

Effects of Aerobic Exercise and Resistance Training among Overweight Female College Students

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Abstract: In the 21st century, with the improvement and improvement of people's quality of life and living standards, the diet structure and lifestyle have changed dramatically, and there are more and more obese people. College students have uneven nutrition, high-calorie, high-sugar foods, and lack of physical activity. In this study, the experimental method is used to interfere with the weight loss of overweight female college students through aerobic exercise combination of resistance training. The exercise intervention intensity is 4 times a week, 2 hours each, and 5 consecutive weeks. Compared with the body composition before and after experiment, health related fitness, cardiopulmonary function test. The results of the study show that the 5-week aerobic exercise combination of resistance training can significantly reduce the weight, body mass index, body fat rate, waist, waist and hip ratio, etc., which also significantly improve the basic metabolic rate. However, the impact of legs and arms are not obvious. 5 weeks of aerobic exercise combined with resistance training can significantly improve the 800-meter score of overweight female college students, but the impact on sitting flexion and sit-up indicators is not obvious. 5 weeks of aerobic exercise combined with resistance training can significantly increase the vital capacity of overweight female college students, but the impact on the resting heart rate index is not obvious. We believe that this experimental scheme can effectively help female college students lose weight.

Keywords: Aerobic Exercise and Resistance Training, Weight Loss, Overweight Female College Students.

1. Introduction

In June 2023, the World Obesity Alliance released the 2023 World Obesity Map, predicting that by 2035, more than 4 billion people worldwide will be obese or overweight, accounting for 51% of the global population. The prevalence of obesity has increased from 14% in 2020 to 24%, with nearly 2 billion people. The Global Alliance for Nutrition Improvement (gain) released its "Global Malnutrition Report" in Washington, D.C., which shows that the large number of overweight and obese individuals is related to inadequate diet, dietary structure, and lack of exercise. The number of people suffering from obesity worldwide is constantly increasing, and this phenomenon is no longer a personal problem for them, which has affected the healthy and orderly development of countries. Currently, many countries have upgraded their governance of obesity to the national level. The government has taken measures to provide guidance to obese individuals, with the aim of forcing them to maintain physical health and overcome obesity through normal means. The UAE government has come up with a very efficient method: they invite overweight people to participate in competitions and reward them with two grams of gold for every kilogram they lose. The New Zealand government has adopted the most radical weight loss method - they prohibit people with BMI that does not meet the standards from entering the country, which will save the government budget; The Mexican government has formulated a series of measures that require obese local residents to receive guidance from nutritionists and fitness coaches. Experts from China's "Healthy China" Action Promotion Committee demand that obesity prevention and control should focus on key populations, implement

important measures, and find breakthroughs in overweight and obesity prevention and control. Specialized institutions should take the lead, establish cross departmental collaboration mechanisms, and strengthen the prevention and control of overweight and obesity. The current obesity rate among adult residents in China has exceeded 50%, with nearly 20% of children and adolescents aged 6-17 and 10% of children under 6. Overweight and obesity have become an important public health issue affecting the health of Chinese residents. On December 23, 2020, the latest report on the nutrition and chronic disease status of Chinese residents (2020) released by the National Health Commission of China pointed out that the overweight and obesity rate of urban residents of all age groups in China is continuously increasing, with an adult obesity rate of 16.4%, an increase of 4.5% compared to 2015.

The age of college students in China is basically between 18 and 23 years old, and they are in a transitional period between teenagers and youth. In recent years, with the rapid development of China's economy and society and the continuous improvement of people's living standards, the dietary structure and lifestyle of college students have undergone profound changes. In addition, frequent binge eating, staying up late and other unhealthy behaviors have led to widespread malnutrition, high calorie and high sugar food intake, and insufficient physical activity among college students. The obesity rate is showing a rapid upward trend. Obesity will not only increase the risk of premature occurrence of chronic diseases such as cardiovascular and cerebrovascular diseases and diabetes among college students, but also pose a threat to people's health. It will also leave people with the impression of being overweight, clumsy and lazy, causing them to have psychological problems such as

isolation and inferiority, which seriously affects the physical and mental health of college students. So, we must pay attention to the issue of obesity among college students and study scientifically effective, convenient, and low-cost weight loss methods.

Aerobic exercise for weight loss is currently the focus of many scholars' research and the most extensive weight loss method. A large number of studies have confirmed the effectiveness and function of aerobic exercise for weight loss. Long term aerobic exercise is a safe exercise method that can promote and improve aerobic metabolism in the cardiovascular and respiratory systems. Aerobic exercise weight loss is achieved by consuming body fat to provide energy, increasing the body's energy expenditure, and thereby reducing fat synthesis. In terms of sports characteristics, aerobic exercise has a flexible rhythm, low intensity, and a relatively long duration throughout the entire exercise process. Liu Jing (2019) and others proposed in their study on the relationship between aerobic exercise and body composition that the impact of aerobic exercise on body fat removal varies. Some studies have pointed out that some subjects do not have a significant effect on reducing body fat content during aerobic exercise. However, scientific intervention experiments have found that aerobic exercise has a significant effect on improving body composition and reducing body mass content in their subjects. Therefore, aerobic exercise has a significant effect on reducing fat in obese individuals. The key is to scientifically exercise and effectively supervise implementation. In a study on the weight loss effect of aerobic exercise on college students, Zhang Guohai (2018) pointed out that aerobic exercise has a significant improvement in indicators such as body composition and bone density. It not only increases the lean weight content of subjects, but also has good effects in reducing fat percentage, improving the proportion of body composition structure, promoting physical health, and preventing diseases. It is recommended that college students increase aerobic exercise.

