

EFFECTS OF COMBINED CORE TRAINING WITH AEROBIC TRAINING ON PHYSICAL HEALTH OF COLLEGE STUDENTS



ORIGINAL ARTICLE
ARTIGO ORIGINAL
ARTÍCULO ORIGINAL

EFEITOS DA FORMAÇÃO COR COMBINADA COM A FORMAÇÃO AERÓBICA NA SAÚDE FÍSICA DOS ESTUDANTES DA COLÉGIO

EL IMPACTO DE LA COMBINACIÓN DE ENTRENAMIENTO BÁSICO Y ENTRENAMIENTO AERÓBICO EN LA SALUD FÍSICA DE LOS ESTUDIANTES UNIVERSITARIOS

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ABSTRACT

Introduction: College students are in a critical physical and mental development period, where their health and physical fitness require special attention. It is believed that the combination of strengthening the abdominal core associated with aerobic exercises can increase muscle strength in college students, improving cardiopulmonary function and body composition. **Objective:** Analyze the effects of combined abdominal core training with aerobic training on health and fitness of college students. **Methods:** Samples were selected for research and analysis, and 46 volunteer college students received 12 weeks of abdominal core strength training associated with aerobic training. Changes in college students' physical conditions were compared before and after training, the impact of training on college students' health and fitness were also evaluated. **Results:** When analyzing the changes of the indicators, a promoting effect of abdominal core strength training on students in physical education classes was found. **Conclusion:** Increasing the promotion of strength training is essential so that more physical educators can understand the benefits of strength training and student fitness, allowing for true classroom integration in colleges. Physical education teachers should fully consider the physical and psychological development characteristics and physical development rules of college students. **Level of evidence II; Therapeutic studies - investigating treatment outcomes.**

Keywords: Abdominal Core; Physical Fitness; Students.

RESUMO

Introdução: Os estudantes universitários estão em um período crítico de desenvolvimento físico e mental, onde tanto seu desenvolvimento de saúde quanto a aptidão física requerem atenção especial. Acredita-se que a combinação do fortalecimento do centro abdominal associado a exercícios aeróbicos possa aumentar a força muscular dos estudantes universitários, melhorando a função cardiopulmonar e a composição corporal. **Objetivo:** Analisar os efeitos do treinamento combinado do centro abdominal com treinamento aeróbico sobre a saúde e a aptidão física dos estudantes universitários. **Métodos:** Foram selecionadas amostras para pesquisa e análise, e 46 estudantes universitários voluntários receberam um total de 12 semanas de treinamento de força do centro abdominal associados ao treinamento aeróbico. As alterações nas condições físicas dos estudantes universitários foram comparadas antes e depois do treinamento, o impacto do treinamento na saúde e na aptidão física dos estudantes universitários também foram avaliados. **Resultados:** Ao analisar as mudanças dos indicadores, encontrou-se um efeito promotor do treinamento de força do centro abdominal sobre os estudantes constatados nas classes de educação física. **Conclusão:** Aumentar a promoção do treinamento de força é essencial para que mais educadores físicos possam entender os benefícios do treinamento de força e aptidão física dos alunos, permitindo uma verdadeira integração em sala de aula nas faculdades. Os professores de educação física devem considerar plenamente as características de desenvolvimento físico e psicológico e as regras de desenvolvimento físico dos estudantes universitários. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Centro Abdominal; Aptidão Física; Estudantes.

RESUMEN

Introducción: Los estudiantes universitarios se encuentran en un periodo crítico de desarrollo físico y mental, en el que tanto el desarrollo de su salud como su aptitud física requieren una atención especial. Se cree que la combinación del fortalecimiento del núcleo abdominal asociado a ejercicios aeróbicos puede aumentar la fuerza muscular de los estudiantes universitarios, mejorando la función cardiopulmonar y la composición corporal. **Objetivo:** Analizar los efectos del entrenamiento combinado del núcleo abdominal con el entrenamiento aeróbico sobre la salud y la aptitud física de estudiantes universitarios. **Métodos:** Se seleccionaron muestras para la investigación y el análisis, y 46 estudiantes universitarios voluntarios recibieron un total de 12 semanas de entrenamiento de fuerza en el núcleo abdominal asociado a entrenamiento aeróbico. Se compararon los cambios en las condiciones físicas de los estudiantes



universitarios antes y después del entrenamiento, y también se evaluó el impacto del entrenamiento en la salud y la aptitud física de los estudiantes universitarios. Resultados: Al analizar los cambios en los indicadores, se constató un efecto promotor del entrenamiento de la fuerza del núcleo abdominal en los alumnos de las clases de educación física. Conclusión: Aumentar la promoción del entrenamiento de fuerza es esencial para que más educadores físicos puedan comprender los beneficios del entrenamiento de fuerza y la forma física de los estudiantes, permitiendo una verdadera integración en las aulas de las facultades. Los profesores de educación física deben tener plenamente en cuenta las características de desarrollo físico y psicológico y las normas de desarrollo físico de los estudiantes universitarios. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptores: Núcleo Abdominal; Aptitud Física; Estudiantes.

