

PHYSICAL FITNESS IN CORE STRENGTHENING TRAINING IN UNIVERSITY STUDENTS PRACTICING AEROBIC GYMNASTICS



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APTIDÃO FÍSICA NO TREINO DE FORTALECIMENTO DO CORE EM UNIVERSITÁRIAS PRATICANTES DE GINÁSTICA AERÓBICA

APTITUD FÍSICA EN EL ENTRENAMIENTO DE FORTALECIMIENTO DEL CORE EN ESTUDIANTES UNIVERSITARIAS QUE PRACTICAN GIMNASIA AERÓBICA

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ABSTRACT

Introduction: Aerobic gymnastics is an emerging sport. It develops mainly the aerobic body metabolism improving the cardiopulmonary function of the practitioner. **Objective:** To analyze the influence of core strength training on the physical fitness of university athletes who practice aerobic gymnastics. **Methods:** Using mathematical statistics, we studied the influence of aerobic exercise on the physical fitness of female college athletes. The fitness index test of female college aerobics athletes was performed with Excel 2007, and the obtained results were discussed. **Results:** College female students showed significant improvement in somatization, interpersonal sensitivity, anxiety, and other four factors after aerobic gymnastics exercise ($P < 0.05$). After the practice period, female college students improved orthostatic performance, long jump, stretching in sitting forward position, 1 minute sitting, running four times round trip for 10 meters, and 800 meters. The increase was 11.16cm, 5.02cm, 8.34 times/min, 2.13s, and 9.42s. **Conclusion:** Core training in aerobic gymnastics can strengthen the body, allowing awareness of physical training in college women. **Evidence Level II; Therapeutic Studies – Investigating the results.**

Keywords: Gymnastics; Woman; Resistance Training.

RESUMO

Introdução: A ginástica aeróbica é um esporte emergente. Ela desenvolve principalmente o metabolismo aeróbico corporal aprimorando a função cardiopulmonar do praticante. **Objetivo:** Analisar a influência no treino de fortalecimento do core sobre a aptidão física em atletas universitárias praticantes de ginástica aeróbica. **Métodos:** Utilizando estatísticas matemáticas, estuda-se a influência do exercício aeróbico sobre a aptidão física das atletas universitárias. O teste do índice de aptidão física de atletas de aeróbica feminina de faculdades foi executado com Excel 2007 e discutiu-se os resultados obtidos. **Resultados:** As estudantes universitárias apresentaram melhora significativa na somatização, sensibilidade interpessoal, ansiedade, e outros quatro fatores após o exercício de ginástica aeróbica ($P < 0,05$). Após o período de prática, as estudantes universitárias tiveram melhora no desempenho ortostático, salto à distância, no alongamento em posição sentadas para frente, 1 minuto sentadas, corrida 4 vezes de ida e volta por 10 metros, e 800 metros. O aumento foi respectivamente de 11,16cm, 5,02cm, 8,34 vezes/min, 2,13s, e 9,42s. **Conclusão:** O treino do core na ginástica aeróbica pode fortalecer o corpo, permitindo a conscientização do treino físico nas universitárias. **Nível de evidência II; Estudos Terapêuticos - Investigação de Resultados.**

Descritores: Ginástica; Mulheres; Treinamento de Força.

RESUMEN

Introducción: La gimnasia aeróbica es un deporte emergente. Desarrolla principalmente el metabolismo corporal aeróbico mejorando la función cardiopulmonar del practicante. **Objetivo:** Analizar la influencia del entrenamiento del core en la aptitud física en atletas universitarias que practican gimnasia aeróbica. **Métodos:** Utilizando la estadística matemática, se estudió la influencia del ejercicio aeróbico en la aptitud física de las atletas universitarias. La prueba del índice de aptitud física de las atletas universitarias de aerobismo se realizó con Excel 2007 y se discutieron los resultados obtenidos. **Resultados:** Las estudiantes universitarias mostraron una mejora significativa en la somatización, la sensibilidad interpersonal, la ansiedad y otros cuatro factores después del ejercicio de gimnasia aeróbica ($P < 0,05$). Después del periodo de práctica, las estudiantes universitarias tuvieron una mejora en el rendimiento ortostático, en el salto de longitud, en el estiramiento en posición sentada hacia delante, en la posición sentada de 1 minuto, en la carrera de 4 vueltas de 10 metros y en los 800 metros. El aumento fue, respectivamente, de 11,16 cm, 5,02 cm, 8,34 veces/min, 2,13 s y 9,42 s. **Conclusión:** El entrenamiento del core en la gimnasia aeróbica puede fortalecer el cuerpo, permitiendo la concienciación del entrenamiento físico en las estudiantes universitarias. **Nivel de evidencia II; Estudios terapéuticos - Investigación de resultados.**