Ma Chunlian (2019) pointed out in her study that specific exercise environments such as low oxygen and water can have better effects on weight loss, and the influence of choosing the time period during exercise weight loss cannot be ignored. The effect of exercise before dinner on weight loss is better than that after dinner. In the study by Lu Qi, Wu Benlian, et al. (2020), it was pointed out that aerobic exercise promotes weight loss based on two principles: firstly, when the human body is engaged in long-term endurance exercise, the heat provided by sugar in the body is far from meeting the body's needs. Therefore, by increasing the supply of oxygen, the body's fat is oxidized and decomposed, generating heat energy that can be used by the body. Among these endurance exercises, aerobic exercise has the most significant impact on the metabolism of fat in the human body, directly affecting the size of adipocytes in adipose tissue. Because aerobic exercise can reduce the accumulation of fat in the body by increasing energy consumption, inhibit the accumulation of fat cells, reduce the volume of fat cells, and reduce feeding efficiency and fat deposition. Secondly, prolonged aerobic exercise can reduce the content of insulin in the blood, increase the secretion of glucagon, JL catecholamine, and adrenaline, promote the activity of rate limiting enzymes in the process of fat hydrolysis, accelerate fat hydrolysis, and promote fat decomposition. Huang Xiaoli (2022) showed in her study that obese female college students significantly improved their obesity indicators such as weight, BMI, waist

to hip ratio, and fat content during aerobic exercise in their spare time. These experimental evidence provide a basis for the fat reducing effect of aerobic exercise.

Resistance training is a type of strength training that is an effective way to increase muscle strength and fitness. Doing resistance training well can help us burn fat more effectively, making our muscles stronger and our body shape more aesthetically pleasing. Bai Liqiu's (2019) study pointed out that resistance training contributes to the body's energy metabolism and the intensity of metabolism at rest. When combined with other forms of training, resistance training has a significant impact on the fitness effect of participants. Its research also provides in-depth research on the issue of resistance training both domestically and internationally, and most studies have confirmed that resistance exercise has good intervention effects in increasing lean weight and improving body composition. Zhu Hong (2018) also pointed out through research that gradual strength resistance training is relatively scientific in improving muscle strength and health related fitness of middle-aged and elderly people, and the fitness effect is also significant. Hu Dan (2020) believes that resistance training and exercise forms can effectively improve the muscle content of subjects, and muscle metabolism is higher than human fat metabolism. Therefore, resistance exercise can effectively improve the metabolic level of the human body. For every kilogram of muscle content increase, the amount of calories consumed is equivalent to a reduction of 3-5 kilograms of fat in the human body. Therefore, it is recommended that obese individuals engage in resistance exercise more frequently. Pang Xiangxia (2022) conducted a twelve-week exercise intervention on college students. The research results showed that after undergoing cyclic resistance strength training and continuous aerobic training, significant changes were observed in college students' weight, body fat percentage, fat weight, and basal metabolic rate. Cyclic resistance strength training had a more significant effect on improving college students' body composition, increasing lean weight, and basal metabolic rate, its lipid-lowering effect is superior to traditional aerobic training, and it is pointed out that cyclic resistance strength training can be an effective training method for reducing fat and weight, promoted and applied in the adjustment period of sports training and the field of fitness.

Yu Feng et al. (2021) pointed out in their study that conducting strength training at a certain intensity will consume more fat in the body, improve the metabolic level of the body, and make the body's heat energy consumption greater than its intake. Muscles of the same quality consume 15 times more calories than fat in a quiet state. As muscle content increases, the body's metabolic rate under static conditions also gradually increases. And it was mentioned that scholars from Colorado State University in the United States found through their research on the monitoring results of metabolic rate changes after human exercise that the metabolic rate of aerobic exercisers will return to normal levels one hour after exercise. The metabolic rate of those undergoing strength training remained at a high level for a long period of time after exercise, and it was not until 15 hours later that it returned to normal levels. This indicates that strength training consumes less calories than aerobic exercise within one hour of exercise but can consume higher levels of calories in the following time. Therefore, muscle type people can burn more calories than fat type people and can achieve better weight loss results. In addition, moderate strength

training can also prevent muscle and skin relaxation after weight loss and shape delicate curves.

Chen Feng (2021) took 20 female college students from non-sports majors at Tianjin Institute of Physical Education as an example and conducted a 12-week elastic band resistance training intervention. The research results showed that through elastic band resistance training, the body composition indicators of the experimental group of female college students all changed to varying degrees, with significant differences in BMI, body fat ratio, fat content, visceral fat area, and waist to hip ratio. The muscle content has increased, but the magnitude of the change is not significant. These experimental basis provide a basis for the fat reducing effect of strength training.

Through the literature, it is found that there are relatively few comparative analysis of the comparative analysis of simplicity and resistance of aerobic exercise and resistance. The aerobic exercise is recognized as the most effective method of weight loss at present. The determination of the exercise is explained. Because the duration of duration, boring content, etc. are not easy to persist, people with too much weight may also damage the joints. Anti-resistance exercise has a significant role in reducing fat and improving physical fitness, rich and diverse content, low joint damage rate, etc., which is better than aerobic exercise. Li Baitong (2021) and others also pointed out that the specific differences between the effects of aerobic exercise and resistance exercise weight loss, we also need to study in -depth research. Cai Lan (2019) research pointed out that aerobic endurance exercise and resistance for resistance forces can effectively improve the body balance and coordinated quality of the subjects. After the research results, it is confirmed that simply conducting anti-resistance training, the balance ability of the subject is better than simply performing aerobic exercise effects, but it is not sufficient in data support. Wang weixing (2022) Research believes that for people who do not often participate in fitness exercise, the form of aerobic exercise and aerobic exercise combined with resistance exercise can help improve the cardiovascular function of the subject. Compared with this Anti-resistance force training is not ideal in improving the cardiovascular function of the subject.

