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BODY FAT PERCENTAGE AND MUSCLE MASS CHANGED BY PHYSICAL EXERCISE PROGRAM IN OBESE PATIENTS

Merdyah Choirunisa Indra Anwari[1], Sugiarto[2], Mohammad Arif Ali[3]
[1,2,3]Universitas Negeri Semarang
merry@students.unnes.ac.id[1], sugiarto.edu@mail.unnes.ac.id[2],
hiarifalikhan@mail.unnes.ac.id[3]

Abstract

Intruduction : Obesity, marked by excess body fat, is a widespread problem with serious health effects. Causes include poor eating habits, lack of exercise, genetics, and environmental factors. Preventing obesity focuses on healthy eating, regular exercise, and educating the public about weight control. The Kilang Pertamina Internasional Fit Journey program has proven effective in reducing body fat and increasing muscle mass. The purpose of study : To investigave the effect on physical exercis program on that changes of body fat percentage and muscle mass in obese patiens Method : This study examined body fat and muscle mass among 11 obese Kilang Pertamina Internsional employees at Klinik Utama Eminence from September to November 2023. Due to the <30 sample, a non- parametric test, the Wilcoxon signed-rank test, was used to analyze data. Body fat and muscle mass were measured using the Tanita Type 5BC545N scale. Results study : The study demonstrated that the exercise program significantly reduced body fat (from 39.3 ± 8.63 to 34.86 ± 9.62, Δ 4.43, $p < 0.05$) and showed noticeable changes in muscle mass (from 50.68 ± 10.48 to 49.10 ± 9.82, Δ 1.58, $p < 0.05$). These results conclude that the global challenge of obesity and the need for preventive measures like promoting physical activity.

***Keywords**: Healthy Lifestyle, Degenerative Disease, Body Composition.*

Abstrak

Pendahuluan: Obesitas, yang ditandai dengan kelebihan lemak tubuh, merupakan masalah yang meluas dengan dampak kesehatan yang serius. Penyebabnya meliputi kebiasaan makan yang buruk, kurang olahraga, faktor genetik, dan lingkungan. Pencegahan obesitas berfokus pada pola makan sehat, olahraga teratur, dan edukasi masyarakat tentang pengendalian berat badan. Program Fit Journey Kilang Pertamina Internasional telah terbukti efektif dalam mengurangi lemak tubuh dan meningkatkan massa otot. Tujuan penelitian: Untuk menyelidiki pengaruh program latihan fisik terhadap perubahan persentase lemak tubuh dan massa otot pada pasien obesitas. Metode: Penelitian ini meneliti lemak tubuh dan massa otot pada 11 karyawan Kilang Pertamina Internasional yang obesitas di Klinik Utama Eminence dari September hingga November 2023. Karena sampel kurang dari 30, uji non-parametrik, yaitu uji peringkat bertanda Wilcoxon, digunakan untuk menganalisis data. Lemak tubuh dan massa otot diukur menggunakan timbangan Tanita Tipe 5BC545N. Hasil penelitian: Penelitian ini menunjukkan bahwa program latihan secara signifikan mengurangi lemak tubuh (dari 39,3 ±

8,63 menjadi 34,86 ± 9,62, Δ 4,43, $p < 0,05$) dan menunjukkan perubahan yang nyata pada massa otot (dari 50,68 ± 10,48 menjadi 49,10 ± 9,82, Δ 1,58, $p < 0,05$). Hasil ini menyimpulkan bahwa tantangan global obesitas dan kebutuhan akan tindakan pencegahan seperti mempromosikan aktivitas fisik.

Kata Kunci: Gaya Hidup Sehat, Penyakit Degeneratif, Komposisi Tubuh.

A. INTRODUCTION

Physical fitness refers to the body's ability to carry out daily tasks efficiently and over a relatively long period of time without experiencing excessive fatigue . This fitness is essential to meet basic human needs such as optimal health and performance. Regular physical exercise is very necessary so that a person can carry out their duties smoothly and achieve maximum results. The intensity, frequency and duration of exercise are key factors in achieving good fitness. There are five main aspects of physical fitness, namely heart and lung endurance, muscle strength, muscle endurance, flexibility, and body composition. Physical exercise has various benefits, including lowering the risk of diseases such as coronary heart disease, stroke, diabetes, hypertension, colon cancer, and depression.

Physical exercise not only affects physical fitness but also has a significant influence on lung function. Physical exercise done regularly will improve coordination, strength, flexibility and muscle agility. Physical exercise can have physiological effects on the body, especially on the lung system which has an important role in human life, which can stimulate breathing and increase lung volume because there is an increase in respiratory muscle strength.

