Impact of a Six-Week Circuit Weight Training Program on Body Fat Percentage in Untrained Young

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Abstract: Low cardiovascular fitness and obesity are major global health challenges, contributing to a wide range of chronic diseases. Circuit Weight Training (CWT), which combines resistance and aerobic components, has shown promise in improving body composition and reducing fat mass. This study aimed to investigate the effectiveness of moderate-intensity Circuit Weight Training in reducing body fat among novice gym members at Guns Gym Surakarta. A quasi-experimental pre-test–post-test design was employed involving 10 newly registered male participants aged 18–25 years. Participants underwent a six-week CWT intervention, consisting of 16 training sessions (three per week). Pre- and post-intervention measurements of body fat were obtained using calipers and digital weight scales. Paired sample t-tests were conducted to determine the significance of changes in body fat levels. The results showed a statistically significant reduction in body fat following the training program (pre-test mean = 26.52, post-test mean = 23.814; p = 0.000), with an average improvement of 2.706 points in body mass profile. The normality and homogeneity tests confirmed the appropriateness of parametric statistical analysis. Moderate-intensity Circuit Weight Training is an effective method for improving body mass index and reducing body fat in untrained individuals. This study supports the implementation of structured resistance training programs in fitness settings to enhance body composition and overall health.

Keyword : *Circuit Weight Training, body fat, resistance training, BMI, exercise intervention, fitness*

Introduction

Low cardiovascular fitness and obesity pose significant public health concerns. Poor cardiovascular fitness has been linked to an increased risk of developing chronic diseases such as diabetes, stroke, and heart disease (Maqsood et al., 2013). At the same time, obesity—often the result of unhealthy lifestyle choices—contributes to a range of serious health conditions, including type 2 diabetes, hypertension, dyslipidemia, respiratory disorders, and cardiovascular complications. A sedentary lifestyle further heightens the risk of premature death and various adverse health outcomes (Kok et al., 2004).

Individually and collectively, these factors are recognized as primary contributors to the onset of numerous chronic

diseases(WHO, 2020). One indicator of a healthy body is the ability to maintain an ideal body weight, which is generally calculated based on the relationship between weight and height using specific formulas, then categorized according to established standards. Obesity increases the risks of developing cardiovascular and metabolic diseases, degrading quality of life and increasing the risk of death(Frank et al., 2019; Hauner, 2016). Higher concentrations of visceral relative to subcutaneous adipose tissue are associated with greater metabolic risks (Frank et al., 2019). Excess body fat deposition is caused by an imbalance between energy intake and expenditure, influenced by genetic and environmental factors (Ali & Crowther, 2010). Central fat has been linked to type 2 diabetes and cardiovascular disease, independent of body mass index (Pi-Sunyer, 2004). Body fatness and its distribution are associated with large artery structural and functional properties, with roots of these associations potentially present in adolescence.

Obese individuals with upper-body-fat distribution have increased health complications such as dyslipidemia, hypertension, insulin resistance, and type 2 diabetes compared to lower-body-obese individuals (Votruba & Jensen, 2007). Abdominal fat is a primary risk factor for type 2 diabetes and cardiovascular disease, with visceral fat being more indicative of the accumulation of fat deposits in organs in the abdomen. Genetic and environmental factors, including nutrient exposures and dietary behaviors, can influence the development of obesity(Papoutsakis, 2012). There is evidence that the accumulation of body fat has a genetic basis, suggesting that variations in body mass index can be attributed to an epistatic effect involving multiple genes as well as behavioral and environmental factors (Salinas-Santander et al., 2024). Genetic correlations exist between body fat percentage and cardiorespiratory fitness, indicating a shared genetic etiology between whole body fat percentage and cardiorespiratory fitness (Schnurr et al., 2016). Obesity is associated with poorer mental health, particularly depression and subclinical depressive symptoms, with greater body weight leading to psychological distress (Sharma et al., 2023; Steptoe & Frank, 2023). Obese individuals often suffer from problems including depression, low self-esteem, poor quality of life, and negative body image, with weight stigma and discrimination contributing to psychological distress