Zhang Guan hao (2019) uses anti-resistance training, aerobic training, and aerobic combination resistance training as the experimental method. The experimental group of the three -month experiment after the experiment of aerobic combination with resistance training is on the waist and hip circumference. The effect of oxygen training is more obvious, and there are significant differences in statistics.

Liang Jiaming (2019) Experimental intervention in 8 weeks with the aerobic exercise experiment group, the aerobic binding resistance training experimental group and the independent exercise group (control group) for 8 weeks. The group's bust and waist circumference changes significantly, compared with the aerobic group and autonomous exercise group, there is significant differences, and it has a positive impact on the improvement of the body shape.

Mao Yuting (2021) studied 2 months of exercise intervention, and the exercise of aerobic equipment and anti-resistance equipment exercise for more than 60 minutes each time. The results showed that the maximum oxygen quantity indicators and basic metabolism were significantly improved in the experimental group ($P < 0.05$).

Geng Jiamei (2021) Studies believe that aerobic fitness

walking as an aerobic exercise is a exercise with a certain speed and accompanied by hip -to -hip movements. After 24 weeks of experiments, the staff of the experimental group were based on the basic metabolism, lung volume, quietness, and quietness. Heart rate, systolic blood pressure, and diastolic blood pressure have improved, and the effect of only aerobic exercises has not changed significantly after the experiment.

In summary, many scholars have proven that under different groups of people, different intervention time, and different methods of exercise intervention, the conclusion that exercise can effectively improve the physical composition of obese people, and the effects of the impact after exercise intervention are different. Essence After the body weight loss, the participants' physical fitness and cardiopulmonary function may change. At the same time, it can reflect the physical health and prevention and reduction of related diseases. The training of aerobic exercise combination forces is currently a scientific and effective way to lose weight. The existing research on exercise and body composition is mainly focused on formulating exercise plans for superb people to achieve the role of improved body components. And the selection and combination of the action during the implementation of the exercise plan did not clearly introduce, and the research on the group of overweight female college students also needs to be further discussed.

2. Methodology

2.1. Research Design

This study purposely selected 30 female college students who volunteered to participate in a weight loss experiment from Pingxiang University in China, who were overweight. They have a BMI greater than 25 and are physically healthy without any other diseases. Before the formal experiment, this study conducted initial health related fitness testing and health screening on all prospective respondents, with the aim of ensuring that all respondents had no symptoms or problems related to illness or fitness for weight loss. At the same time, they were required to voluntarily fill out an informed consent form, sign an experimental agreement, and promise to participate in the entire study of this experiment.

2.2. Experimental Design

Development of a combination of aerobic exercise and resistance training plan:

(1) Develop this exercise plan by consulting literature and books.

The content of aerobic exercise training adopts the training method of aerobic aerobics. Compared to other exercise methods, aerobic aerobics has a stronger sense of rhythm and more changes in movements, avoiding the possibility of training interruption due to dryness and tedium, and is not easily limited by venue equipment; The content of aerobic exercises included three sets of self-made aerobic exercises: the first set of aerobic exercises, using music and fireworks $\times 8$ beats, a total of 12 actions. The second set of aerobic exercises, using music SM, 4×8 beats, a total of 15 actions. The third set of aerobic exercises, using music Walking in the sun, 4×8 beats, a total of 14 actions.

Strength training adopted the method of self weight strength training. For respondents without training foundation, on the one hand, they only needed to resist their own gravity, which is relatively easy to complete, with high safety, and not

limited by venue equipment; On the other hand, weight training can stimulate more muscle groups to participate simultaneously. Nick Tumenu (2014) explained in his book "Fat Reducing Strength Training" how to use strength training to minimize fat and maintain muscle based on scientific programming, and introduced over 150 exercise techniques in the book. This experiment selected exercises such as sit ups, supine leg lifts, push ups, flat supports, self weight squats, prone pull downs, bow and arrow walking, box jumping, 30S high leg lifts, and Russian twists based on the specific equipment and physical condition of the respondents.

Specific time arrangements for exercise intervention: The experiment is a 5-week exercise intervention period, 4 times a week (Monday, Wednesday, Friday, Sunday), 120 minutes each time, 50 minutes of aerobic exercise, 50 minutes of resistance training, and rest for 20min in the middle. Each lecture is performed in aerobic exercise, and then strength training is performed.

Table 1. An exercise plan combining aerobic exercise with resistance training

Content	Project	Time	Intensity
Week 1 (4 times a week)	Aerobic exercise	50min	60%-75% HRmax
	Aerobics		
	Rest	10min	
	Resistance training	50min	
Week 2 (4 times a week)	Sit ups/abdominal curls/supine leg lift/self weight squat		60%-75% HRmax
	Aerobic exercise	50min	
	Aerobics		
	Rest	10min	
	Resistance training	50min	
Week 3 (4 times a week)	Standard push ups /static support		60%-75% HRmax
	Bow down dumbbell rowing/bows and arrows		
	Aerobic exercise	50min	
	Aerobics		
	Rest	10min	
Week 4 (4 times a week)	Resistance training	50min	60%-75% HRmax
	Standard push ups /bobby jumps/static support/Roll		
	Aerobic exercise	50min	
	Aerobics		
Week 5 (4 times a week)	Rest	10min	60%-75% HRmax
	Resistance training	50min	
	Standard push ups /static support		
	Bow down dumbbell rowing/Swolf		

2.3. Measurement Indicators before and after the Experiment

In order to further ensure the safety and effectiveness of the entire experimental stage, and to strictly control various sports risks and adverse issues during the implementation of the experiment, this study measured all female-respondents' measurement indicators before and after the experiment, mainly including body composition, health related fitness, cardiopulmonary function.

