

INFLUENCE OF ATHLETICS ON MUSCLE COMPOSITION AND BALANCE OF STUDENTS



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INFLUENCIA DEL ATLETISMO EN LA COMPOSICIÓN MUSCULAR Y EN EL EQUILIBRIO DE ESTUDIANTES

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ABSTRACT

Introduction: The physical quality of college students decreases annually, a problem that physical education teachers should consider. Athletics can exercise the body's musculature integrally and improve young college students' physical and psychological abilities. **Objective:** Analyze the influence of athletics on the muscle composition and hemodynamic balance of students. **Methods:** In a given university 70 volunteers were randomly selected and divided into experimental and control classes, with 35 students each. The experimental class chose a gymnastics course, while the control class performed athletic activities represented by running. **Results:** Under continuously increasing exercise duration and intensity, the athletes gradually shifted from aerobic to anaerobic exercise, so that muscle oxygen saturation gradually decreased. The dynamic balance ability of the students in the experimental class was greatly improved compared to the control class, reaching a balanced state. **Conclusion:** The athletic program proposed in this paper can promote the adjustment of athletes' blood oxygen saturation, increase muscle oxygen delivery capacity, and exercise endurance, and fully promote fitness progress in the students. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Track and Field; Body Composition; Homeostasis.

RESUMO

Introdução: A qualidade física dos estudantes universitários decresce anualmente, sendo um problema que deve ser ponderado pelos professores de educação física. O atletismo pode exercitar integralmente a musculatura corporal além de melhorar as habilidades físicas e psicológicas dos jovens universitários. **Objetivo:** Analisar a influência do atletismo na composição muscular e no equilíbrio hemodinâmico dos estudantes. **Métodos:** Em uma determinada universidade foram selecionados 70 voluntários aleatoriamente divididos em classe experimental e controle, com 35 alunos cada. A classe experimental elegeu um curso de ginástica, enquanto a classe de controle realizou atividades de atletismo representadas pela corrida. **Resultados:** Sob aumento contínuo da duração e intensidade do exercício, os atletas começaram a passar gradualmente do exercício aeróbico para o anaeróbico, de modo que a saturação de oxigênio muscular diminuiu gradualmente. A capacidade de equilíbrio dinâmico dos alunos da classe experimental foi muito aprimorada comparativamente a da classe de controle, atingindo um estado equilibrado. **Conclusão:** O programa de atletismo proposto neste artigo pode promover o ajuste da saturação de oxigênio no sangue dos atletas, aumentar a capacidade de fornecimento de oxigênio muscular e a resistência ao exercício, promovendo integralmente o progresso da aptidão física nos alunos. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Atletismo; Composição Corporal; Homeostase.

RESUMEN

Introducción: La calidad física de los estudiantes universitarios disminuye anualmente, siendo un problema sobre el que deben reflexionar los profesores de educación física. El atletismo puede ejercitar integralmente la musculatura corporal además de mejorar las capacidades físicas y psicológicas de los jóvenes universitarios. **Objetivo:** Analizar la influencia del atletismo en la composición muscular y el equilibrio hemodinámico de los estudiantes. **Métodos:** En una determinada universidad se seleccionaron aleatoriamente 70 voluntarios y se dividieron en clase experimental y de control, con 35 estudiantes cada una. La clase experimental eligió un curso de gimnasia, mientras que la clase de control realizó actividades atléticas representadas por la carrera. **Resultados:** Al aumentar continuamente la duración y la intensidad del ejercicio, los atletas empezaron a pasar gradualmente del ejercicio aeróbico al anaeróbico, de modo que la saturación de oxígeno del músculo disminuyó gradualmente. La capacidad de equilibrio dinámico de los alumnos de la clase experimental mejoró mucho en comparación con la clase de control, alcanzando un estado de equilibrio. **Conclusión:** El programa de atletismo propuesto en este artículo puede promover el ajuste de la saturación de oxígeno en la sangre de los atletas, aumentar la capacidad de entrega de oxígeno de los músculos y la resistencia al ejercicio, promoviendo integralmente el progreso de la aptitud física en los estudiantes. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptorios: Atletismo; Composición Corporal; Homeostasis.



