maintain physical activity. Cardiopulmonary tolerance is usually expressed as the maximum or high oxygen

consumption obtained through exercise test of exercise board or dynamic circulation. In recent years, a large amount of evidence has shown that cardiopulmonary tolerance is related to cardiovascular mortality, all-cause mortality and multiple cancers. Under normal circumstances, the interaction between lung function and cardiovascular system is subject to the internal interference of cardiovascular diseases. Therefore, lung function must be studied when studying cardiopulmonary tolerance. Research on healthy people shows that aerobics training can better improve the adaptive changes of peripheral skeletal muscle and cardiopulmonary function.

## CONCLUSION

Cardiopulmonary endurance and physical fitness are very important for the physical health of college students. If these two indicators can be effectively improved, the physical health of college students can be guaranteed. Through a large number of experiments, this paper proves that aerobics training can effectively improve college students' cardiopulmonary endurance and physical fitness. In particular, it can significantly improve the five indicators of college students' resting heart rate, systolic blood pressure, diastolic blood pressure, vital capacity and maximum oxygen uptake, as well as the overall physical fitness indicators of college students. Therefore, reasonable aerobics training can effectively ensure the physical health of college students, so it is very necessary to continuously promote aerobics training in college students' daily exercise.

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**AUTHORS' CONTRIBUTIONS:** The author has completed the writing of the article or the critical review of its knowledge content. This paper can be used as the final draft of the manuscript. Every author has made an important contribution to this manuscript. Ai Liu: writing and execution.

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