

**The Effect of External Weight Training on Body Fat and Muscle****Tahir Mubarak¹, Rian Triprayogo², Ida Zubaida³**¹Universitas Sultan Ageng Tirtayasa, 8883210029@untirta.ac.id²Universitas Sultan Ageng Tirtayasa, riantripayogo@untirta.ac.id³Universitas Sultan Ageng Tirtayasa, ida.zubaida@untirta.ac.id
(riantripayogo@untirta.ac.id)**ABSTRACT**

This study aims to determine the effects of training using external weights on reducing body fat and increasing muscle mass in women. The term external weight refers to exercises performed with dumbbells, barbells, or other additional loads that provide resistance during movement. The research employed an experimental design with 12 female participants selected through purposive sampling based on criteria aligned with the study objectives. The training program was conducted over 16 sessions with a frequency of three workouts per week to ensure consistency and the effectiveness of the intervention. Body composition measurements were taken before and after the treatment using a body composition analyzer, which provided accurate data on body fat percentage and muscle mass. The results showed a significant reduction in body fat after the training program, with an average change of 5.1583%, t -value = 10.127, and $p < 0.001$. The 95% confidence interval ranged from 4.0372 to 6.2795, indicating that the program was effective in reducing body fat. Regarding muscle mass, there was a significant increase of 2.79%, as indicated by the mean difference of -2.7917 (due to the Before – After calculation), t -value = -9.512 , and $p < 0.001$, with a 95% confidence interval from -3.4376 to -2.1457 . Overall, this training program proved to provide substantial benefits for women in improving body composition and may serve as motivation to engage in regular exercise for better health and a more ideal physical appearance.

Keywords: *external weight training, weight training, body fat, muscle mass, women*

INTRODUCTON

Physical activity is an activity that involves muscle work and requires energy, and is beneficial for human life. Physical activity can be done at school, work, during travel, or leisure time, and is grouped into light, moderate, and vigorous activities. Physical activity is influenced by biological, psychological, social environmental, and physical factors (Romadhoni et al., 2022). These activities cannot be performed optimally without a healthy body condition. A healthy lifestyle is necessary as a preventive measure to maintain body health, as it can boost the immune system so that various diseases such as fever, flu, and cough do not easily attack (Made et al., 2021).

A healthy and fit body improves the quality of life and productivity. However, modern humans often neglect physical activity due to the convenience of technology. This also triggers an increase in cases of overweight and obesity caused by an unhealthy lifestyle, poor diet, junk food consumption, and lack of physical activity (Sri Mulyani et al., 2020). The convenience of services through mobile phones and e-commerce also decreases physical activity, thereby increasing the risk of obesity.

Based on the author's experience during an internship at Fisko Gym, many members are overweight and aim to lose weight. Riskesdas in 2023 recorded an obesity rate of 15.8 percent, an increase from 21.8 percent in 2018. According to the Deputy Minister of Health of the Republic of Indonesia, Dr. Dante Harbuwono (CNN Indonesia), obesity in Indonesia generally occurs in urban communities with incomes above the regional minimum wage due to a lack of understanding about healthy lifestyles.

To overcome the increase in obesity, an effective training program is needed. Two types of training often chosen by beginners are Internal Weight and External Weight. Internal Weight uses one's own body weight as resistance (Nasrulloh & Wicaksono, 2020), while External Weight uses equipment such as dumbbells, barbells, or machines (Carneiro et al., 2024). Internal Weight is more flexible, while External Weight provides stronger stimulation for muscle growth through additional loads (Lestari & Nasrulloh, 2019).

Based on this background, researchers are interested in examining the effect of the external weight training method using a Full Body workout with an Endurance approach, which led to the title "The Effect of External Weight on Body Fat and Muscle Mass." This research is expected to provide an overview of the impact of the training program.

METHODS

This research section is an experimental study with a one-group pretest-posttest design (Sugiyono, 2013), where one group is given a treatment in the form of external weight training and measurements are taken before (pretest) and after the treatment (posttest) to observe changes in body fat and muscle mass. The study was conducted at Fisko Gym, Serang City, for 1 month with a total of 16 meetings and a training frequency of three times per week. The study population consisted of all

active members of Fisko Gym, totaling 57 people. The research sample was selected using a purposive sampling technique based on specific criteria, such as females aged 18–35 years, physically healthy, categorized as overweight to obesity II, interested in participating in external weight training, having never participated in programmed training before, and willing to be respondents. Based on these criteria, 12 samples were obtained, which complies with the reasonable limits for experimental research (Hafni Sahir, 2021).

Data collection was carried out through pretest and posttest using measuring instruments, namely the Omron Karada Scan Body Composition Monitor HBF-375, which functions to measure body weight, body fat percentage, and muscle mass. This instrument was used to obtain body fat and muscle mass data as dependent variables, while external weight served as the independent variable. Data collection was supported by tools such as a Bodyfat Monitor Scale, a ballpoint pen, and a notebook. The data obtained from the measurement results were then analyzed to assess the effectiveness of the treatment in influencing changes in body composition. Because this study is a quantitative experiment utilizing electronic instruments, the verification of data validity was conducted through repeated measurement procedures (pretest-posttest) using a device with consistent specifications.