However, the effectiveness of weight training in reducing body fat depends greatly on having a systematic training plan and applying proper training principles. In practice, many individuals engage in resistance training without clear objectives or adherence to guided protocols, resulting in suboptimal outcomes or even training failure. Strength training has been shown to have a significant impact on reducing body fat levels. Based on an analysis of various studies, this type of exercise can lower body fat percentage by an average of 1.46% and reduce fat mass by approximately 0.55 kg in healthy adults. These findings are consistent across multiple studies, indicating a fairly strong

confidence in the effectiveness of strength training in supporting body fat reduction (Wewege et al., 2022).

Engaging in regular physical activity has been shown to reduce the likelihood of developing chronic conditions such as heart disease, stroke, diabetes, and certain types of cancer (Faude et al., 2015; Pritchard et al., 2016; Santiago Bautista & Ferrín, 2007). Moreover, exercise plays an important role in enhancing mental well-being by alleviating symptoms of anxiety and depression, improving mood, and supporting overall psychological health (Denson, Mason, & Parkinson, 2023; Hemmeter & Ngamsri, 2022). Consistent physical activity–whether aerobic or anaerobic–also contributes significantly to improving physical fitness, including muscular strength, endurance, flexibility, and balance (Görner & Reineke, 2020; Kang et al., 2020; Micheo, Baerga, & Miranda, 2012; Savela et al., 2015).

Although aerobic exercise offers a wide range of health benefits, combining it with resistance training has been found to yield even greater improvements in physical strength, performance, and psychosocial well-being (Kambic et al., 2022; Marzolini et al., 2015; Xanthos et al., 2017). Resistance training, also known as weight training, is a fundamental component of a balanced exercise regimen due to its many health benefits. This form of training enhances muscle strength, bone density, and general well-being. Furthermore, it supports muscle hypertrophy, improves metabolic function, and helps prevent injuries (Jiménez et al., 2023; Kai, 2009; Kerr et al., 2010).

Combining resistance training with aerobic workouts is particularly effective for weight loss and improving overall health, as it promotes fat reduction while preserving lean muscle mass (Oppert et al., 2024; Wirth, 2019). One training method that integrates both elements is Circuit Weight Training (CWT)–a form of resistance training that merges strength and cardiovascular exercises into a single session.

Circuit Weight Training (CWT) is designed to deliver a full-body workout by minimizing rest periods between exercises, making it more time-efficient than traditional routines (Seyam et al., 2022). It can be tailored to various intensity levels–ranging from low to high–allowing it to accommodate different fitness levels and goals. High-intensity circuit training, in particular, has been shown to significantly improve body composition, muscular strength, and cardiovascular health.

CWT has proven to be an effective strategy for reducing BMI and enhancing body composition, especially for individuals who are overweight or obese. In addition to its physical benefits, CWT also yields positive effects on cardiometabolic health, making it a valuable component of weight management and health improvement programs (Safarzade et al., 2020; Seo et al., 2019; Xiao et al., 2020). Structured CWT programs using moderate resistance represent a promising approach for individuals aiming to improve their BMI, increase muscle mass, and reach a healthy body weight. This training not only promotes physical enhancements but also contributes to

cardiovascular fitness and mental well-being. Based on this background, the present study was conducted to examine the effects of moderate-intensity circuit weight training on BMI improvement among new gym members, particularly those seeking to gain muscle mass and achieve an ideal body weight.

Given the importance of resistance training in improving body composition, particularly in reducing body fat percentage, this study aims to examine the effectiveness of a structured weight training program in lowering body fat levels. This research also seeks to provide a scientific basis for fitness practitioners and trainers to design exercise programs that not only focus on muscle hypertrophy but also on reducing fat mass to achieve a healthier and more ideal body condition. Based on the background described above, this research aims to examine how moderate-intensity circuit weight training influences the reduction of body fat in new gym members, the majority of whom seek to build muscle mass to reach a balanced and healthy body composition.

