

INFLUENCE OF PHYSICAL TRAINING ON THE PHYSICAL QUALITY OF UNIVERSITY STUDENTS

INFLUÊNCIA DO TREINAMENTO FÍSICO SOBRE A QUALIDADE FÍSICA DOS ESTUDANTES UNIVERSITÁRIOS

INFLUENCIA DEL ENTRENAMIENTO FÍSICO EN LA CALIDAD FÍSICA DE LOS ESTUDIANTES UNIVERSITARIOS



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ABSTRACT

Introduction: Although the overall physical health of university students has positive rates in recent years, indicators such as body composition, vital capacity, and flexibility have declined, following the indicators of speed and strength. Several studies corroborate the beneficial impacts of strength training, accelerating the metabolism of university students, reducing injuries and joint pain, and increasing flexibility, bone density, and self-image of obese students. In light of this situation, the government, through schools and related departments, encourage effective measures to control the current situation under a new context. **Objective:** Study the impacts of strength training on the physical fitness of college students. **Methods:** 70 male college students in a physical education institute were randomly divided into an experimental group and a control group, with 35 people in each group. Systematically protocolled and scientifically validated physical exercises were performed for eight weeks. After the implementation of physical exercise, physical quality indicators were evaluated. **Results:** Functional physical training raised the scores of several sports of male college students. There was also an effective reduction in blood pressure in obese youth, improvement in vascular elasticity index, vital capacity, cardiovascular system function, exercise capacity, and strengthening physique. The results of the seven FMS tests were significantly improved. Physical function training can significantly improve and strengthen students' core, hip, shoulder, knee, and ankle stability and flexibility. **Conclusion:** Strength training has been shown to improve college students' physical health indices. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Physical Conditioning, Human; Physical Education and Training; Students; Physical Fitness.

RESUMO

Introdução: Embora a saúde física geral dos estudantes universitários tenha índices positivos nos últimos anos, indicadores como a composição corporal, a capacidade vital e a flexibilidade tiveram um declínio, acompanhando os indicadores de velocidade e força. Vários estudos corroboram sobre os impactos benéficos do treinamento de força, acelerando o metabolismo dos estudantes universitários, reduzindo lesões e dores articulares, aumentando a flexibilidade, densidade óssea e a autoimagem dos estudantes obesos. Diante dessa situação, o governo, por intermédio das escolas e departamentos correlacionados incentiva medidas eficazes para controlar a situação atual sob um novo contexto. **Objetivo:** Estudar os impactos do treino de força sobre a aptidão física dos estudantes universitários. **Métodos:** 70 estudantes universitários do sexo masculino em um instituto de educação física foram divididos aleatoriamente em grupo experimental e grupo controle, com 35 pessoas em cada grupo. Exercícios físicos sistematicamente protocolados e cientificamente validados foram executados por oito semanas. Após a implementação do exercício físico, avaliou-se os indicadores de qualidade física. **Resultados:** O treinamento físico funcional elevou as pontuações de vários esportes de estudantes universitários do sexo masculino. Também houve redução efetiva na pressão arterial de jovens obesos, melhora do índice de elasticidade vascular, capacidade vital, função do sistema cardiovascular, capacidade de exercício e alcançar o propósito de fortalecer o físico. Os resultados dos sete testes de FMS foram significativamente aprimorados. O treinamento em funções físicas pode melhorar e fortalecer significativamente a estabilidade do core dos alunos, estabilidade e flexibilidade do quadril, ombro, joelho e tornozelo. **Conclusão:** O treinamento de força demonstrou-se eficaz em melhorar os índices de saúde física nos estudantes universitários. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Condicionamento Físico Humano; Educação Física e Treinamento; Estudantes; Aptidão Física.

RESUMEN

Introducción: Aunque la salud física general de los estudiantes universitarios presente índices positivos en los últimos años, indicadores como la composición corporal, la capacidad vital y la flexibilidad tuvieron un descenso, acompañando a los indicadores de velocidad y fuerza. Varios estudios corroboran los efectos beneficiosos del entrenamiento de fuerza, acelerando el metabolismo de los estudiantes universitarios, reduciendo las lesiones y el dolor articular, aumentando la flexibilidad, la densidad ósea y la autoimagen de los estudiantes obesos. Ante esta situación, el gobierno, a través de las escuelas y los departamentos relacionados, impulsa medidas eficaces para controlar la situación actual en un nuevo contexto. **Objetivo:** Estudiar el impacto del entrenamiento de fuerza en la condición física de los estudiantes universitarios. **Métodos:** 70 estudiantes universitarios varones de un instituto de educación física fueron divididos aleatoriamente en