Body composition: height and weight, body mass index, body fat rate, basal metabolic rate, waist circumference and waist to hip ratio, leg circumference, arm circumference.

(1) Body composition: height and weight, body mass index, body fat rate, basal metabolic rate, waist circumference and waist to hip ratio, leg circumference, arm circumference.

(2) Health related fitness: flexibility, sit-up, 800meter run.

(3) Cardiopulmonary function testing: vital capacity, resting resting rate.

2.4. Data Collection Procedures and Methods

(1) Body composition and testing methods

Body composition testing indicators: weight, body mass index, body fat ratio, basal metabolic rate waist circumference and waist to hip ratio, leg circumference, and arm circumference.

1) The indicators of body composition are all derived from the Inbody test results report, extracting indicators such as body weight, body mass index, body fat rate, and basal metabolic rate. Among them, inorganic salt content refers to the total amount of inorganic salt content in the body, without involving major and trace elements.

Body composition testing equipment and testing steps:

Measure body composition related indicators using a body composition tester (Inbody Body Composition Tester (770), origin: South Korea). To ensure the accuracy of the data, the body composition indicators are measured by the same person to reduce errors.

Before the test, the test subject is required to remove all metal and electrical related items that may affect the test, such as glasses, earrings, necklaces, watches, rings, etc., and use an alcohol wet tissue to wipe the hands and soles of the feet.

According to regulations, the subject stands on the Inbody tester with both feet, ensuring that their heels are flush with the foot electrodes.

When prompted by the instrument control panel, enter basic information such as the name, gender, height, weight, and date of birth of the test subject. After confirming that the personal information is correct, start the test. Each person's time is 1-2 minutes.

Hold the Inbody handle forward with the tiger's mouth, and place your thumb on the sensing electrode. Keep your arms naturally sagging, slightly apart, and avoid contact with other parts of the body. Keep your body relaxed,

Breathe steadily during the testing process and remain quiet until the test is completed. After the test is completed, the Inbody results were automatically saved to the computer. After all female-respondents save the test content, it is considered as the end of the test and wait for the instrument to print the test results.

2) Waist circumference: The subject naturally stands in the measurement area, and the measurer places a soft leather ruler around the abdomen about three centimeters above the navel. Measure around a circle and record the readings twice before taking the average value.

3) Leg circumference: The tester stands naturally in the measurement area, and the tester places a soft leather ruler around a distance of ten centimeters above the subject's knee. Measure it in a circle, and take the average of the two recorded readings.

4) Arm circumference: The subject naturally stands in the measurement area and bends the elbow joint to the maximum extent. The tester places a soft skin ruler around the top of the subject's biceps muscle peak, and records the average of the

readings twice around a circle.

(2) Health related fitness: Flexibility, Sit-up, 800 meter run

800 meter run: The test should be conducted on a standard 400 meter track and field track, and participants can only start running after hearing the command to "run". After the timer starts, the subject should maintain continuous running until the test is completed. The timekeeper will start timing after the signal is issued until the subject's torso reaches the vertical plane of the finish line and stops the watch. Test results are recorded in minutes and seconds, without calculating decimal parts. If there is a decimal in time, it is rounded up by one, for example, 3 minutes, 53 seconds, and 21 seconds were counted as 3 minutes, 54 seconds.

Flexibility: Using a sitting position, bend forward with the heels together and the toes naturally apart. Then, with the palms facing down and the arms together and extended horizontally, bend the upper body forward and move the fingers forward at a constant speed until they can no longer move. After restoring the posture, continue to do so. The inner edge plane of the pedal longitudinal plate of the tester is at point 0, with negative values inward and positive values forward.

Sit-ups: The correct practice for sit ups is to lie flat on a yoga mat, with legs naturally bent and calves upright, forming an angle of about 45 degrees with the ground. Place your hands on both sides of your ears, relax your body, and when getting up, touch your knees with both hands. Evaluate based on the number of tasks completed within 1 minute.

(3) Cardiopulmonary function test: lung activity, resting heart rate

When testing the lung volume, let the examiner try to inhale once, and then try to exhale, and test it with a lung volume tester. The normal value of the lungs can fluctuate by 20% up and down.

Resting Heat Rate can take a deep breath before measuring to completely relax the body, measure the radial artery, use the index finger and middle finger to press on the radial artery, measure in minutes, and measure the average value twice.

2.5. Statistical Treatment

This study used the following statistical methods to process and analyze the collected data:

Descriptive statistics: Use statistical indicators such as mean and standard deviation to describe and summarize various indicators of the aerobic exercise group combined with resistance training group before and after the experiment, in order to reflect their basic situation and changes.

Paired sample t-test: Use paired sample t-test to compare various indicators of the study subjects before and after the experiment to test for significant differences;

Independent sample t-test: Use independent sample t-test to compare various indicators of the aerobic exercise combined with resistance training group after the experiment, in order to test whether there is a significant difference.

3. Results and Discussion

3.1. RESULTS

3.1.1. A Significant Difference in the Results of the Body Composition before and after the Experiment

The experiment data highlights the impact of aerobic exercise on individuals' body composition. Prior to the experiment, participants had average weight of 76.78 kg, a BMI of 27.72 kg/m², a body fat rate of 34.02%, a basic

metabolic rate averages at 1425.70 Kcal, a waist circumference of 91.42 cm and a waist and hip ratio of 0.88, a leg circumference averages at 34.88 cm, an arm circumference averages at 67.48 cm. After 5 weeks of aerobic exercise combined with resistance training, participants showed improvements in BMI, and body fat rate, Basic metabolic rate, Waist circumference, Waist and hip ratio, Leg circumference, Arm circumference. Analyze whether the changes before and after the experiment are different.