DOI: http://dx.doi.org/10.1590/1517-8692202329012022_0771

Article received on 12/11/2022 accepted on 12/20/2022

INTRODUCTION

Adolescence is a critical period for the development of physical and mental health and various physical qualities, and China's party and government attach great importance to the physical health of adolescents.¹ With the rapid development of society, people's living standards have been greatly improved, and the nutritional status of adolescents has been significantly improved.² Compared with the past, students' height, weight and chest circumference have increased, and the incidence of common diseases has also decreased significantly.³ However, the data show that the physical fitness and physical function of college students are declining, such as: flexibility, muscle strength, muscular endurance and cardiorespiratory endurance and many other physical qualities, especially the strength quality in physical quality has been declining for 10 consecutive years. Therefore, this study will take the development of health and physique as the main line, and conduct core strength training combined with aerobic training for the physical condition of college students.⁴ Compared with conventional strength training, because of its diverse training content, it can not only rely on equipment (yoga ball) for training, but also train in the freehand state, which is simple, convenient and interesting to operate, and can effectively mobilize students' enthusiasm for training.⁵ It has a significant effect on solving the boring, lack of interest and incomplete training methods of college students, and improving the current situation of health and physical fitness of college students.⁶ Strength quality is the basis of all sports, without its support, human activities will not be able to carry out normally.⁷ Students in lower secondary school are in a critical period of physical and mental health and growth and development, as well as a critical period for the development of their strength and quality.⁸ American physiologist Hickson for men with no formal training Sex underwent 10 weeks of leg strength training, aerobic training, and aerobic and force The amount of simultaneous training, compare the final training effect found that the simultaneous training impact Power development, but it did not affect the increase in maximum oxygen uptake. After that, the same the interference effect of period training on strength adaptation has attracted much attention and recognition. Research in recent years, It is believed that aerobic training reduces strength training on muscle to some extent Adaptive changes in mass, strength, and explosive force, to the development of aerobic capacity Less impact. Compared with slow power, the same period of training has more clear effects on explosive power apparent. Dudley et al. studied the loss of human muscle strength during concurrent training The effect of the rate of exit However, at present, the decline in the strength and quality of young students is particularly obvious, especially the weak strength of the human core muscle. After reviewing a large number of literature related to core strength training, it is found that core strength training is used in the field of competition, but there is less research on core strength training on physical fitness, especially on the physical constitution of college students.⁹ In this study, students from two classes of ordinary college were used as experimental subjects, and

through 12 weeks of core strength training, the changes of health fitness indicators before and after the core strength training class and before and after the experiment of the regular strength training class were compared and analyzed, and the impact of core strength training on the health and fitness of college students was systematically discussed, so as to provide a reference for college students to carry out core strength training.¹⁰

RESEARCH OBJECT AND METHOD

Subjects of study

This study focused on the effects of core strength training combined with aerobic training on the health and physique of college students.

Research Method

Expert interview method: Based on a large number of relevant literature in the early stage of this paper, the expert interview outline is designed around the understanding of core strength training and the problems that arise in actual training. Interviews were conducted with relevant experts and professors who have been engaged in physical fitness and athletics teaching for more than 10 years, as well as senior teachers of the college physical education department. The opinions and suggestions of experts and professors are sorted out, and their views on core strength training are basically grasped to provide a reference for the screening of core strength training movements in this study. Literature and data method: According to the needs of this study, a large number of relevant literature (including: doctoral masters, journals, newspapers and forums, etc.) was searched through CNKI and Wanfang Database with "core strength", "healthy physical fitness" and "college students" as keywords. And, watch videos about core strength training on the Internet. At the same time, The retrieved literature and video materials were sorted, summarized and summarized, and the origin, development process and current situation of this research field were fully understood, as well as the existing problems. It has laid a solid theoretical foundation for this research topic.

Teaching experiment

Two secondary school classes (experimental and control, each with 46 students from Suzhou University) were subjected to a 12-week teaching experiment. Among them, the control class introduced regular strength training in the physical education classroom, and the experimental class introduced core strength training in the physical education classroom. After the experiment, the experimental data were collected and statistical calculations were performed through statistical software to analyze the difference between core strength training and conventional strength training on the health and fitness of college students. In order to confirm that core strength training has more advantages for the improvement of health and physical fitness of college students.

Among them, there are 4 experimental classes, 24 boys and 22 girls, for a total of 46 students; The control class was 6 classes, of which 24 boys and 22 girls, out of a total of 46.

The study is Purely observational studies which no need to registry ID of ICMJE, and all the participants were reviewed and approved by Ethics Committee of Suzhou University, China (NO. 2021021)

Through the analysis of the relevant contents of the National Student Physical Health Standards (revised in 2014), the National Student Physical Health Standards and the Sports Measurement and Evaluation. Through the basis of expert interviews and the help of the thesis supervisor for many times, the health and fitness test indicators suitable for college students were finally determined. This is shown in Table 1.