grupo experimental y grupo de control, con 35 personas en cada grupo. Se realizaron ejercicios físicos sistemáticamente protocolizados y científicamente validados durante ocho semanas. Tras la realización del ejercicio físico, se evaluaron los indicadores de calidad física. Resultados: El entrenamiento físico funcional aumentó las puntuaciones de varios deportes de los estudiantes universitarios masculinos. También hubo una reducción efectiva de la presión arterial de los jóvenes obesos, la mejora del índice de elasticidad vascular, la capacidad vital, la función del sistema cardiovascular, la capacidad de ejercicio y lograr el propósito de fortalecer el físico. Los resultados de las siete pruebas FMS mejoraron significativamente. El entrenamiento de la función física puede mejorar y fortalecer significativamente la estabilidad del core, la cadera, el hombro, la rodilla y el tobillo de los estudiantes y la flexibilidad. Conclusión: El entrenamiento de fuerza ha demostrado ser eficaz para mejorar los índices de salud física de los estudiantes universitarios. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptor: Acondicionamiento Físico Humano; Educación y Entrenamiento Físico; Estudiantes; Aptitud Física.

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INTRODUCTION

Although the physical health status of male college students has undergone positive changes in recent years, such indicators as body shape, vital capacity and flexibility have started to stop falling and rise, while the decline rate of indicators such as speed and strength has slowed down, but the physical condition of college students has not been fundamentally improved.¹ Because a large number of studies have shown that strength training has a great impact on obesity and metabolism of college students, reducing injury and pain, beautifying the body, increasing flexibility, increasing bone density and reducing joint diseases.² In view of this situation, our government, schools and relevant departments are constantly making various attempts, trying to find effective measures to control the current situation under the new background so as to achieve the goal of improving the physical fitness of college students.

In recent years, there has been a research craze on physical fitness in our country. Many universities around China regard physical training as a compulsory course during their college study, and the concept of physical fitness has gradually been accepted by researchers majoring in physical fitness in China. This paper makes an experimental study on the influence of strength training intensity on the indexes of college students' physical fitness. The purpose of this study is to design 8-week functional physical training by using the concept and method of functional physical training to help college students improve their physical health.

Research objects and methods

70 male college students in a physical education institute were selected as the research objects. They were randomly divided into experimental group and control group, 35 in each group.

In CNKI, "college students", "physical fitness", "functional action screening" and "physical function training" are used as key words to search related documents, and the searched documents are sorted and read to extract relevant information, which lays a theoretical foundation for the writing of this paper. In addition, I also read books such as "Manual of Physical Function Training" and "Action-Physical Function Training System", which provide theoretical basis for writing the thesis.

Expert interview method

According to the content of this study, after interviewing experts and teachers in physical fitness test, college physical education and physical training, we ask their opinions on the research purpose, research content, research methods and experimental design of this study, make up for the lack of consideration, and know how to use relevant theoretical knowledge to guide teaching experiments.

Before 8 weeks' strength training, 70 subjects were measured and evaluated, and the data were recorded. During the physical education

class exercise, some students in the experimental group and the control group collected their heart rate in real time through the team version of the heart rate collection system, and adjusted the exercise load intensity through the heart rate. The experimental group and the control group have the same teaching contents and teaching methods, without interference from other factors. The subjects were arranged to have systematic strength training for 8 weeks, and after systematic training, they were measured and recorded. 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 South-Central University for Nationalities of China (NO. SCU2020013).

In the training class, the experimental group used Crossfit training mode to exercise the physical condition of the subjects,³ gradually increasing the load intensity within the range that the subjects can bear, constantly stimulating the physiological adaptability of the subjects, and enhancing the physical and sports abilities of the subjects.

Training course arrangement of the control group: The physical training plan of the control group divides 8 weeks into 4 cycles, with 2 weeks as one cycle, and periodically trains the six qualities of strength, speed, endurance, flexibility, sensitivity and coordination of the subjects, with the cycle of practice intensity increasing by about 20% of the previous cycle.

Excel 2010 was used to summarize the data before and after the experiment, and the data were sorted and charted. SPSS20.0 software was used to further process the paired sample T-test, so as to display and analyze the research results intuitively.

Experimental result

FMS tests a total of 7 actions, which are evaluated in the form of scoring. The highest score of a single action is 3 points, the lowest score is 0 points, and the total score is 21 points. According to the different performances of the subjects, the testers give corresponding scores. The following Figure 1 shows the FMS test results of the subjects.

It can be seen from Figure 1 that among the seven actions tested, the scores of individual actions are different. All the subjects participating in the experiment did not get 0 points in all the test actions. The number of people who scored 2 points in each action was the highest, more than half, the number of people who scored 3 points was the second, and the number of people who scored 1 point was relatively the least. Among them, the flexibility of shoulder joint and the active lifting of straight legs did not get 1 point.

