SWIMMING TRAINING IN COLLEGE STUDENTS BASED ON PHYSICAL FITNESS

TREINAMENTO DE NATAÇÃO EM UNIVERSITÁRIOS BASEADO NA APTIDÃO FÍSICA

ENTRENAMIENTO DE NATACIÓN EN ESTUDIANTES UNIVERSITARIOS BASADO EN LA APTITUD FÍSICA

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ABSTRACT

Introduction: The current swimming training of college students does not meet the needs for physical fitness, requiring adjustments. Objective: Explore the effects of fitness-based swim training on college students. Methods: Forty volunteers from a university were recruited for the experiment, divided equally and separately by sex into groups A male, A female, B male, and B female. The exercise intensity of male group A and female group A was designed as resting heart rate + 70% * heart rate difference; that of male group B and female group B was designed as resting heart rate + 50% * heart rate difference. The experiment lasted 12 weeks, twice a week. Results: In group A, the forward bending results in the sitting position increased from 13.672 ± 5.8123 cm to 16.368 ± 4.8935 cm after the experiment, and the forward bending results in the sitting position increased from 6.079 ± 4.7637 cm to 18.236 ± 3.9650 cm. The results of both groups were better than those of group B of the same sex. Conclusion: Fitness-based swimming training for college students can improve exercise efficiency by adopting the presented protocol (resting heart rate + 70% * heart rate difference). ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Physical Fitness; Swimming; Physical Education and Training.

RESUMO

*Introdução: O treinamento de natação atual dos estudantes universitários não corresponde às necessidades em prol da aptidão física, necessitando de ajustes. Objetivo: Explorar os efeitos do treinamento de natação baseado na aptidão física dos estudantes universitários. Métodos: Foram recrutados 40 voluntários de uma universidade para o experimento, divididos igualmente e separadamente por sexo em grupo A masculino, A feminino, B masculino e B feminino. A intensidade de exercício do grupo masculino A e do grupo feminino A foi projetada como frequência cardíaca em repouso + 70% * diferença de frequência cardíaca; a do grupo masculino B e do grupo feminino B foi projetada como frequência cardíaca em repouso + 50% * diferença de frequência cardíaca. O experimento durou 12 semanas, duas vezes por semana. Resultados: No grupo A, os resultados de flexão para frente na posição sentada aumentaram de 13.672 ± 5.8123 cm para 16.368 ± 4.8935 cm após o experimento, os resultados de flexão para frente na posição sentada aumentaram de 6.079 ± 4.7637 cm para 18.236 ± 3.9650 cm. Os resultados de ambos os grupos foram melhores do que os do grupo B do mesmo sexo. Conclusão: O treinamento de natação baseado na aptidão física dos universitários pode melhorar a eficiência do exercício adotando o protocolo apresentado (frequência cardíaca em repouso + 70% * diferença de frequência cardíaca).* ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Aptidão Física; Natação; Educação Física e Treinamento.*

RESUMEN

*Introducción: El entrenamiento actual de natación de los estudiantes universitarios no se corresponde con las necesidades a favor de la forma física, necesitando ajustes. Objetivo: Explorar los efectos del entrenamiento de natación basado en la condición física en estudiantes universitarios. Métodos: Para el experimento se reclutaron 40 voluntarios de una universidad, divididos equitativamente y por separado según el sexo en el grupo A masculino, A femenino, B masculino y B femenino. La intensidad del ejercicio del grupo masculino A y del grupo femenino A se diseñó como frecuencia cardiaca en reposo + 70% * diferencia de frecuencia cardiaca; la del grupo masculino B y del grupo femenino B se diseñó como frecuencia cardiaca en reposo + 50% * diferencia de frecuencia cardiaca. El experimento duró 12 semanas, dos veces por semana. Resultados: En el grupo A, los resultados de flexión hacia delante en posición sentada aumentaron de 13,672 ± 5,8123 cm a 16,368 ± 4,8935 cm tras el experimento, los resultados de flexión hacia delante en posición sentada aumentaron de 6,079 ± 4,7637 cm a 18,236 ± 3,9650 cm. Los resultados de ambos grupos fueron mejores que los del grupo B del mismo sexo. Conclusión: El entrenamiento de natación basado en la condición física de los estudiantes universitarios puede mejorar la eficacia del ejercicio adoptando el protocolo presentado (frecuencia cardiaca en reposo + 70% * diferencia de frecuencia cardiaca).* ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