INTRODUCTION

Compared with other sports, aerobics is a new sport. The project combines dance, music and skills to complete a complete set of continuous and artistic challenging movements under the accompaniment of music.¹ The complete set of movements is mainly composed of people and the main body of activities. The combination of movements is the exercise content to achieve the purpose of fitness. Therefore, it is necessary for the athletes to have good physical fitness and must show the ability of the athletes to complete continuous movements through good physical control.² When the human body is affected by external forces, the ability to recover the body posture through self-regulation is called balance force. In terms of factors affecting balance, in addition to the structural integrity of the body itself, it is also affected by the brain, its own receptors, vision and vestibule.³ Therefore, the balance ability can be regarded as a comprehensive control form of the internal physiological organs and external trunk of the human body. In addition, flexibility and dexterity are also directly related to the ability of balance, which determines the ability of the human body to exercise and master difficult skills in the main exercise process.⁴ Lack of flexibility will affect strength, speed and stability. This paper believes that core strength training can support the movement of limbs, that is, training the core part of the body muscle group. In order to better understand the core, considering that the core involves all aspects of the body, it occupies an important position in the body structure.⁵ The main function of the core muscle group is to participate in static movement, but not in dynamic movement, that is, the core muscle group plays a role in human activities. Therefore, stable and powerful core strength can improve the body's exercise ability and further improve muscle efficiency.⁶ In view of this problem, this paper chooses sophomores of a certain university as the research object to study the influence of Aerobics on students' muscle composition and analyze the changes of students' dynamic balance after aerobics training.⁷

METHOD

In this experiment, sophomores in a certain university are selected as the research objects, and teaching is carried out in the form of small class system. In order to reduce the difference of human factors as much as possible, after selecting 80 volunteers. The study and all the participants were reviewed and approved by Ethics Committee of West Anhui University (NO.2019WAUST-09). They were divided into experimental class and control class according to the form of random sampling, and the class size was 40. In the end, there were 5 students in the experimental group and 5 students in the control group who failed to complete the experiment for various reasons. This part of data was excluded. After sorting, 70 subjects can be obtained. The basic information is shown in Table 1.

After the end of the 18 week course, the muscle oxygen saturation of the experimental group was measured, and the wearable device with the instrument of muscle oxygen monitoring was used to analyze the muscle oxygen change curve during the exercise, to explore the muscle function changes of the students during the aerobics exercise, and finally to analyze the impact of Aerobics on the students' muscles.

The balance stability experiment adopts the biodexbalance system (BBS) dynamic balance ability test system. The experiment is composed

Table 1. Basic information of the experimental class and the control class.

Option	experimental class	control class	F	P
Age	21.21±0.908	20.63±0.819	2.8490	0.1085
Height (cm)	165.66±3.286	163.13±5.371	0.4864	0.4964
Weight (kg)	57.08±6.502	57.36±5.758	0.0000	0.9670

of a test bench and a computer. During the experiment, the students take off their shoes and stand on the test bench, with their arms hanging down naturally, and their feet placed at the specified position: the coordinates of the left heel are (F, 8), the coordinates of the right heel are (F, 14), the distance between the inner ankles of both feet is about 8cm to 10cm, and the toes are separated into 30 degrees. The detection time is 15 seconds, and the test is repeated three times, The difficulty coefficient is 7. After the start of the experiment, both eyes are fixed on the screen on the tester to keep the black spots on the screen at the center of the cross coordinate axis as much as possible.

RESULTS

Influence of Aerobics on students' muscle composition

As shown in Figure 1, the changes of blood oxygen parameters of lateral thigh muscle of knee joint during aerobics exercise. It can be seen from the figure that with the continuous enhancement of exercise duration, ΔHB shows a fluctuating rising state, ΔTHB and ΔHBO2 show a fluctuating decreasing state, and the change range of ΔHBO2 is greater than ΔTHB . Hb is the content of hemoglobin, which is an important carrier responsible for carrying oxygen. During exercise, hemoglobin in blood brings oxygen from the lungs to the muscles for consumption by the muscles, thus providing certain energy. HBO2 is oxygenated hemoglobin. The proportion of oxygenated hemoglobin capacity to the bound hemoglobin capacity in the body is called blood oxygen saturation. THB represents total hemoglobin, which is the overall situation of hemoglobin. It can be seen that, with the increase of exercise intensity and exercise duration, the change of hemoglobin presents a fluctuating state, and the amount of hemoglobin increases, but the proportion of oxygenated hemoglobin to the total amount of hemoglobin that can be bound in the body gradually decreases, and the change rate of total hemoglobin gradually decreases. This shows that with the gradual increase of the intensity of aerobics, athletes gradually change from aerobic exercise to anaerobic exercise, The hemoglobin and the oxygen content carried by it are reduced.