Comparison of physical fitness test between two groups of students before and after the experiment

Compared with traditional physical training, functional physical training can effectively improve the physical quality of male college students, and promote the development of physical quality in different growth periods. Functional physical training is an activity to train the

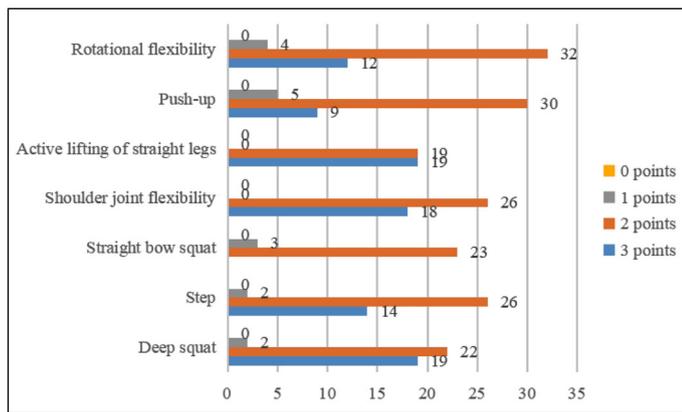


Figure 1. FMS test results.

control and accuracy of “movement”, rather than training the development of muscles. It emphasizes the balanced development of trunk core strength muscles, antagonistic muscles and deep small muscles under big muscles, and the coordination, balance and stability of joint muscles.

From the experimental results (Table 1), after the functional physical training was adopted in the experimental group, the scores of male college students in various sports events were greatly improved, and those in the control group were also improved, but the effect was obviously not as significant as that in the experimental group.

Influence of physical training on blood pressure

From the comparison results before and after the experiment in Table 2, it can be seen that after 8 weeks of physical training, the diastolic blood pressure before the experiment increased from 74.21 ± 8.01 to 82.62 ± 7.61 , with a significant change ($P < 0.01$). The systolic blood pressure increased from 133.81 ± 8.24 before the experiment to 140.12 ± 8.33 after the experiment, with a difference of 7.21 ($P < 0.01$). The elasticity index of blood vessels increased obviously, and it changed obviously from 48.66 before the experiment to 51.21 after the experiment.

Influence of physical training on heart rate

From the comparison results before and after the experiment in Table 3, it can be seen that the quiet heart rate before the experiment was 82.74 ± 5.21 and after the experiment was 72.66 ± 7.83 , which changed obviously ($P < 0.01$) and improved the heart function. Immediately before the experiment, the heart rate dropped from 152.71 ± 9.62 to 130.25 ± 7.21 after the experiment, showing a significant change ($P < 0.01$). It can be seen that physical training enhances the reserve capacity of the heart. The heart rate was 95.81 ± 3.46 3 minutes before the experiment and 75.81 ± 5.51 3 minutes after the experiment. It can be seen that the heart rate can be restored to a quiet level after the experiment ($P < 0.01$). It shows that physical training can quickly shorten the recovery time of heart rate and further improve the cardiovascular function of the experimenter.

Influence of physical training on sports ability

From the comparison results before and after the experiment in Table 4, it can be seen that after 8 weeks of physical training, the 50-meter running and grip strength are taken as the test items, 50 meters: it takes 12.03 ± 1.33 seconds for the experimenter to finish the 50-meter running before and after the experiment, and it takes 9.66 ± 0.84 seconds after the experiment, showing obvious differences between the results before and after the experiment ($P < 0.01$). The grip strength of the experimenter was 43.96 ± 7.88 kg before the experiment, and increased to 50.02 ± 8.65 kg after the experiment. Before and after the experiment, the grip strength of the experimenter increased significantly ($P < 0.01$). It shows that after 8 weeks of systematic physical training, the body's athletic performance can be improved.

Table 1. Comparison of physical fitness test between two groups of students before and after the experiment (average scores).

Index	Experimental group		Control group	
	Before the experiment	After the experiment	Before the experiment	After the experiment
100m (s)	15.12	14.1	15.11	14.82
1000/800m (min)	17.66	16.3	17.3	16.37
Standing long jump (m)20x5	4.56	4.18	4.61	4.18
Run back and forth (s)	1.69	1.90	1.82	1.87
Sit and reach (cm)	7.47	7.60	12.77	7.08

Table 2. Influence of physical training on blood pressure before and after experiment.

	Diastolic pressure	Systolic pressure	Vascular elasticity index
Before the experiment	74.21 ± 8.01	133.81 ± 8.24	48.66
After the experiment	82.62 ± 7.61	140.12 ± 8.33	51.21
Differential value	8.01	7.21	2.62
P	<0.01	<0.01	<0.01

Table 3. Effect of physical training on heart rate before and after experiment.

