Study on weight-loss effect of moderate-intensity swimming training on young women

Emily Harrison[1, a, *]

[1]University of Exeter, Streatham Campus, Northcote House, The Queen's Drive, Exeter, Devon, EX4 4QJ, United Kingdom
a.emily_harrison_ehnn@outlook.com
***Corresponding Author**

Abstract: Weight loss is a lifelong topic for women, and pursuing a good figure is even regarded as an ultimate life goal. Dieting, physical exercise and other methods are the preferred weight-loss approaches favored by women. Swimming has the effects of weight loss, body shaping and beauty improvement, so it is highly popular among women. By adopting questionnaire survey, mathematical statistics and logical analysis, this paper studies and analyzes the changes of various indicators of young women under moderate-intensity swimming training and explores its weight-loss effect.

Keywords: Young women, swimming exercise, body index

1. Introduction

This paper takes 20 overweight young women as research subjects and adopts a 12-week moderate-intensity swimming intervention program to explore the effects of moderate-intensity swimming on the body morphology and body composition of young women. The participants received four training sessions per week, completing three sets of 500-meter moderate-intensity swimming in each session. Indicators including body weight, BMI, limb circumferences, waist-hip ratio and body fat were compared before and after the experiment. The results show that after 12-week moderate-intensity swimming training, the subjects presented significant decreases in body weight, BMI, waist circumference, hip circumference, upper-arm circumference, thigh circumference and waist-hip ratio, together with reduced body fat and subcutaneous fat content. Aquatic exercise can reduce joint load, effectively avoid sports injuries, optimize body contours and firm the skin. The study indicates that moderate-intensity swimming can realize weight loss and body reshaping for young women, and it is a suitable fitness exercise for overweight young women to reduce fat.

2. Subjects and methods

2.1. Subjects

Twenty-five young women with irregular daily physical activity, non-athlete status, non-minor status, and who were neither pregnant nor lactating and volunteered to participate were recruited. According to the Guidelines for the Prevention and Control of Overweight and Obesity in Chinese Adults, adults with a BMI above 24 kg/m² are defined as overweight and those with a BMI above 28 kg/m² as obese. After exercise load tests and physical function examinations, candidates with cardiovascular disorders and other joint-related diseases were excluded. Finally, 20 young women were selected as experimental subjects. Before the experiment, the participants were informed of the purpose of this study and voluntarily signed informed consent forms. The basic information of the subjects is shown in Table 1.

2.2. Methods

2.2.1. Exercise program

Each subject completed 500 m of moderate-intensity swimming, followed by a 3-minute rest, for 3 sets per session. The training was conducted four times a week for 12 consecutive weeks between 16:00 and

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18:00 in the afternoon, with the pool water temperature maintained at 25±2 ℃. Moderate intensity was defined as (220-age) × (60%-70%) of maximum heart rate. Subjects wore heart rate monitors during exercise, and their heart rates were remotely monitored by researchers on land. All subjects finished questionnaire surveys and basic indicator measurements before the experiment, and confirmed that they had not engaged in strenuous exercise within the preceding 24 hours.

Table 1 Basic information of the subjects

number of subjects	age(y)	height(cm)	body weight(kg)	BMI (kg/m^2)
20	27±1 .2	162±2 .1	72±4.2	27.43±2.2

Table 2 Changes of body morphology before and after 12-week moderate-intensity swimming exercise

indicators	pre-training	post-training
height(cm)	162±2.1	162±2.3
body weight(kg)	72±4.1	68±3.6
BMI (kg/m2)	27.43±4.2	25.91±3.5
waist circumference(cm)	91±10.4	88±10.3
hip circumference(cm)	106±6.1	103±6.15
WHR	0.82±0.03	0.79±0.05
upper-arm circumference(cm)	36±2.6	32±2.5
thigh circumference(cm)	64±3.6	60±3.4

Table 3 Changes of body composition before and after 12-week moderate-intensity swimming exercise

Index	pre-training	post-training
body fat	31.01±0.3	28.30±0.4
BF%	24.10±0.4	21.56±0.3
Sub-BF%	20.32±0.5	17.40±0.4