Figure 2 shows the muscle oxygen saturation when the intensity of Aerobics increases. It can be seen from the figure that at the beginning of the exercise, the blood oxygen saturation of the athletes presents a

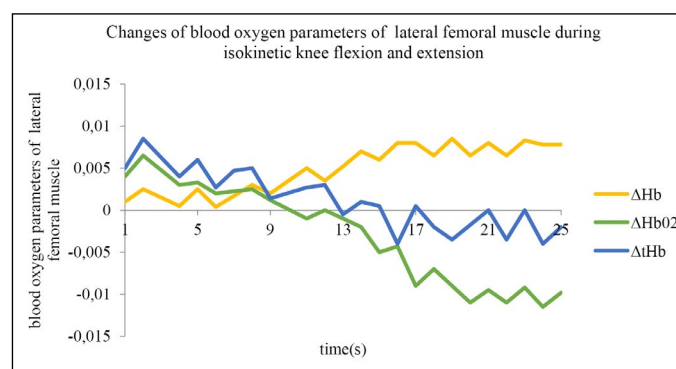


Figure 1. Changes of blood oxygen parameters of lateral thigh muscle of knee joint in Aerobics.

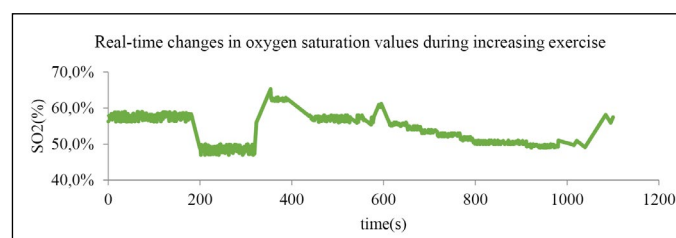


Figure 2. Muscle oxygen saturation when the intensity of Aerobics increases.

large fluctuation state. At this time, the athletes are still in a state of good physical fitness. Although aerobic and anaerobic exercises alternate due to different Aerobics movements, the overall recovery speed is faster. Once the exercise intensity decreases, the blood oxygen saturation increases rapidly, but with the continuous enhancement of the exercise duration, With the continuous increase of exercise intensity, the athletes gradually began to shift from aerobic exercise to anaerobic exercise, so the blood oxygen saturation of muscles gradually decreased. At this time, it is shown in the macro that the athletes are weak, panting and sweating, and gradually enter the state of exhaustion.

Influence of Aerobics on students' balance ability

When analyzing the influence of students' balance ability, three indicators were selected, namely, Si score representing the overall stability of the body, APSI score representing the stability of the body before and after the body, and mlsi score representing the left and right stability. In this section, the analysis is conducted through intra group comparison.

Table 2 shows the intra group comparison of the experimental class. It can be seen from the table that the Si score decreased from 1.78 ± 0.374 to 0.87 ± 0.275 before the experiment, the APSI score decreased from 1.11 ± 0.224 to 0.62 ± 0.177 before the experiment, and the mlsi score decreased from 0.96 ± 0.283 to 0.53 ± 0.305 before the experiment. $P < 0.01$ indicates that there is a significant difference. Therefore, with the development of 18-week aerobics, the dynamic balance ability of the students in the experimental class has been greatly improved and reached a better state.

Table 3 shows the intra group comparison of the control class. It can be seen from the table that the Si score is reduced from 1.64 ± 0.708 to 1.72 ± 0.835 before the experiment, the APSI score is reduced from 1.21 ± 0.7 to 1.16 ± 0.71 , and the MLSI score is reduced from 1.05 ± 0.638 to 1.20 ± 0.796 before the experiment. It can be seen that the dynamic balance stability of the control class students has also been improved with the progress of the 18-week track and field course, but the current dynamic balance index is still not ideal.