Table 2. Comparison of body composition test results of the experimental group before and after the intervention

Index	Pre-experiment Mean	Post-experiment Mean	t	Sig.	Interpretation
Weight(kg)	76.78	73.45	3.407	0.000	<0.01
BMI(kg/m ²)	27.72	26.57	7.946	0.000	<0.01
Body fat rate(%)	34.02	32.72	2.823	0.020	<0.01
Basic metabolic rate (Kcal)	1425.70	1447.90	-3.767	0.004	<0.01
Waist circumference (cm)	91.42	88.30	3.638	0.005	<0.01
Waist and hip ratio	0.88	0.85	3.407	0.008	<0.01
Leg circumference (cm)	34.88	33.91	1.873	0.060	>0.05
Arm circumference (cm)	67.48	65.46	1.932	0.057	>0.05

From Table 2, compared with the result of the changes in body composition before and after exercise intervention, we can find that after the overweight female college students participated in the aerobic exercise combination of resistance, some measurement indicators have changed significantly. The weight of overweight female college students is significantly reduced ($T = 3.407, P < 0.01$), the BMI value is significantly reduced ($T = 7.946, P < 0.01$), the percentage of body fat is significantly reduced ($t = 2.823, PP < 0.01$), and the basic metabolic values are significantly improved ($T = -3.767, P < 0.01$), the waist circumference value is significantly reduced ($t = 3.638, P < 0.01$), and the waist and hip ratio is significantly reduced ($t = 3.407, P < 0.01$), the leg circumference is slightly reduced, but it is not obvious ($T = 1.873, P > 0.05$), the arm circumference value is slightly reduced, but it is not obvious ($T = 1.932, P > 0.05$). This exercise plan effectively reduces the weight of overweight female college students, reduces the BMI value, and the body fat rate has also decreased. It has very significant differences. Improving the basic metabolism of overweight female college students, and increasing the consumption of calories in the body. Effectively reduce the waist circumference and waist and hip ratio. However, the upper arm circumference and leg circumference were slightly reduced, without statistically significance. These data show that the combination of aerobic exercise forces can develop some indicators of the body's ingredients in a good direction, improve the physical structure of overweight female college students, and make the body shape better.

Therefore, it is concluded that aerobic exercise has significance since it can dramatically reduce body fat when combined with resistance exercise. In addition, the waist, arm, and leg circumferences have all decreased considerably with aerobic activity and resistance training; the waist to hip ratio has also decreased. It implies that a mix of resistance training and aerobic exercise would be very beneficial in halting the rising obesity rate.

On the basis of aerobic exercise, strength training has been added, which has accelerated the consumption of fat and

increased the proportion of muscles. Therefore, it has a good exercise effect, which has made significant changes in weight, BMI and body fat rate, Li Wenyu (2018) studied indicate the utilization rate of various nutrients is related to exercise time and exercise intensity. Generally speaking, the strength of the exercise is small, the longer the duration, the higher the percentage of relying on fat oxidation and energy.

3.1.2. A Significant Difference in the Results of the Health Related Fitness before and after the Experiment

The experiment data highlights the impact of aerobic exercise on individuals' fitness levels. Prior to the experiment, participants had average flexibility of 4.42 cm, abdominal strength and endurance of 21.20 repetitions, and cardiovascular endurance of 6.43 minutes. After 5 weeks of aerobic exercise combined with resistance training, participants showed improvements in front body flexion, stand-up, and 800-meter running. Analyze whether the changes before and after the experiment are different.

Table 3. Comparison of health related fitness test results of the experimental group before and after the intervention

Index	Pre-experiment	Post-experiment	t	Sig.	Interpretation
	Mean	Mean			
Flexibility (cm)	4.42	5.1	2.081	0.055	>0.05
Sit-up(n)	21.10	21.72	1.977	0.068	>0.05
800 meters(min)	6.43	5.39	4.345	0.004	<0.01

From Table 3, compared with the result of the changes in health related fitness before and after exercise intervention, we can find that after the overweight female college students participated in the combination of aerobic exercise, some measurement indicators have changed significantly. Some changes have taken place in their health related fitness. Siter forward flexion test value has been slightly improved after exercise intervention, but there is no significant change ($T=2.081$, $P> 0.05$), and the test value of the sitting on the same time is slightly improved after the exercise intervention, and there is no significant change in the intervention, and there is no significant change in changes. ($T = 1.977$, $P> 0.05$). But the 800 -meter score increased significantly after exercise intervention, with significant differences ($T = 4.345$, $P < 0.01$) indicates 5 weeks (4 times a week, 2 hours each) Aerobic exercise combined with resistance training has a certain impact on the test indicators of the sitting body flexion and sit-ups, but it is not obvious, and it can significantly increase the score of 800 meters.

Overall, After analyzing the changes in health-related fitness among overweight female college students following a combined aerobic and resistance exercise intervention, several key findings emerged. Although there was a slight improvement in the sit-and-reach test values and sit-up test values post-intervention, these changes were not statistically significant. However, the 800-meter run scores improved significantly after the exercise intervention, with notable statistical differences. Therefore, the researcher believes that this program plan can improve physical fitness. The data concludes that the intervention exercises such as the aerobic and the combinations of resistance has significantly impacts

on the changes in health related fitness. However, there are some variable such as the flexion test and sit-up that has a slightly improved, but there is no significance difference.