RESULTS

This study focuses on changes in body composition through two main variables, namely body fat percentage and muscle mass percentage, measured before and after the treatment. This pretest-posttest approach allows researchers to directly observe the physiological changes that occur in the subjects. These variables were analyzed using a parametric statistical test after passing basic assumption testing, so that the results presented not only emphasize statistical aspects but also physiological relevance and scientific basis.

The normality test is a crucial step to ensure that the data meets the distribution assumptions required in parametric analysis. In this study, the Shapiro-Wilk test was used because it is more sensitive in detecting distribution deviations, especially in small sample sizes like the one used.

Table 1. Normality Test

Variable	Statistic	df	Sig.
Percentage of Fat After	0.944	12	0.548
Percentage of Muscle Mass After	0.930	12	0.382

Source: Personal Documentation, 2025

The normality test results using Shapiro-Wilk show that the percentage of fat after ($p = 0.548$) and the percentage of muscle mass after ($p = 0.382$) have p -values above 0.05, so there is no indication of deviation from the normal distribution. These findings confirm that the data follows a reasonable distribution pattern. Based on these data, the normality assumption is fulfilled, and the data are eligible

to be analyzed using parametric tests such as Pearson correlation and paired t-tests.

The paired sample t-test was used to assess the effectiveness of the treatment by comparing the variable values before and after the intervention on the same subjects. This test is capable of detecting statistically significant average changes.

Table 2. Paired Sample t-Test

No	Variable	Mean Difference	t	df	Sig. (2-tailed)
1	(%) Fat Pretest – Posttest	5.1583	10.127	11	0.000
2	(%)Muscle Mass Pretest – Posttest	-2.7917	-9.512	11	0.000

Source: Personal Documentation, 2025

Based on the Paired Sample t-Test results in **Table 2**, it is known that there is a significant difference between measurements before and after the treatment in the two variables studied, namely body fat percentage and muscle mass percentage. For the body fat percentage variable, a mean difference value of 5.1583 was obtained, indicating an average decrease in body fat after the treatment was given. The t-count value of 10.127 with 11 degrees of freedom (df) resulted in a significance value ($p = 0.000$), which is smaller than 0.05. Thus, it can be concluded that there is a significant difference between the percentage of fat before and after the treatment. This finding indicates that the given treatment is effective in reducing body fat percentage.

In the muscle mass percentage variable, a mean difference value of -2.7917 was obtained. The negative value of this difference indicates that the average muscle mass after treatment is higher than before treatment. The t-count value of -9.512 with 11 degrees of freedom also yielded a significance value of $p = 0.000$, which means it is less than 0.05. Therefore, there is a significant difference between muscle mass before and after the treatment. These results indicate that the provided treatment is also effective in increasing muscle mass percentage. Overall, the test results show that treatment using external weights has a significant effect on decreasing body fat percentage and increasing muscle mass percentage in the research participants.

DISCUSSION

Decrease in Body Fat Percentage

This study found that body fat percentage decreased significantly after treatment. This result is in line with many previous studies stating that physical exercise, both weight training and aerobic exercise, can increase calorie burning and trigger fat loss. Several studies in the bibliography such as (Afgenesya Novenda Denata et al., 2024), (Andini Azmy & Indra Eka Novita, 2016), and (Purwanto Prabowo, 2016) explain that intense exercise can accelerate fat oxidation and increase energy expenditure. Therefore, the fat loss that occurred in this study can be considered reasonable and in accordance with known physiological mechanisms.

Increase in Muscle Mass

In addition to lowering fat, the research results also showed a significant decrease in muscle mass. This usually occurs when the body experiences an energy deficit or when the training performed does not provide enough stimulus needed to maintain or increase muscle mass.

Several literatures such as (Sucipto & Widiyanto, 2016), (Sidik Didik Zafar, 2022), and (Wilhelmina et al., 2023) state that muscle mass is strongly influenced by the type of exercise, intensity, load, and nutritional intake, especially protein. If the exercise does not contain a strong enough resistance element or if energy intake is lacking, the body can take muscle as an energy source. This could explain why muscle mass decreased after the treatment.

CONCLUSIONS AND SUGGESTIONS

Conclusion

The study shows that the training program provided was effective in improving the participants' body composition. Body fat percentage decreased significantly by 5.16% ($p < 0.001$), indicating that the exercise is capable of tangibly lowering fat levels. Furthermore, muscle mass percentage increased significantly by 2.79% ($p < 0.001$), which indicates a training stimulus that successfully triggered muscle adaptation. Overall, the applied training had a positive effect through fat reduction and increased muscle mass.

Suggestions

For future research, it is recommended to use a larger sample, extend the training duration, control extraneous variables such as diet and sleep patterns, add structured weight training, and use more accurate measuring instruments or repeated measurements. For practitioners or exercise participants, combine weight training and cardio, pay attention to nutritional intake especially protein, apply training with measurable intensity and progression, and conduct regular monitoring of body changes. For fitness institutions or programs, training programs like the one in this study can be applied in gyms, sports clubs, or educational institutions, and it is recommended to provide education related to exercise and healthy lifestyles for participants.

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The author realizes that this research still has limitations. Therefore, constructive criticism and suggestions are highly expected by the author for improvement in the future. Hopefully, this work can provide benefits to the world of education, research, and the development of sports science.

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