2.2.2. Test indicators and methods

Experimental data were collected from 7:00 to 8:00 in the morning on the day before the experiment and the day after the end of the experiment. A body composition analyzer was used to test subjects' body composition, including body weight, upper-arm circumference, thigh circumference, body fat percentage, total body fat mass and subcutaneous fat mass. Height was measured with a height-weight measuring instrument. Waist circumference and hip circumference were measured using an inelastic tape, with measured values accurate to the millimeter. Body Mass Index (BMI) was calculated as body weight divided by height squared (kg/m²), and Waist-Hip Ratio (WHR) was calculated as waist circumference divided by hip circumference [1].

2.2.3. Statistical analysis

All data obtained from the experiment were expressed as mean values. The data of young women before and after training were compared for data analysis, so as to draw conclusions and put forward suggestions.

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3. Results and analysis

3.1. The influence of swimming on body morphology

As can be seen from Table 2, various indicators of the subjects changed before and after the experiment. Their overall height increased by approximately 0.2 cm; body weight decreased obviously by nearly 5 kg; BMI dropped by 2 kg/m²; both waist circumference and hip circumference decreased significantly by 3 cm; upper-arm circumference and thigh circumference both decreased by 4 cm. Body dimension indicators including waist circumference, hip circumference, upper-arm circumference, thigh circumference and WHR all declined. These dimensional indicators are important measures of body morphology. For beauty-oriented young women, the decline in these indicators may be even more meaningful than simple weight loss, serving as a vital sign of overall body-shape changes and helping this group of young women rebuild self-confidence. As a key indicator for judging or predicting central obesity, WHR decreased by roughly 3% after the experiment. Therefore, moderate-intensity swimming also exerts certain effects on reducing WHR.

3.2. Effects of swimming on body composition

As shown in Table 3, there was no statistical difference in body fat and subcutaneous fat indicators of the subjects between before and after the experiment. After 12-week moderate-intensity swimming training, the contents of body fat and subcutaneous fat of the subjects decreased significantly. Combined with the above results, it suggests that moderate-intensity swimming training can not only effectively reduce body weight, but also cut down body fat mass. It is of great significance for improving physical functions, effectively reducing sports injuries and maintaining a fit body shape.

4. Discussion

Swimming is an aerobic exercise carried out in a specific environment. Water possesses buoyancy, pressure, thermal conductivity and resistance, which are absent in land-based sports. Accordingly, human movement patterns in water differ from those on land. Swimming enables people to consume more calories than land-based exercises so as to achieve weight loss. In addition, from the perspective of exercise physiology, weight-loss exercises of any form may cause sports-related injuries to the waist, knee joints and ankle joints due to gravity. During swimming, however, water buoyancy keeps most overweight adults afloat and mitigates the impact of gravity, thus lowering injuries to the waist, knees and ankles. Besides, the fluidity of water produces a massaging effect on the body, which not only shapes smooth body contours but also effectively relaxes muscles.

This study focuses on young women who took up swimming exercise at moderate intensity for the first time. After the experiment, obvious changes were observed in various physical indicators of young women following moderate-intensity swimming training. Height increased slightly, while indicators such as body weight and body fat percentage decreased significantly compared with pre-training levels. Waist circumference, hip circumference and thigh circumference also dropped markedly. Most female participants also reported firmer and smoother skin after swimming exercise, an effect hardly achieved by other sports. This is attributed to the favorable shaping of streamlined body contours brought by water fluidity and the accelerated skin metabolism induced by aquatic exercise.

5. Conclusion

Considerable physical changes occurred in young women after moderate-intensity swimming exercise. Indicators including body weight, BMI, waist circumference, hip circumference, upper-arm circumference, thigh circumference and WHR all decreased, indicating that swimming can reduce body weight and shape body figure. In addition, the tested young women generally reported more elastic and firmer skin. Meanwhile, 12-week swimming training caused no discomfort to the waist, knee joints or ankle joints. Moderate-intensity swimming training exerts a remarkable weight-loss effect on young women.

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