It indicates that the program exercises such as the flexion test and sit-up would not dramatically effect on losing weight. The studies would dramatically helps in losing weight. However, it did not conclude that either of the three indicators are not necessary on combating overweight. According to a study of Cronkleton (2023), the flexibility would helps to a better circulation, reduced stress, increased concentration, and higher energy levels, all which can support eight loss efforts. And he added, that sit-up may not be significantly affect on losing weight, but on losing weight it involves a combination of aerobics and resistance exercises which includes flexion test, sit-up, running, and etc.

3.1.3. A Significant Difference in the Results of the Cardiopulmonary Function before and after the Experiment

The experiment data highlights the impact of aerobic exercise on individuals' cardiopulmonary. Prior to the experiment, participants had average vital capacity of 2586.78 ml, resting heart rate of 76.54 beats per minute. After 5 weeks of aerobic exercise combined with resistance training, participants showed improvements in vital capacity and resting heart rate. Analyze whether the changes before and after the experiment are different.

Table 4. Comparison of cardiopulmonary function test results of the experimental group before and after the intervention

Index	Pre-experiment	Post-experiment	t	Sig.	Interpretation
	Mean	Mean			
vital capacity(ml)	2586.78	2933.67	3.541	0.005	<0.01
resting heart rate (times/min)	76.54	75.31	1.982	0.057	>0.05

From Table 4, it can be obtained that the changes in the cardiopulmonary function of the overweight female college students participating in the combination of aerobic exercise combined with resistance exercises. The changes in each determination indicator before and after the experiment were compared for 5 weeks (4 times a week, 1 hour each). After the combination of aerobic exercise combined with resistance, their cardiopulmonary function has changed. Their vital capacity has increased significantly compared to the experimental intervention, and its improvement has significant differences ($T = 3.541$, $P < 0.01$), and the heart rate is slightly reduced before the experimental intervention, but the change is not obvious and there is no difference ($T = 1.9822$, $P > 0.05$). It shows that the 5 Weeks (4 Times A Week, 2 Hours Each) Aerobic exercise combined with resistance training has a positive impact on overweight female college students' vital capacity and has a small impact on the heart rate indicators.

Overall, The data shows that there is a significant difference between the pre-experiment and post-experiment on the vital capacity of the respondents, which indicates that aerobic exercise combined with resistance has a significant impact on aerobic work ability, enhance cardiopulmonary function. On the other hand, with the indicator of heart rate during the pre-experiment and post-experiment, it shows that there is a slight reduction in the heart rate, or it indicates no significant

difference. However, the significant difference in heart rate did not indicate the impact of losing weight, but it helped boost the resistance of the female students. Heart rate would not indirectly contribute to losing weight, but it helps with the cardiovascular system to maintain weight loss.

Zhang San's(2019) research believes that aerobic exercise usually chooses low exercise strength, long duration, and rhythmic movement. Essence But heart rate changes are not obvious. Aerobic exercise combined with resistance training can improve the efficiency of the heart, thereby increasing the function of the heart and reducing the attack of cardiovascular disease. In short, aerobic exercise combined with resistance training enables the heart and lungs to fully exercise and improve cardiopulmonary function, so as to maintain the best functional state of whole body tissue and organs, and the body's resistance is also enhanced.

3.2. Discussion

This experiment found that after 5 weeks of aerobic exercise combination resistance training, it has some positive impact on the weight loss of overweight female college students. The specific manifestations are in the following aspects:

3.2.1. The Effect of Aerobic Exercise Combined with Resistance Training on the Physical Composition of Overweight Female College Students

Weight is the basic indicators to evaluate a person's obesity. The weight is divided into lean weight and fat weight, and lean body weight is the weight of the oscilloscope and muscle. Weight is the result of the comprehensive effects of many factors such as age, gender, living conditions, and physical exercise. Fan Qun (2019) studies believe that changes in fat content and muscle content can cause weight changes. Excessive energy intake in the body will increase the synthesis of fat, and the fat in the body will accumulate a lot, which will cause overweight and obesity. Increased muscle content in the body will cause an increase in weight. Therefore Whether obesity is not scientific and objective, you should also refer to BMI and body fat rate. BMI is also known as the weight index. It is an important indicator of the measurement of adults and weight released by WHO. However, BMI has its limitations and cannot accurately display the fat distribution, type and fat content in the body (Liu Min, etc. 2020).Body fat rate is an important indicator of human fat content. It is the proportion of fat quality of the human body. Body fat rate is more objective and objectively reflecting the distribution of body fat. The body fat rate is closely related to human health. Existing research has found that if the body's body fat rate is too high, it will affect the exercise ability of the human body. People with high body fat rate are usually bloated and there are some endocrine problems, such as Hyperlipidemia, coronary heart disease, etc.

The results of this study are consistent with the results of the research results of Li Wenyu (2018) and Zhang Jun (2019) and others, indicating that the combination of aerobic exercise training can improve the body's ingredients, effectively reduce weight, reduce BMI values and body fat rate, and analyze its significant analysis of its significant The possible mechanism for decline is the following three points: First, the training method combined with aerobic exercise and strength training has played a good role in fat loss for overweight and obesity college students. Aerobic fitness is a systemic exercise. When doing aerobic exercise, the muscles of the whole body will participate, increasing energy consumption,

reducing and suppressing the accumulation of fat in the body. In addition, strength training was added on the basis of aerobic exercise, which accelerated the consumption of fat and increased the proportion of the muscles. Therefore, it has a good exercise effect, which has changed significantly in weight, BMI and body fat rate. Second, during exercise training, the utilization rate of various nutrients is related to exercise time and exercise strength. Generally speaking, the strength of the exercise is small, the longer the duration, the higher the percentage of relying on fat oxidation to accounted for the total energy metabolism of the human body (Zhao Yipin, 2021). In this study, the time of aerobic exercise at 50 minutes, and the resistance training time at 50 minutes,rest 10 minutes in the middle,Sports intervention that lasted for 5 weeks, four times a week. The exercise strength is controlled by 60%-75%of the maximum resting rate of overweight female college students, that is, 120.6-150.75 times/min. During the exercise, fat becomes the main source of energy. Provide energy, which leads to decreased adipose tissue in the body, and the weight, BMI and body fat rate have decreased. Third, aerobic fitness exercises are performed under the cheerful rhythm music. The subject's mood is more pleasant and excited to stimulate the central nervous and sympathetic nerves, and indirectly adjusted the hormone secretion of overweight and obese college students. Improve the body's static metabolic rate, promote weight loss, reduce body fat, and reduce the body quality index.

