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Optimizing Health Outcomes: The Impact of Circuit Training Programs in Reducing Obesity and Improving Body Composition

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Abstract

This study aims to evaluate the impact of circuit training programs on reducing obesity and improving body composition, including weight loss, body fat percentage, and Body Mass Index (BMI). The method used was a quasi-experimental design with a pre-test and post-test design on 30 obese participants who underwent an exercise program for 12 weeks. The program integrates strength and cardio training with a gradual increase in intensity. The results showed that circuit training significantly reduced weight, especially in the group that used additional weight (free weight). However, the decrease in body fat percentage and BMI did not show significant results in a relatively short period of time. The suggestion of this study is to combine circuit training with the right nutrition approach to accelerate body fat loss. In addition, more comprehensive health monitoring, including waist circumference and body fat percentage measurements, needs to be applied to get a more accurate picture of changes in the body composition of obese people.

Keywords: *Circuit Training; Obesity Reduction; Improving Body Composition*

Introduction

Obesity is a rapidly growing health problem globally and is linked to a variety of chronic diseases, such as heart disease, type 2 diabetes, and hypertension. According to the World Health Organization, the prevalence of obesity worldwide has tripled since 1975, signaling the seriousness of the problem (WHO, 2020). Obesity is defined as the excessive accumulation of body fat that can be detrimental to health. One method for measuring obesity is the Body Mass Index (BMI), where BMI above 30 is categorized as obese (WHO, 2020). In addition to an unhealthy diet, lack of physical activity also plays a role in obesity (Jia et al., 2022).

Circuit training is an effective exercise method in losing weight, reducing body fat percentage, and improving overall fitness. This exercise combines a variety of strength and cardio movements in a single session to increase calorie burning (Wu et al., 2024). In the context of weight loss, circuit training provides significant benefits because its high training intensity is able to increase metabolism even after the exercise is completed, a phenomenon known as the afterburn effect or excess post-exercise oxygen consumption (EPOC) (Moon et al., 2023). Thus, circuit training is an effective method of losing weight for obese people who often have difficulty losing weight through diet alone.

Several studies show that circuit training is effective in reducing body weight and fat. Research by Fonseca et al (2022) showed that participants who underwent circuit training for eight weeks experienced significant weight loss and body fat percentage. In addition, improving physical fitness also contributes to reducing the risk of cardiovascular disease (Liechti, 2014). This weight loss is not only affected by the number of calories burned during exercise, but also by an increase in basal metabolism after intensive exercise that helps burn more calories at rest (Orlando et al., 2018).

In addition to weight loss, circuit training also has a positive impact on BMI. Research by Sata et al., (2023) shows that BMI, as an indicator of obesity, can experience a significant decrease with a structured exercise program such as circuit training. These results are in line with other studies that have found that moderate to high-intensity exercise programs can lower BMI in populations with obesity (Ajjimaporn et al., 2023).

Although circuit training has been shown to be effective, it is important to consider the individual condition of obese people when designing an exercise program (Seyam et al., 2022). High-intensity exercise can increase the risk of injury if performed without proper guidance or in individuals with certain health conditions, such as hypertension or joint problems (Mohammed et al., 2020). Therefore, a careful approach and adjustment to the physical condition and health of each individual are necessary.

Although many studies have explored the effectiveness of physical exercises such as circuit training in weight loss and body fat percentage, most focus on the general population or athletes and are conducted in well-equipped gyms (Fonseca et al., 2022; Sata et al., 2023). Research that specifically evaluates the impact of circuit training on obese people in environments with limited access to fitness facilities is still very limited. In addition, many previous studies have only measured the effects of exercise on body weight without considering changes in body composition in detail, such as body fat percentage and BMI simultaneously (Kim et al., 2018). This creates a gap in the literature regarding effective fitness interventions for overall weight loss in obese people.

The novelty of this study lies in a comprehensive approach that not only focuses on weight loss, but also measures body fat percentage and BMI simultaneously in obese people. In addition, the study was conducted in the context of an environment with limited access to fitness facilities, providing insight into the effectiveness of circuit training in a more general scenario compared to a study in a fully equipped gym (Cardozo et al., 2019). Thus, the results of this study can make a practical contribution to the development of exercise programs for obese patients that can be widely adapted in various environmental conditions.

This study aims to analyze the effect of circuit training on weight loss, body fat percentage, and BMI in obese patients. By combining theories from previous studies and using a robust methodology, this research is expected to make a significant contribution to the field of health and wellness and suggest effective weight loss programs for obese people.