Descriptor: Gimnasia; Mujeres; Entrenamiento de Fuerza.



INTRODUCTION

Aerobics is an emerging sports item. It integrates gymnastics, dance, and music. Exercise through aerobics can improve your health and shape your body. This sport can cultivate sentiment and cultivate aesthetic ability.¹ At the same time, exercisers can improve the functions of blood vessels, breathing, digestion, and other internal organs. This exercise can also improve the exerciser's nervous system function.² The above characteristics have made aerobics very popular among college teachers and students, especially girls, since it was introduced in the 1980s. The proportion of normal colleges and universities in our province is relatively large, with more girls. How to better carry out aerobics teaching and research to promote college students' physical and mental health is more meaningful. This article analyzes its influence on female college students' psychological and physical quality through 10 weeks of systematic aerobics exercises. The article provides a theoretical basis for female college students in our province's universities, especially normal colleges, to participate in aerobics exercises.

METHOD

Research object

We selected 44 female college students in the 2019 grade.

Research methods

We check the literature and the latest research results on aerobics research. This provides a theoretical basis for this study.³ Teachers and subjects communicated about the situation before and after aerobics exercises.

We practiced aerobics for the subjects for 10 weeks. Exercise 2 times a week for 90 minutes each time. The contents are warm-up, physical exercises, mat exercises, and relaxation. Exercise intensity is moderate.⁴ The heart rate is controlled at 130 to 150 beats/min. Before the experiment, the body circumference and quality of 44 students were tested. We then use the internationally-used self-rating symptom scale to test the psychological status of the subjects. After the experiment is over, we will test the above indicators. This will test the effect of the experiment.

Simulation Research on Fast Recognition of Aerobics Athletes' Footprint Images

In the process of human footprint image recognition in aerobics sports images, we divide the contour area $\Lambda = \{(i, j) : 1 \leq i \leq L, 1 \leq j \leq H\}$ of the human footprint image into K non-overlapping areas. I_Λ represents an image of aerobics human footprint image.⁵ Any $v \in \Lambda, I_v \in \{0, \dots, G\}$ is the gray value of the grayscale human footprint image. We use equation (1) to give the contour area of the human footprint image.

$$\Lambda = \bigcup_{i=1}^k R_i, R_i \cap R_j = \emptyset, \forall i \neq j \quad (1)$$

Formula, each small area $R_i \subset \Lambda$ of the contour of the human footprint image, does not overlap, $\Gamma_i = \partial R_i$ represents the edge information of each small area R_i of the contour of the footprint image.⁶ We assume that the contour image area I_R of each footprint image of the human body in the aerobics exercise is overlapped and connected. We use $p(I_R; \Theta)$ to represent the contour model of the human footprint image. Θ represents an aerobics exercise process. The instantaneous state value determines its type I of aerobics.

Assume that the instantaneous state space of the image contour I of the human footprint image during aerobics is $W = (K, \{(R_i, \ell_i, \Theta_i); i = 1, 2, \dots, k\})$. Combining Bayesian theory inference to obtain all the instantaneous footprint image contour state-space forces of the shape. Ω is expressed by equation (2)

$$W \sim p(W | I) \propto p(I | W)p(W), W \in \Omega \quad (2)$$

In the formula, the prior probability $p(W)$ of the instantaneous state-space shape of the image outline of the human footprint image in the aerobics exercise is expressed as follows.