Descriptores: *Aptitud Física Natación; Educación y Entrenamiento Físico.*

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INTRODUCTION

With the development and improvement of swimming events, the popularity of swimming events has gradually matured under the guidance of major swimming events.[1] What followed was that many colleges and universities also carried out swimming related courses. The theoretical knowledge of modern sports science is the basis of the curriculum, and the curriculum content of swimming related courses in colleges and universities has been preliminary. Swimming is conducive to shaping the body of college students. It is beneficial for college students to improve their health. It is also helpful to cultivate the will quality of college students. Swimming events are special, and the sports environment is special compared with other events.[2] In addition, there is a certain danger in underwater sports, which puts forward higher requirements for college students' technical movements and physical fitness. The group of college students with poor physical fitness can not get a better sports experience when participating in swimming events.[3] Under the traditional swimming teaching mode, students are only taught basic movements and basic theoretical knowledge. The students were unable to practice swimming skills at a higher level.[4] Therefore, it is difficult for the traditional teaching mode to make the student group make great progress in swimming. Therefore, colleges and universities should calculate the sports consumption of students according to the theory as a reference when carrying out swimming related courses. Design different intensity training contents for students at different stages. Having theoretical knowledge as the basis is conducive to the enrichment of teaching content. It can effectively improve the harvest of college students in swimming events.[5] Aiming at the weak links of college students, the training design should be carried out in an all-round way from strength, flexibility, coordination, endurance and other important swimming related attributes to improve the sports experience of students participating in the course. Follow up and understand students' current technical level in real time, and update the training design according to students' current level. It is also an important link for universities to carry out swimming course related training. The design of training intensity based on fitness theory conforms to the development concept of modern sports science and helps to achieve faster and stronger sports goals. At the same time, it is also an important way to improve the teaching of swimming courses in colleges and universities.[6]

METHOD

Selection of experimental objects

In order to explore the impact of swimming intensity on college students' physical fitness, in terms of the selection of research objects, four classes of non sports majors in a university were selected as research classes, and the research was conducted in each class according to the principle of full voluntariness. The study and all the participants were reviewed and approved by Ethics Committee of Shijiazhuang University of Applied Technology(NO.2020SJZUAT047). The recruitment of volunteers meets the following characteristics.

1. Volunteers are college students who are not majoring in sports and are not specialized in sports.
2. The volunteers are healthy and free from congenital genetic diseases, anemia, hypoglycemia, cardiovascular diseases and other diseases that may affect the exercise effect.
3. Throughout the experiment, volunteers should ensure their attendance twice a week and the training duration can be guaranteed. In other spare time, no extra swimming sports are required.
4. The volunteers have good obedience and can complete the measurement of relevant indicators before and after the experiment according to the needs of the experimenters throughout the experiment.
5. The volunteers were in good health throughout the experiment, without taking drugs or diseases that affected exercise.

Through a series of inclusion and exclusion, 10 subjects were selected from two boys' swimming classes and two girls' swimming classes, a total of 40 subjects were divided into male A group, male B group, female A group and female B group.

Determination of swimming training load and design of experiment

In this paper, we first conducted a preliminary experiment, and selected three students with middle grades from each class as the subjects of the preliminary experiment, measured their heart rate through exercise, and calculated the bull's eye rate.

The experiment was divided into male group A, male group B, female group A and female group B. The range between the upper and lower bull's eye rate of exercise intensity of male group A and female group A was designed and set as (quiet heart rate+70% * heart rate difference). Male group B and female group B were designed as (quiet heart rate+50% * heart rate difference) according to the relevant load intensity of the elective college students' swimming.

Through the pre experiment of four groups of college students, the exercise load was determined and set as the exercise intensity of each group of college students. After the start of the experiment, there was an hour of swimming on each Monday and Wednesday. The experiment lasted for 12 weeks. In the 12 weeks, except for different exercise intensity, the four groups of college students were completely consistent in sports items, sports types, skills teaching, etc. In addition, the volunteers in each group did not carry out additional swimming training, and their work schedule and diet were basically the same, so as to minimize the interference of unrelated factors.