Methodology

This study uses a quasi-experimental method with a pre-test and post-test design in one group. The population in this study is obese people who are registered in a gym in City X. A total of 30 participants were purposively selected to participate in a 12-week exercise program. The inclusion criteria are individuals with a BMI $\geq$ 30, aged between 25-50 years, and not having a history of heart disease or other serious medical conditions that could preclude participation in an intensive exercise program.

Participants took part in a circuit training program specifically designed to lose weight and body fat percentage. Each training session lasts 60 minutes, three times a week, with moderate to high intensity. The workout consists of a combination of cardio movements, such as jumping rope and burpees, as well

as strength training, such as squats and push-ups. Before the program begins, all participants undergo an initial test that includes measurements of weight, body fat percentage, and BMI. After 12 weeks, the same measurements were taken to see the changes that occurred.

The data obtained were analyzed using a paired t-test to determine significant differences before and after the intervention. This analysis was used to assess the effect of circuit training on weight loss, fat percentage, and BMI. The following is a schedule of training schedules, available in the following table:

Table 1. 12- Week Training Schedule Circuit Training Program

Week	Day	Exercise	Duration	Intensity	Information
1-4	Monday	Jump rope, Push up. Squat, burpee, Plank	60 Minute	Medium	Each exercise is done in 2 sets with 10-15 repetitions per movement. 1-minute break
	Wednesday	Jump rope, Push up. Squat, burpee, Plank	60 Minute	Medium	Focus on the formation of initial stamina and correct movement techniques
	Friday	Jumping Jack, Push up, Lunges, Mountain climbers	60 Minute	Medium	Each exercise is done in 3 sets with 10-15 repetitions per movement. 1-minute break
5-8	Monday	Jump rope, Push up. Squat, burpee, Plank	60 Minute	Medium-high	Each exercise is done in 3 sets with 10-15 repetitions per movement. 1-minute break
	Wednesday	Jump rope, Push up. Squat, burpee, Plank	60 Minute	Medium-high	Increased intensity with faster variation and more repetitions (20-30)
	Friday	Jumping Jack, Push up, Lunges, Mountain climbers	60 Minute	Medium-high	Focus on improving core muscle endurance and strength data
9-12	Monday	Jump rope, Push up. Squat, burpee, Plank	60 Minute	High	Each exercise is done in 4 sets with 20-25 repetitions of movement, resting 30 seconds between sets
	Wednesday	Jump rope, Push up. Squat, burpee, Plank	60 Minute	High	Intensive exercise to increase calorie burning to the maximum
	Jumat	Jumping Jack, Push up, Lunges, Mountain climbers	60 Minute	High	Focus on cardio strength and body fat loss

Information:

Strength exercises: Squats, push-ups, lunges, planks.

Cardio Workouts: Jump Rope, Burpee, Jumping Jack, Mountain Climbers.

Duration per Session: 60 minutes (including 10-minute warm-up and 10-minute cooling-off).

Workout Frequency: 3 times a week.

Intensity: Weeks 1-4 (moderate), Weeks 5-8 (moderate-high), Weeks 9-12 (high).

Objective: After 12 weeks, a remeasurement of body weight, body fat percentage, and BMI was performed to evaluate changes in the results of this program.

Results and Discussion

Circuit training is a form of exercise that combines various high-intensity movements continuously in a short duration. This exercise has proven to be effective in improving fitness and helping with weight loss, especially for obese people. This study examines the effect of circuit training programs, both with free weight and only with body weight, on weight loss, body fat percentage, and Body Mass Index (BMI). The following data results between the effects of Circuit training on Weight Loss, Fat Percentage, and BMI are available in table 2, below:

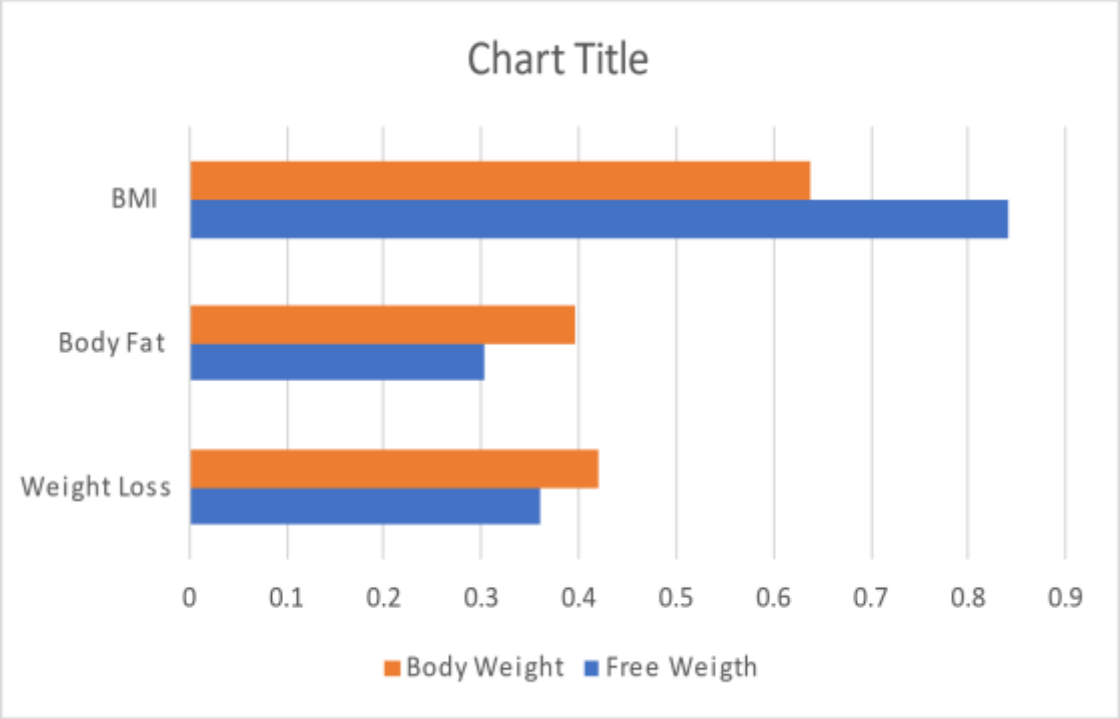

Figure 1. Effect of Circuit Training on Weight Loss, Fat Percentage, and BMI

The Effect of Circuit Training on Weight Loss

The results of the study showed that the circuit training program provided significant results in weight loss in obese patients. The group that underwent circuit training using free weight showed significant weight loss ($p=0.36$), compared to the body weight group ($p\approx0.42$). This decrease can be explained by the fact that the use of external weights during exercise can increase energy expenditure, which ultimately speeds up metabolism and burns more calories. According to Schwingshackl & Hoffmann (2013), physical exercise that involves repetitive body movements, such as circuit training, can have a significant effect on weight loss. This exercise program takes advantage of a variety of movements that involve almost all muscles of the body, thereby increasing oxygen consumption and fat burning effectively (Kolnes et al., 2021).

The Effect of Circuit Training on Reducing Body Fat Percentage

Although circuit training provided significant results in weight loss, results on a decrease in body fat percentage did not show significant results. In the free weight group, the value of $p=0.302$, while in the body weight group, $p=0.397$, which means that neither method provides a significant change in body fat percentage, This indicates that although weight loss, fat mass loss takes longer and may require a combination of other factors such as proper nutrition. Oukheda et al. (2023) explained that the decrease in body fat percentage is not only affected by physical exercise, but also the composition of the nutrients

consumed as well as individual metabolic patterns. Body fat is the last energy reserve used after other major energy sources, such as glycogen (Murray & Rosenbloom, 2018).

The Effect of Circuit Training on Body Mass Index (BMI)

The BMI variable in this study also showed insignificant results (p=0.841 for free weight and p=0.638 for body weight). BMI, which is the ratio between weight and height, did not experience significant changes despite weight loss. This can be explained by the nature of BMI which is influenced by structural factors, such as muscle mass and body fluids, which do not necessarily change even if the body weight is lost. Wu et al., (2024) research by mentioning that although weight loss can occur, BMI does not always directly reflect such changes because BMI is a parameter that is more influenced by the ratio of weight and height, which is not sensitive to fat composition or muscle mass. Therefore, it is important to consider other measurement methods, such as body fat percentage and waist circumference measurement, to get a more accurate picture of health and body composition (Bays et al., 2022). Thus, more holistic monitoring will help in achieving more effective and sustainable health goals.

Conclusion

Circuit training has been shown to be effective for weight loss in obese people, but it is not enough to significantly lower body fat percentage and BMI in a relatively short period of time. Therefore, it is recommended that this program be combined with the right nutrition approach to accelerate body fat loss. Health monitoring also needs to be carried out more comprehensively by measuring waist circumference and body fat percentage, not just based on BMI, to get a more accurate picture of changes in body composition of obese people.

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