$$p(W) \propto p(k) \prod_{i=1}^k p(\Gamma_i) p(R_i) p(I_i) p(\Theta_i | I_i) \quad (3)$$

$$\propto \exp\{-\lambda_0 K - \sum_{i=1}^k [\mu \int_{\partial R_i} ds + \gamma |R_i|^c + \nu | \Theta_i |]\}$$

$p(K) \propto e^{-\lambda_0 K}$ represents the probability of the number of states in the small contour area of the human footprint image. $p(\Gamma) \propto e^{-\mu \int \Gamma ds}$ represents the edge information probability of the small area of the outline of the human footprint image. The probability of the size $A = |R|$ of the footprint image contour area is $p(A) \propto e^{-\gamma A^c}$. Where $c = 0.9$, γ stands for the metric factor. This formula is used to adjust the size of the area that divides the image area of the human footprint in aerobics.⁷ The type probability $p(\ell)$ of the contour model of the human footprint image is uniformly distributed. $p(\Theta | \ell) \propto e^{-\nu |\Theta|}$. The likelihood probability $p(I | W)$ of the contour state space of the human footprint image in formula (4) is expressed as follows:

$$p(I | W) = \prod_{i=1}^K p(I_{R_i} | \Theta_i, \ell_i) \quad (4)$$

When the condition of $\ell = g_3 : \tilde{\omega}_{g_3}$ is met, we build an image model of the depth region of the human footprint image. We use formula (5) to express

$$p(I_R; \Theta, g_3) = \prod_{v \in R} p(I_v | I_{\partial v}; \Theta) = \prod_{v \in R} \frac{1}{Z_v} \exp\{-\langle \Theta, h(I_v | I_{\partial v}) \rangle\} \quad (5)$$

In the formula, $\Theta = (\beta_1, \beta_2, \dots, \beta_m) \in \tilde{\omega}_{g_3}, m$ represents the gray level of the depth area of the human footprint image. $h(I_v | I_{\partial v})$ represents the number of gray levels in the immediate area v of the depth area of the contour image of the human footprint image.

Data processing

Use SPSS11.5 software to perform statistics. Use t-test for statistical analysis and the results are based on $P \leq 0.05$ as the standard of significance.

RESULTS

Mass aerobics exercise can improve students' self-confidence

After 10 weeks of regular aerobics exercise, students generally think they dare to speak loudly in front of everyone. They can practice and perform aerobics boldly in public places. This shows that they have strengthened their self-confidence after a period of aerobics exercises.⁸ Aerobics exercises can enhance the physical fitness of the practitioners, improve the physical shape of the practitioners, and adjust the mental state of the practitioners. This makes the practitioner feel a sense of accomplishment after exercise and enhances their self-confidence in the movement.

The influence of mass aerobics exercise on the psychological quality of female college students

It can be seen from Table 1 that after aerobics exercise, female college students have a significant improvement in somatization, interpersonal sensitivity, anxiety, and other four factors.⁹ The test found that the

difference was significant ($P < 0.05$). This shows that aerobics exercises can promote interpersonal communication and enhance self-confidence. This exercise can reduce anxiety and improve the sleep and eating conditions of the practitioner.

The influence of mass aerobics exercise on the body shape of female college students

It can be seen from Table 2 that the bust circumference of 44 female college students dropped slightly after 10 weeks of aerobics exercise. After testing, the difference before and after exercise was not significant ($P > 0.05$). The hip circumference decreased, and the difference was significant ($P < 0.05$). Waist circumference and thigh circumference are significantly reduced, and the difference is highly significant ($P < 0.01$). This shows that the popular aerobics routine can ensure that the bodybuilder can get maximum oxygen. This exercise makes full use of oxidation to burn glycogen in the body and highlights the burning of fat as an energy supply.^{10,11} This can achieve the purpose of accelerating the body's metabolism and re-establishing a higher level of human function. This shows that this exercise can reduce the body circumference of female college students, and it can also change the physical characteristics of women.

The influence of mass aerobics exercises on the physical fitness of female college students

It can be seen from Table 3 that after a period of aerobics exercises, female college students' five physical qualities, including standing long jump, sitting forward bending, 1 min sit-ups, 10m*4 round-trip running,

Table 1. Comparison of the average and standard deviation of SCL-90 factors before and after the experiment.