Basic metabolism refers to the minimum energy demand required by various organs in the body, which is related to different gender, age, height, weight, and health. As the age increases, the level of basic metabolism has decreased. The basal metabolic rate accounts for between 60%-70%of the average daily energy consumption of the human body. It is a risk factor for obesity, diabetes, hypertension, and coronary heart disease. The intensity of exercise is closely related to the level of basic metabolism. Exercise is an important means to improve the ability of human basic metabolic.

The results of Su Shaohui (2021) showed that after the use of 30 minutes of strength training plus 30 minutes of aerobic training combined with exercise intervention for 3 months, the basic metabolism of the exercise intervention group has significantly improved, an average increase of 430.33kcal . Zhang Qian (2019) conducted a one -month exercise experiment on 150 adolescents, and paid a group according to the types of different aerobic exercises. The research results show that the basic metabolism of the youth of the swimming group, jogging group and bicycle group has varying degrees of varying degrees Improve.

The research results of this experiment are consistent with the results of the above scholars. The reason for the increase in the basis of the basics of the basics may be the following three points: First, during the exercise, the subjects promoted the hemorrhage. The garbage existing in blood vessels, such as necrotic red blood cells, white blood cells, etc., as well as tissues that are degraded with these necrotic cells, accelerate the absorption and excretion of these necrotic tissues. Second, maintaining normal metabolism requires sufficient sleep. Zhang Zhengxiu (2022) also pointed out that lack of sleep and staying up late can cause endocrine disorders, which affects digestion, circulation, metabolism and other functions. During the 8-week experiment, the experimenters all maintained the schedule of early sleep in accordance with the experimental requirements, so as to improve the basic metabolism of the subject. Third, some studies have pointed

out that one -pound muscle can increase the speed of metabolism by 15 cards. After overweight and obese college students, after a 12 -week aerobic exercise combined force training intervention, the average muscle content increased by 1.02kg. While the muscle content increased, the basic metabolic rate increased.

The waist circumference reflects the subcutaneous fat thickness of obesity and the abdomen of obesity and super-heavy students, which is a good way to test obesity. According to relevant domestic data, the my country Obesity Research Group suggested that the conclusions of the cut point value of men's waist circumference or more than 85 cm, women's waist circumference > 80 cm as the central obesity. Many scholars have said that the increase in waist circumference has an unfavorable effect on blood pressure, blood sugar, and blood lipids. For example, the research results of Marsau P (2023) and others show that if a person's weight is reduced, his blood pressure will decrease, his weight will decrease, and his waistline will become normal; Li Weica (2019) The research results of people show that waist circumference is an important risk factor for hypertension; the results of Liu Zunyong (2020) show that appropriate waist circumference can effectively reduce high blood sugar.

The waist and hip ratio refers to the proportion of waist and hips. It is a manifestation of the accumulation of subcutaneous fat and internal organs, and an important symbol to judge the degree of heart hypertrophy. It is generally believed that the waist and hips are obesity 0.85. Compared with the whole body overweight, the risk of central obesity is much greater, which is prone to cardiovascular disease. The waist and hip ratio is the main method of measuring central obesity and cardiovascular disease (Jin Na 2018).

So 5 weeks of aerobic exercise combined with resistance training can significantly reduce the weight, body mass index, body fat rate, waist and hip ratio, legs, arm circumference and other indicators of overweight female college students, and can also significantly improve basic metabolism Rate, showing that the movement intervention scheme can effectively lose weight.

3.2.2. The Impact of Aerobic Exercise Combined with Resistance Training on the Health Related Fitness of Overweight Female College students

From the perspective of exercise training, on the one hand, the combination of aerobic exercise combined with resistance training can consume a lot of fat in overweight college students, and increase weight weight to improve the overall muscle moderate. Will stimulate related neuromuscular muscles, accelerate the recruitment of muscle fibers, and adapt to foreign loads, so that muscle endurance and muscle strength are enhanced. In addition, aerobic exercise can improve cardiopulmonary function, improve hypoxia or hypoxia conditions The motion ability of the lower 800 -meter movement has improved significantly. From the perspective of exercise physiology, the combination of aerobic exercise combined with resistance training activates the synthesis pathway of muscle proteins in obese college students, stimulates the release of muscle hormones in the body, and regulates muscle growth factors, thereby improving the muscle endurance and muscle strength of obese college students. In the experiment, during the training of waist and abdomen muscles, the training methods such as waiting, centrifugal training, and centripetal training are adopted. Among them, due to the excessive weight of obesity college students, the waist and abdomen fat accumulate too much, the

basic strength of the waist and abdomen is insufficient, and the waist circumference is too large. Therefore, it is difficult for college students to participate in sitting up and sitting in front of the seat. In addition, the training time is short. This training does not completely change the abdominal muscles of obese college students and improve students' physical fitness. Therefore, after the overweight female college students participated in the motion experiment, their sit -ups sitting and sitting body flexion indicators did not improve much, and the degree of improvement was not obvious.