Selection of observation indicators and data processing

Physical fitness can be divided into health physical fitness and skill physical fitness. Health physical fitness can be divided into basic indicators and cardiopulmonary capacity. Skill physical fitness can be divided into flexible physical fitness, strength physical fitness and endurance physical fitness for sports training. In this study, height and weight were selected as the judgment criteria for the basic indicators of college students, vital capacity as the judgment criteria for cardiopulmonary endurance, sitting forward bending as the judgment criteria for flexible physical fitness, standing long jump distance as the judgment criteria for strength and physical fitness, and the number of supine ups as the judgment criteria for endurance physical fitness.

RESULTS

Effects of different training intensity on college students' health and physical fitness

Through the comparative analysis of Table 1 and Table 2, it can be seen that after 12 weeks of swimming training, the four groups of college students showed a state of weight loss and vital capacity improvement, which shows the effectiveness of swimming. It can be seen from the comparison of group AB that the improvement of physical fitness of group A is better than that of group B for both boys and girls, which indicates that the design (quiet heart rate+70% * heart rate difference) is better than that (quiet heart rate+50% * heart rate difference). It can be seen from the comparison between men and women that the change range of male college students is slightly higher than that of female college students, which indicates that the training intensity design in this paper is more suitable for men to a certain extent. If you want to apply it to women to obtain better sports effects, you need to make some improvements.

Table 1. The Influence of Different Training Intensity on College Students'Health and Physical Fitness -- Basic Index.

Group	Male Group A		Female Group A	
Test time	Before experiment	After experiment	Before experiment	After experiment
Height (cm)	173.450±7.4501	173.540±7.4701	155.983±5.6525	156.033±5.6825
Weight (kg)	70.568±9.4306	66.399±8.1891	55.612±6.7087	53.609±6.4814
Group	Male Group B		Female Group B	
Test time	Before experiment	After experiment	Before experiment	After experiment
Height (cm)	174.309±6.6512	174.389±6.5620	158.130±5.1731	158.190±5.1544
Weight (kg)	69.151±11.8591	66.102±11.1652	55.380±10.1288	53.918±10.2065

Table 2. The Effect of Different Training Intensity on College Students'Healthy Physical Fitness Cardiopulmonary Endurance.

Group	Male Group A		Female Group A	
Test time	Before experiment	After experiment	Before experiment	After experiment
Vital capacity (mL)	3,228.119 ± 699.3725	3,538.797 ± 514.4777	2,242.955 ± 491.1387	2,502.921 ± 492.3978
Group	Male Group B		Female Group B	
Test time	Before experiment	After experiment	Before experiment	After experiment
Vital capacity (mL)	3,463.825 ± 816.6277	3,497.43 ± 770.5481	2,301.685 ± 462.7270	2,289.204 ± 442.6030

Effects of different training intensity on college students' skill and physical fitness

It can be seen from the results of flexible body fitness change in Table 3 that the forward bending performance of male group A in sitting position has increased from (13.672 ± 5.8123) cm before the experiment to (16.368 ± 4.8935) cm after the experiment. The forward bending performance of female group A was improved from (16.079 ± 4.7637) cm before the experiment to (18.236 ± 3.9650) cm after the experiment. The results of both groups were better than those of group B of the same sex.

It can be seen from the results of changes in strength and physical fitness in Table 4 that the standing long jump performance of group A of men increased from (217.711 ± 16.97753) cm before the experiment to (222.705 ± 15.9788) cm after the experiment. The sitting and standing long jump of female group A increased from (162.784 ± 19.9735) cm before the experiment to (168.776 ± 16.8511) cm after the experiment. The results of both groups were better than those of group B of the same sex.

It can be seen from the results of changes in endurance and physical fitness in Table 5 that the sit up performance of male group A has increased from (23.639 ± 4.9934) before the experiment to (31.848 ± 3.5852) after the experiment. The number of sit ups in female group A increased from (33.536 ± 6.00205) before the experiment to (38.129 ± 5.9078) after the experiment. The results of both groups were better than those of group B of the same sex.

It can be seen from the comparative analysis of Table 3, Table 4 and Table 5 that swimming training has played a certain role in promoting the skills and physical fitness of college students in the four groups of college students. From the comparison between groups of group AB, it can be seen that the exercise effect of group a is much higher than that of group B, whether male or female college students, indicating that the exercise intensity (quiet heart rate+70% * heart rate difference) is better than the traditional (quiet heart rate+50% * heart rate difference). From the comparison between male and female groups, it can be seen that when the state of exercise heart rate is the same, the increase of male college students is slightly greater than that of female college students. However, in terms of flexible physical fitness represented by forward bending of the seat body and endurance physical fitness represented by the number of sit ups, the average score of men is still lower than that of women, which is also related to the physical conditions of men and women, and needs more comprehensive research.