After sorting out the data in Table 2 and Table 3, we can get the comparison between groups as shown in Table 4. From the table, we can see that the scores of the two groups before the experiment are different, but there is no difference between them. After the experiment,

Table 2. Comparison of dynamic balance test indexes before and after the experiment in the experimental class (n = 15).

Time	SI score	APSI score	MLSI score
Before the experiment	1.78 ± 0.374	1.11 ± 0.224	0.96 ± 0.283
After the experiment	0.87 ± 0.275	0.62 ± 0.177	0.53 ± 0.305
T	8.6057	5.3973	3.6456
P value	0.0000	0.0000	0.0039

Table 3. Comparison of dynamic balance test indexes before and after the experiment in the control class (n = 15).

Time	SI score	APSI score	MLSI score
Before the experiment	1.64 ± 0.708	1.21 ± 0.7	1.05 ± 0.638
After the experiment	1.72 ± 0.835	1.16 ± 0.71	1.20 ± 0.796
T	-1.8971	1.883	-2.1721
P value	0.0865	0.0845	0.0551

Table 4. Comparison of dynamic balance test indexes after the experiment between the experimental class and the control class (n = 15).

Time	SI score	APSI score	MLSI score
Control class	1.72 ± 0.835	1.16 ± 0.71	1.20 ± 0.796
Test class	0.87 ± 0.275	0.62 ± 0.177	0.53 ± 0.305
T	-5.3096	-4.3729	-2.2647
P value	0.0010	0.0049	0.0029

the dynamic balance indexes of the two groups are obviously different. It can be seen that although the routine track and field teaching can improve the students' dynamic balance ability, The effect of track and field sports on improving balance ability is slightly weak.

DISCUSSION

The core muscle group includes the shallow core muscle and the deep core muscle. The latter mainly controls the synergistic effect between the muscles to maintain stability, while the former mainly controls the movement direction of the spine and relieves the load between the vertebral bodies. The core strength determines the balance and stability of the human body in the process of movement. It can regulate the generation of action, the transmission of force and the integration of power chain with the passage of time, and has a significant role in regulating the stability of the human spine; The trunk is the weakest link of the human body, and the core muscle group can directly affect the external force load. Aerobics requires people's body to have good flexibility and strong core muscle groups to ensure the realization of various sports and sports skills and reduce sports injuries.

At present, many athletes and coaches choose the core strength training mode, but due to the limitations of the specific characteristics of various sports, some people have different understanding of the core strength training, and even have some limitations in their technical development process. Compared with routine training, core strength training can adjust the contraction of lumbar and abdominal muscles at the same time, improve the muscle strength of the deep trunk, and thus adjust the balance of the body. Athletes can deliver energy to the human body in time to improve the strength of the body while completing technical actions. Aerobics is a sport that needs more training intensity and pays more attention to the physical function and muscle strength of professional students. The load produced in sports will seriously affect the core strength of Aerobics students. High intensity load will lead to imbalance of spinal muscles and destroy the stability and balance of human spine. Therefore, the special training methods for Aerobics students should pay more attention to the core stability training, focusing on the gradual weight-bearing, neuromuscular proprioception and the improvement of motor control ability.

CONCLUSION

In view of the current problem of the decline of College Students' physical quality, this paper proposes to take aerobics as the teaching content of physical education to promote the optimization of students' muscle composition and the improvement of their balance ability. The research results show that the aerobics program proposed in this paper has higher advantages than the traditional sports teaching. It can promote the adjustment of blood oxygen saturation of athletes, enhance the muscle oxygen supply capacity and exercise endurance, and also improve the students' balance ability from the perspective of dynamic balance, so as to comprehensively promote the continuous progress of students' physical fitness. However, the research in this paper is relatively one-sided at present. It only compares the traditional physical education teaching represented by track and field, and does not compare and analyze with other teaching contents. Therefore, in the follow-up research, it is necessary to combine different physical education courses for further analysis and mining.

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