Method

This study utilized a quasi-experimental method with a pre-test and post-test design to explore the impact of Circuit Weight Training (CWT) on reducing body fat in newly enrolled members at Guns Gym. Prior to the training intervention, participants underwent an initial BMI assessment (pre-test). The intervention consisted of a six-week CWT program, delivered in 16 total sessions, with three sessions per week. Upon completion, participants were reassessed through a post-test to evaluate changes in BMI.

A purposive sampling approach was employed to select participants who met specific inclusion criteria: (1) voluntary participation; (2) new members of Guns Gym Surakarta without previous training experience; (3) aged 18 to 25 years; (4) no history of chronic illnesses that could compromise physical health (e.g., cardiovascular, respiratory, or kidney diseases); and (5) not experiencing any musculoskeletal injuries. A total of 10 participants who met these criteria were included in the study.

Before beginning the training program, each participant completed a One Repetition Maximum (1RM) assessment using a repetition-based chart as recommended by (Contreras & Schoenfeld, 2011). Training loads were prescribed based on NSCA (National Strength and Conditioning Association) guidelines, ranging from 67% to 85% of 1RM, with 6 to 12 repetitions per exercise (Schoenfeld & Snarr, 2021). The workout regimen comprised eight different exercises: bench press, side bend, T-bar row, deadlift, butterfly, pulldown, leg extension, and biceps curl. Participants were instructed to perform each movement consecutively with short rest intervals (10–15 seconds) between exercises(Martínez-Rodríguez et al., 2018; Siqueira et al., 2018) . After one complete round, a 2-minute rest was given before starting the next round. Each session consisted of three rounds (sets) in total.

Data collection involved physical measurements taken before and after the intervention. Tools used included body fat calipers and digital weight scales, with measurement points located at the chest, upper arm, thigh, and calf.

To assess the distribution of the collected data, the Shapiro–Wilk test was conducted for normality. A homogeneity test was also performed to confirm the similarity in participant characteristics. The primary statistical analysis used in this study was the paired sample t-test, which determined whether there was a significant difference in body fat levels before and after the training intervention.

Results And Discussion

This research was carried out from October 1 to November 12, 2024. The intervention was implemented over a period of four weeks, comprising 16 total training sessions, held three times per week within a six-week timeframe. The participants involved were new members of Guns Gym Surakarta, totaling 10 individuals who had no prior experience in structured training programs. The main aim of this study was to evaluate the impact of moderate-intensity circuit weight training on the reduction of body fat in novice gym members.

Table 1. Descriptive Statistics

	N	Min	Max	Mean	SD
Pretest	10	36,8	103,5	63,84	17,81368
Post test	10	29,7	97,3	59,64	17,98408

The mean pre-test body fat level was 63.84 with a standard deviation of 17.81368. The highest pre-test score was 103.5, while the lowest was 36.8. The mean post-test body fat level was 59.64 with a standard deviation of 17.98408. The highest post-test score was 97.3, and the lowest was 29.7.

Table 2. Normality Test Results

No	Variable	Sig	Conclusion
1.	Body Fat (Pre-Test)	0,543 > 0,05	Normal
2.	Body Fat (Post-Test)	0,837 > 0,05	Normal

Normality testing was conducted using the Shapiro-Wilk test. This test examines the hypothesis that a sample comes from a normally distributed population. The decision to accept or reject the hypothesis is based on the comparison between the significance value and 0.05. The null hypothesis is accepted if the significance value is greater than 0.05; otherwise, it is rejected, indicating that the data are not normally distributed. Based on the table above, the significance (Sig) values for all variables are greater than 0.05, indicating that the hypothesis stating the samples are drawn from a

normally distributed population is accepted. Therefore, the data for the variables in this study meet the assumptions for parametric statistical analysis.