Factor name	Before the experiment	After the experiment	Mean difference	t	P
Somatization	2.6873±0.38355	2.5203±0.42722	0.277	-2.02224	<0.05
Obsessive-compulsive symptoms	2.0273±0.48573	2.8455±0.50874	-0.0828	-0.76377	>0.05
Interpersonal sensitivity	2.0257±0.54362	2.7765±0.5842	-0.2382	-2.88836	<0.05
Depression	2.8064±0.58252	2.678±0.48626	-0.2284	-2.20308	>0.05
Anxiety	2.6056±0.42443	2.7885±0.48828	0.2828	2.872888	<0.05
Hostility	2.6234±0.42428	2.6836±0.58254	0.0802	0.73578	>0.05
Fear	2.5255±0.55827	2.5648±0.37622	0.0483	0.485724	>0.05
Paranoid	2.6828±0.47275	2.6875±0.53678	0.0257	0.24564	>0.05
Psychotic	2.6582±0.38052	2.675±0.48758	0.0258	0.270528	>0.05
Other	2.7834±0.58028	2.5775±0.36888	-0.2058	-2.88554	<0.05

Table 2. Comparison of changes in body shape and circumference before and after the experiment.

Factor name	Before the experiment	After the experiment	Mean difference	t	P
Chest circumference	84.06±6.86	84.24±6.04	0.92	0.675205	>0.05
Waistline	72.54±7.04	67.82±5.62	4.72	2.587494	<0.01
Hips	92.94±4.72	90.08±4.42	2.86	2.974424	<0.05
Thigh circumference	54.76±4.74	52.88±4.09	2.88	2.64022	<0.01

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Table 3. List t-test results of female college students' physical fitness before and after the experiment.

Factor name	Before the experiment	After the experiment	Mean difference	t	P
Standing long jump (cm)	164.12±11.36	175.27±11.41	-11.16	-4.71434	<0.01
Sitting forward bending (cm)	5.74±2.16	11.76±4.37	-5.12	-6.79247	<0.01
Sit-ups (times/min)	17.34±2.31	25.67±3.29	-7.34	-13.7624	<0.01
10m*4 round-trip running (s)	14.25±1.67	12.12±1.73	2.13	7.75222	<0.01
800m(s)	249.12±11.62	239.6±12.93	9.42	3.73439	<0.01

and 800m, have all improved. The test showed that the difference is highly significant ($P < 0.01$). This shows that regular aerobics exercises can improve the physical qualities of female college students, such as lower limb strength, flexibility, abdominal muscle strength, sensitivity, and endurance. This sport can provide a good physical guarantee for their intense and heavy study.^{12,13} At the same time, they can maintain their vigor and vitality in life and study.

DISCUSSION

Mass aerobics exercise can make practitioners deeply feel the beauty of posture, body, movement, and strength. This exercise can improve women's cardiopulmonary function, relieve mental stress, and promote social interactions.¹⁴ Aerobics is a sport that is very popular among female college students. Therefore, colleges and universities should set up a variety of aerobics practice subjects and regularly hold general aerobics competitions or competitions of different levels and different types of aerobics regulations and optional exercises. This inspires female college students' enthusiasm for exercise to achieve the goals of health, fitness, and fitness. At the same time, they are guided to establish the guiding ideology of "health first." This lays a good foundation for lifelong sports.

CONCLUSION

Mass aerobics exercise can make female college students overcome their shyness, feel comfortable, and enhance their self-confidence. Mass aerobics exercise can improve the psychological status of female college students. This reduces anxiety and improves sleep quality. At the same time, the exercise promotes interpersonal communication and mutual aid behavior. Mass aerobics exercise can promote fat metabolism in female college students. Eliminate excess fat in the body and body surface and reduce the circumference of all parts of their body. This sport creates a fit body and cultivates a good body posture. Mass aerobics exercises can significantly improve the physical qualities of female college students, such as strength, flexibility, agility, and endurance. This can achieve the purpose of strengthening the body.

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