So 5 weeks of aerobic exercise combined with resistance training can significantly improve the 800 -meter score of overweight female college students, but the impact on the front and sit -ups of the sitting body is not obvious.

3.2.3. The Impact of Aerobic Exercise Combined with Resistance Training on the Cardiopulmonary Function of Overweight Female College Students

Cardiopulmonary capacity, also known as cardiopulmonary endurance, refers to the ability of the body to use blood and lung circulation to transport the in vitro in vitro to the use of tissue cells. In the whole process The ability to transport oxygen in the circulatory system and the ability of muscle cells to use oxygen, so cardiopulmonary is a comprehensive indicator of human heart, lung, blood vessels, and tissue cells. Cardiopulmonary function is the basis of the lasting work of the body. Good cardiopulmonary endurance can also prevent cardiovascular disease; and developing cardiopulmonary function can make people's energy vigorously and improve work efficiency. The activation volume refers to the total amount of gas that is exhaled after the maximum ability to inhale at a time. The oxygen required for all parts of the human body is provided by the lungs, and most of the dirt in the body is excluded by the lungs. The lungs are also the transit stations where the body performs gas exchange. It is the most intuitive indicator to detect lung function. There is a certain relationship between the fast resting rate and obesity, mainly because obesity has increased the burden on the body, and the heart needs more blood supply to accelerate the resting rate. Obesity can also cause increased blood pressure and abnormal blood lipids, which further stimulates the increase in resting rate. People with a fat -weight crowd and nervousness are higher than normal people. There are more secretions of catecholamine, which will also cause patient resting rate to accelerate, strengthen myocardial contraction, and cause shortage of breathing. Therefore, this study adopts the changes in the adaptability of obese college students' cardiopulmonary capacity. After the experimental intervention, the changes in overweight female college students' lung volume indicators have significant differences, and the resting rate indicators have decreased slightly but not significant, indicating that aerobic combination resistance training has a positive impact on the adaptive cardiac and lung of the experimental group.

When obese college students are conducting resistance forces, the body needs to overcome large intensity loads for work. At the same time, it is necessary to absorb oxygen dissolving fat to dissolve fat for heat production and supply energy. The resting rate of obese college students should be maintained between 60%-70%of the maximum resting rate. It needs to be continuously inhaled and exhaled, ingesting and consuming a large amount of oxygen to meet the body's need for oxygen, so long-term aerobic exercise combined with resistance training will increase The level of lung volume of obese college students; while the resting rate test index has

not seen significant changes, Zhang Di (2021) shows that the results of the weight loss of adolescents in studying resistance training combined with aerobic exercise have no significant difference in resting rate after the experiment. The impact of this factors requires long-term exercise to improve cardiac function, reduce blood lipids, and short-term weight loss and fat reduction exercise has little effect on resting rate.

So 5 weeks of aerobic exercise combined with resistance training can significantly increase the vital capacity of overweight female college students, but the impact on the resting heart rate is not obvious.

4. Conclusion

According to the results and analysis of this study, we get the following conclusions:

(1) The weight of overweight female college students is significantly reduced, the BMI value is significantly reduced, the percentage of body fat is significantly reduced, and the basic metabolic values are significantly improved, the waist circumference value is significantly reduced, and the waist and hip ratio is significantly reduced, the leg circumference is slightly reduced, but it is not obvious, the arm circumference value is slightly reduced, but it is not obvious. This exercise plan effectively reduces the weight of overweight female college students, reduces the BMI value, and the body fat rate has also decreased. It has very significant differences. Improving the basic metabolism of overweight female college students, and increasing the consumption of calories in the body. Effectively reduce the waist circumference and waist and hip ratio. These data show that the combination of aerobic exercise forces can develop some indicators of the body's ingredients in a good direction, improve the physical structure of overweight female college students, and make the body shape better.

(2) The researcher found that up-sir forward flexion test value has been slightly improved after exercise intervention, but there is no significant change, but the 800-meter score increased significantly after exercise intervention, with significant differences, with a significant improvement, it shows that this sports plan improves the physical fitness of the overweight women and improves their sports ability and quality of life.

(3) The researcher found that after the combination of aerobic exercise combined with resistance, their cardiopulmonary function has changed. its improvement has significant differences, and the heart rate is slightly reduced before the experimental intervention, but the change is not obvious and there is no difference. It shows that this motion plan improves the cardiopulmonary function of obese girls.

(4) overweight female college students participating in 5 weeks (4 times a week, 1 hour each) Aerobic exercise combined with resistance training can effectively lose weight.

5. Recommendations

(1) The results of this study show that this training plan can effectively and effectively reduce the weight of female college students, reduce body fat rate, BMI, waist circumference, waist and hip ratio, etc., and increase the basic metabolic rate, lung volume, 800 meters scores, etc. This plan can be used as a weight loss plan for female college students.

(2) There are signs that extending the exercise cycle may be more effective. Extend the experimental cycle: According to the results of this research, it is recommended to extend the

experimental cycle from 5 weeks to more than 8 weeks. Long-term exercise intervention may be more effective for weight loss

(3) Modify the frequency of exercise and exercise time: Observed in the experiment, 4 times a week, 2 hours each time, the experimental objects have fatigue performance. It is recommended to modify it 3 times a week and exercise for 1 hour each.

(4) Diet control: It is recommended to fix food intake to reduce fried food, high sugar, and high-fat food intake.

(5) Develop living habits: Maintain good sleep quality, 7-9 hours per night. Reduce stress and relax.

(6) Formulate clear goals: require the experimental objects to formulate clear goals, at the same time self-monitor, record the motion status, and maintain unremitting and patience to take weight loss.

(7) Future research to increase testing indicators: Increase blood pressure, blood lipid levels, blood sugar levels such as indicators.

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