Table 3. Homogeneity Test Results		
Variable	**Significance Value**	**Conclusion**
Body Fat	0,903 > 0,05	Homogeneous

This test evaluates the hypothesis that the variances of the variables are equal. The decision to accept or reject the hypothesis is based on whether the significance value is greater than 0.05. The results of the homogeneity test are presented in the table below. Based on the analysis, the significance value is greater than 0.05, indicating that the sample variances are homogeneous. Therefore, the hypothesis stating that the variances of the variables are equal is accepted. It can thus be concluded that the population variances are homogeneous.

Table 4. T-Test Results for Body Fat				
	Body Fat Pre-Test	**Test**	**Sig**	**Conclusion**
Resistance Training with Circuit Weight Training Model	63,84	59,64	0.000 < 0,05	Significant

Based on the mean body fat levels, the pre-test value was 26.52 and the post-test value was 23.814, showing an improvement of 2.706. Therefore, it can be concluded that resistance training using the Circuit Weight Training model can improve body mass profile among fitness members at Guns Gym Surakarta.

The t-test results indicated that resistance training using the Circuit Weight Training model yielded a significance value of 0.000 (p < 0.05), demonstrating a statistically significant effect of this training program on reducing body fat among fitness members at Guns Gym Surakarta. Based on the mean values, the pre-test score was 63.84 and the post-test score was 59.64, indicating a reduction of 2.706 in body mass profile following the training program.

These findings suggest that the Circuit Weight Training program contributed significantly to improvements in body mass profile among the fitness members. The results indicate that the six-week training intervention produced positive outcomes, with a reduction of 2.706, supporting the idea that the program adhered to sound training principles and met the specific fitness needs of members at Guns Gym Surakarta.

Comparable findings have been reported in previous studies. High-Intensity Circuit Training (HICT), for instance, was shown to significantly reduce body fat percentage and oxygen consumption in individuals with obesity after 20 training sessions. The control group demonstrated a significant reduction in body fat, while the experimental group showed no significant change in BMI. However, both groups exhibited a statistically significant decrease in body fat percentage (Diana Paola et al., 2022).

Similarly, research by (Kim et al., 2024) found that a four-week resistance circuit training program was effective in reducing body weight and BMI in women with severe obesity preparing for bariatric surgery. Another related study reported that an eight-week full-body circuit training program improved cardiorespiratory fitness and body composition in overweight individuals with a sedentary lifestyle (Rago & Mohr, 2023).

According to (Xiao et al., 2020), consistent circuit training routines can enhance body composition, increase physical fitness levels, and potentially aid in the prevention of metabolic disorders in individuals with obesity. Moreover, circuit training programs have been proven effective in reducing body weight and improving BMI in overweight and obese adults (Seo et al., 2019).

Overall, circuit resistance training has demonstrated significant effects on body composition, including reductions in body weight, BMI, and body fat percentage, as well as improvements in muscle mass and cardiorespiratory fitness. These findings underscore the effectiveness of circuit resistance training as a viable strategy for individuals with varying BMI levels, particularly those who are overweight or obese. Circuit resistance training is thus considered an effective intervention for reducing BMI and enhancing body composition in this population.

Conclusions

Based on the comparison between the pre-test mean value of 26.52 and the post-test BMI mean value of 23.814, with an improvement of 2.706 in the index, it can be concluded that resistance training using the Circuit Weight Training model is effective in improving body mass profile and reducing body fat among fitness members at Guns Gym, compared to before the training program was implemented.

Acknowledgment

Author Contribution

Conceptualization & methodology: Anugrah Nur Warthadi; investigation : Yulingga Nanda Hanief; writing–original draft preparation: Ardhian Tomy Kurniawan.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Data Availibility

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Funding

This research received no external funding.

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