Table 3. The Influence of Different Training Intensity on College Students'Skills and Physical Fitness -- Flexible Physical Fitness.

Group	Male Group A		Female Group A	
Test time	Before experiment	After experiment	Before experiment	After experiment
Forward bending of sitting body (cm)	13.672 ± 5.8123	16.368 ± 4.8935	16.079 ± 4.7637	18.236 ± 3.9650
Group	Male Group B		Female Group B	
Test time	Before experiment	After experiment	Before experiment	After experiment
Forward bending of sitting body (cm)	12.142 ± 6.3849	13.529 ± 5.8822	16.109 ± 4.9683	16.149 ± 4.5639

Table 4. The Influence of Different Training Intensity on College Students'Skills and Physical Fitness -- Strength and Physical Fitness.

Group	Male Group A		Female Group A	
Test time	Before experiment	After experiment	Before experiment	After experiment
Standing long jump (cm)	217.711 ± 16.9775	222.705 ± 15.9788	162.784 ± 19.9735	168.776 ± 16.8511
Group	Male Group B		Female Group B	
Test time	Before experiment	After experiment	Before experiment	After experiment
Standing long jump (cm)	223.623 ± 20.2374	222.611 ± 19.9735	160.887 ± 15.1780	159.788 ± 14.9801

Table 5. The Influence of Different Training Intensity on College Students'Skills and Physical Fitness -- Endurance and Physical Fitness.

Group	Male Group A		Female Group A	
Test time	Before experiment	After experiment	Before experiment	After experiment
Sit-ups (one)	23.639 ± 4.9934	31.848 ± 3.5852	33.536 ± 6.0020	38.129 ± 5.9078
Group	Male Group B		Female Group B	
Test time	Before experiment	After experiment	Before experiment	After experiment
Sit-ups (one)	23.475 ± 5.4843	23.091 ± 5.2830	32.855 ± 8.0342	31.648 ± 7.4401

DISCUSSION

According to the design of training intensity of group swimming of college students, it is necessary to understand the daily body consumption of student groups in combination with their physical conditions. Based on the theory of physical fitness, the training intensity suitable for college students is calculated. Once the training intensity is too high, it is easy to cause a series of discomfort reactions to the muscles. If the lactic acid content in the muscle is too high, the muscle will have a strong sense of soreness. The amount of creatine produced by the human body is very limited. Unable to decompose the large amount of lactic acid produced by training in a short time. Long time and high intensity training is easy to cause students to participate in training in fatigue. It increases the risk of sports injury. Moreover, swimming has a high risk, and the sports risk under fatigue is often irreversible. It is easy to bring long-term sports injuries to students. Therefore, in the training intensity design link, it is suitable to use the increasing difficulty training. Make students gradually accept more intensive training. The incremental training method is helpful to improve the training efficiency of students. The students are in the growth stage, which is the best time to improve their technical level. During this period, the scientific design of training links based on physical fitness theory is conducive to the development of swimming teaching in colleges and universities.

CONCLUSION

In the traditional elective teaching of swimming for ordinary college students, many teachers pay attention to the teaching of sports skills, which will lead to insufficient training intensity of college students in the elective teaching of swimming, thus failing to achieve better sports training results. To solve this problem, this paper sets up two exercise loads of different concentricity rate intensity, selects two large groups of men and women, and sets up a total of four experimental groups for training. The research results show that the exercise effect of male group A and female group A with exercise heart rate load at (quiet heart rate+70% * heart rate difference) is better, and the exercise effect of male group A is slightly higher than that of female group A, which shows that the exercise efficiency of swimming elective classes for ordinary college students can be better improved by using (quiet heart rate+70% * heart rate difference). However, there are still some problems in this study. First, the exercise load intensity is set too little, which can only prove that (quiet heart rate+70% * heart rate difference) is superior to (quiet heart rate+50% * heart rate difference), and no other exercise heart rate intensity is analyzed. Secondly, there are too few people in the selection of research objects, and the experiment is only conducted with the sample size of 10 people in each of the four classes, which leads to a certain degree of contingency in the experimental results and is not convincing enough. Therefore, in the subsequent research, it is necessary to increase the grouping design of heart rate intensity first, and then each experimental group needs to increase the number of samples, so as to obtain more universal research results.

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