	Quiet heart rate	Instant heart rate	1min	2min	3min	Grade
Before the experiment	82.74 ± 5.21	152.71 ± 9.62	122.41 ± 5.30	102.63 ± 6.77	95.81 ± 3.46	Discrepancy
After the experiment	72.66 ± 7.83	130.25 ± 7.21	101.28 ± 4.17	88.96 ± 5.70	75.81 ± 5.51	Common
P	<0.01	<0.01	<0.01	<0.01	<0.01	

Table 4. Influence of physical training on sports ability before and after experiment.

	500m (s)	The amount of grip (kg)
Before the experiment	12.03 ± 1.33	43.96 ± 7.88
After the experiment	9.66 ± 0.84	50.02 ± 8.65
P	<0.01	<0.01

Analysis and discussion

Functional physical training is to carry out some physical exercises in a planned, step-by-step and purposeful way, so as to develop the exerciser's physical form, physical function and sports quality, that is, to carry out some physical exercises functionally to develop the exerciser's physical form, physical function and sports quality.⁴ On the basis of screening male college students' physical function, we designed the movements that meet the needs of male college students, and through special training methods and means, we achieved the goal of improving the physical quality of male college students and producing the best sports effect. According to the physical education curriculum of male college students, functional physical training designs suitable movements in training male college students in speed, endurance, strength, flexibility and flexibility, so as to improve their physical fitness level.

From the above results, it can be known that the individual actions and total scores of FMS test of the subjects have been significantly improved, indicating that the flexibility and stability of hips, knees, ankles and shoulders, the stability of the core parts of the body and the coordination ability of muscles have been effectively improved and strengthened. From the logical level, functional physical training is one of the means to improve the physical health level of college students.^{5,6} After 8 weeks of strength training, it will promote the growth of human muscles, increase the content of human muscles, allow the body to store more energy, and provide more physical strength and strength for future weight loss exercise. When the muscle quality of human body is improved, it can keep fast metabolism and consume more energy.⁷

In traditional physical training, flexibility is easy to be neglected and only used as warm-up before exercise and relaxation after exercise. The training method is generally to take dynamic stretching and contraction exercises, so flexibility is not obviously developed.

After 6 weeks' functional physical training, the weight of the students in the experimental group decreased and BMI improved obviously. In the experimental group, vital capacity, 50 m running, standing long jump, pull-up and 1 000 m running performance were significantly improved. As a test index of physical fitness, 50-meter running mainly reflects speed quality. If you want to finish 50-meter running at a faster speed, the subjects should have good displacement speed, movement speed and reaction speed. However, the slight increase in performance may be due to the synergistic effect of the improvement of other aspects of physical quality, so this functional physical training program has no effect on the physical flexibility of college students. Improving the strength quality of college students can effectively improve their abilities and achievements in various sports, enhance their interest and love in sports, and promote the development of mass sports.⁸

Blood pressure refers to the pressure of human blood vessel wall on blood. After 8 weeks of physical training, the diastolic blood pressure and systolic blood pressure of the experimenter decreased obviously. First of all, strength quality is the foundation of all sports activities and daily movements; Secondly, strength training can effectively promote the balanced and coordinated development of other physical qualities; Thirdly, for athletes or ordinary people who love sports, the better the strength quality, the higher the efficiency of completing the movement technique, and the easier it is to master and improve the new movement technique. The dieter after strength exercise not only consumes energy during exercise, but also needs to consume more energy even if he stops. In this way, you can do more aerobic exercise and anaerobic exercise. Therefore, 8 weeks of strength training will change the body composition of male college students.

CONCLUSION

Physical training can effectively reduce the blood pressure of obese young men, improve the elasticity index of blood vessels, improve vital capacity and enhance the function of cardiovascular system. After 8 weeks' strength training, the fitness of muscle strength, flexibility and endurance in healthy physical fitness are obviously improved, and long-term adherence to physical fitness will get better and better. After 8 weeks' training, male college students' scores of seven FMS tests have been significantly improved. Physical function training can obviously improve and strengthen students' core stability, hip stability and flexibility, shoulder stability and flexibility, knee stability and flexibility, ankle stability and flexibility.

After FMS test, students can be grouped more carefully, and more targeted training plans can be made according to different problems of different students. Regular strength training will play a positive role in school physical education and students' physical and mental health development. College students should take more physical exercises to enhance their physical fitness. Make reasonable exercise prescription, arrange exercise time and intensity reasonably, and exercise in the most scientific way. Functional physical training can effectively improve the physical quality of male college students in our country. We should vigorously promote functional physical training, combine it with physical education curriculum in our country, enhance the physical quality of male college students in our country, and help our country to move forward from a big sports country to a powerful sports country. This research and promotion task has a long way to go, we need to work together.

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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. JW: writing and execution

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