Experimental results and analysis

BMI index, or body mass index, is a global measurement method and an important and authoritative standard for identifying the fat and thin condition of the human body. Weight and height are objective data that are relatively easy to measure and easy to obtain. The thickness of the skin folds of the upper arms and abdomen can reflect the subcutaneous fat of the body, and is one of the criteria for reflecting the degree of fat and thinness of the human body. Therefore, height, weight, body mass index (BMI), upper arm and abdominal skin fold thickness were selected for body composition indicators. The measured results are shown in the following table (Table 2).

From the data in Table 2, it can be seen that there was no significant difference in height, weight, BMI index and upper arm fold thickness between boys and girls before and after the experiment ($P>0.05$), and there was a very significant difference in abdominal skin fold thickness before and after the experiment ($P<0.01$). The main reasons are analyzed as follows: The reason for the lack of significant difference in height, weight and BMI index between boys and girls before and after the experiment may be due to the short experimental period, which is affected by training load or other uncontrollable factors. Core strength training is mainly aimed at small muscle groups in the core area of the human body, and from the analysis of sports anatomy, the increase or decrease in the strength of the core muscle group will not lead to obvious changes in the height and weight of college students. Weight and height growth are mainly attributed to growth and development, and growth and development is the reproduction, growth and interstitial increase of cells, which is mainly reflected in the changes of various parts of the human body, tissues and organs, and is the change of quantity; The growth and development of adolescents and children will be affected by nutritional intake, exercise, genetic factors, diseases, seasons and other elements. The BMI index refers to the ratio of weight (kg) to height (m) squared, and the relative size of height and weight value will affect the BMI index. This study believes that this is the main reason why there is no significant difference in height, weight and BMI index between students before and after the experiment.

As shown in Figure 1, Core strength training is mainly aimed at small muscle groups in the core area of the human body, from the analysis of sports anatomy, the increase or decrease of core muscle strength will not lead to obvious changes in the height and weight of college students. Weight and height growth are mainly attributed to growth and development, and growth and development is the reproduction, growth and interstitial increase of cells, which is mainly reflected in the changes of various parts of the human body, tissues and organs, and is

Table 1. Fitness test indicators.

Name	Specific content
Body composition index	Height, weight, BMI, upper arm skinfold thickness, abdominal skinfold thickness
Cardiorespiratory endurance index	Male 1000m, female 800m, lung capacity
Muscle strength, muscle endurance index	Standing long jump, pull-ups (men), 1-minute sit-ups (women)
Flexibility quality indicators	Sitting forward bend

Table 2. Pre- and post-test body composition fitness.

Test Items	Number of people	Pre-experiment	After the experiment	Difference t	P
Height (cm)	24	163.13±6.39	165.67±5.82	-1.441	0.156
Body weight (kg)	24	54.46±4.93	52.92±4.98	1.078	0.287
BMI (kg/m ²)	24	20.53±2.29	19.32±2.04	1.941	0.059
Skinfold thickness of the upper arm (mm)	24	11.08±1.38	10.33±1.31	1.932	0.060
Abdominal skin fold thickness (mm)	24	14.96±1.73	13.71±1.20	2.909	0.006

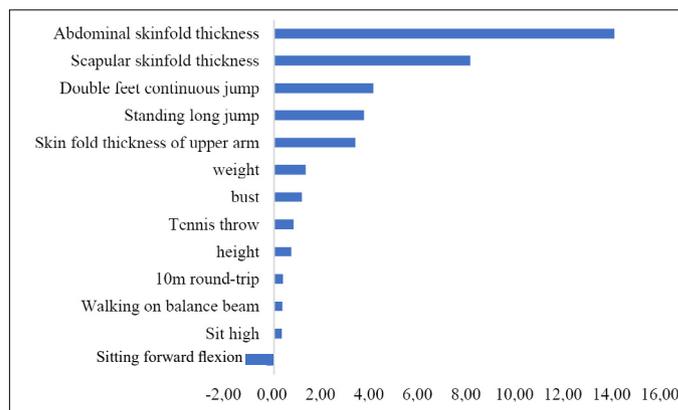


Figure 1. Percentage change of physical fitness indicators of college students.

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CONCLUSION

Core strength training had no obvious effect on improving body composition in college students, and only had a statistically significant effect on abdominal skinfold thickness. Core strength training needs to be combined with aerobic special training to improve the cardio-respiratory endurance of college students. It can improve students' physical activity to a certain extent. Because of its diverse training forms, it can effectively mobilize students' enthusiasm for training. In the middle school physical education classroom, the combination of core strength training and aerobic training should be introduced in a targeted manner to enrich the content and form of classroom teaching, so as to lay a good foundation for the improvement of the health and physical fitness level of college students. Increase the promotion of core strength training, so that more physical educators can understand the benefits of core strength training to students' physical fitness, so that core strength can be truly integrated into the college physical education classroom. Physical education teachers should fully consider the physical and psychological development characteristics and physical development laws of college students. Follow the principle of core strength training, step by step, from simple to complex principles, can not rush to achieve quick results.

ACKNOWLEDGEMENT

This study is funded by Support program for outstanding young talents in Colleges and universities in 2021, NO.gxyq2021027

The author declare no potential conflict of interest related to this article

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