Obesity is a condition where the amount of energy intake exceeds the need so that there is an imbalance between energy intake and energy used. Obesity has become a public health crisis around the world that causes serious health problems. Obesity has tripled worldwide since 1975 and nearly 40% of adults are overweight and 13% are obese. In the United States, it is seen that 18.5% of children and adolescents are obese (7). Other research also explains that the risk of obesity in adolescents increases 1.4 times higher in individuals who have been overweight or obese in childhood and is a concern because of obesity comorbidities in adulthood, including hypertension, metabolic syndrome, fatty liver disease. and type 2 diabetes mellitus which is now widely found in childhood (9).

Obesity data according to Riskesdas 2018 is 18%. The data of the top 5 provinces with the most obese people in the age group of 13-18 years in DKI Jakarta ranked first with

a percentage of 18.3%, followed by Bali 14.9%, DI Yogyakarta 14.2%, East Kalimantan 12.9%, Papua 11.7% (10). On average, regions in Indonesia are still experiencing obesity problems with varying prevalence. Obesity in adolescents can increase the potential for other health problems. Obesity in adolescents is closely related to the occurrence of several non- communicable diseases in adulthood (11). Another study states that obesity in adolescents puts the individual at risk of several chronic diseases and complications. The incidence of diabetes is 44%, other risks include ischemic heart disease with a percentage of 23% and cancer with a risk of 7-41% caused by obesity in childhood and adolescence (12). Obesity is one of the factors that cause several non-communicable diseases and other chronic diseases that can be prevented (13).

Obesity and obesity are caused by lifestyle changes related to diet and decreased physical activity, resulting in an increased incidence of overweight and obesity (14). The diet in question is a diet that is high in energy, high in fat, high in carbohydrates, and low in fiber (15). The causes of obesity and overweight are also influenced by gender and age (16). As we age, the tendency to be overweight and obese increases. Women tend to be overweight and obese quickly because women's metabolism is slower than men's (17).

Adults tend to be overweight or obese quickly, this is because the body's metabolism decreases with age and physical activity decreases. Based on research , those aged 35-44 years have a 1.4 times risk of being overweight. As we age, physical activity decreases, lean body mass decreases, while fat tissue increases, this is what causes the risk of overweight and obesity in adulthood (19). Obesity can increase the risk of non-communicable diseases such as cardiovascular disease (heart attack, stroke), cancer, chronic respiratory disease and type 2 diabetes mellitus (20).

Therefore, this study examines through a critical review study the effect of dietary and physical exercise interventions on body fat percentage in overweight and obese adults. Based on this description, the purpose of this study is to determine the effect of dietary and physical exercise interventions on body fat percentage in overweight and obese adults. There are several actions that can be taken to prevent obesity in adolescents. Studies show that health behaviors can improve health-related quality of life (22). Health behaviors that can be done are by doing physical exercise which is a universal health need, where if the level is insufficient, it can increase the risk of health problems. Other evidence suggests physical exercise can help control weight. Surveys in America show that 57% to 74% of

teens rarely do physical exercise (23). The proportion of physical activity is lacking in Indonesian adolescents aged 10 to 14 years by 64.4% and in the age range of 15 to 19 years by 49.6% (24).

Based on the type of physical exercise carried out as an intervention to prevent obesity in employees, further research is needed on the type, duration and frequency of physical exercise that is more effective as a weight control strategy and prevents weight gain. body fat percentage and the impact if obesity is not achieved.

immediately intervene. This study was also conducted by collecting several relevant references related to physical exercise and obesity in adolescents through searching several online databases and questionnaires related to body fat percentage and muscle mass..

B. RESEARCH METHOD

This study is a type of quantitative research with quasi-experimental, using a pre-experimental research design of one group pre-test post-test. The research was carried out in September – November 2023. The population used was KPI employees, and a sample of 11 KPI employees who were obese, was selected using the purposive sampling method. The data analysis test used was a non-parametric test because the research subjects were less than 30 people. The appropriate parametric test is the Wilcoxon pair test because the pre-test and post-test data come from the same subject. This research was conducted using a quantitative research design. In this context, the research design used is Pre-experimental One Group Pre-test Post-test Design. This design involves measuring variables before (pre-test) and after (post-test) the intervention, but does not involve the control group as a comparison. The research subjects were selected from the population that was suitable for the purpose of the study. In this case, the research subjects were selected from KPI employees who were obese. It is important to select a sample that is representative of the population being studied in order to obtain statistically justifiable results.

The data obtained from the measurement of variables were processed and analyzed using statistical methods. Because the number of research subjects <30, a non-parametric test was chosen for analysis. In this case, the non-parametric test used is the Wilcoxon pairing test. This test is suitable for comparing pre-test and post-test data from the same subject in situations where the data distribution is abnormal or the sample size is small. The purpose of the data analysis was to evaluate the effect of physical exercise program interventions on body fat percentage and muscle mass in obese workers in KPIs. Using proper statistical methods, studies

can conclude whether physical exercise programs are effective in lowering body fat percentage and increasing muscle mass. Using a detailed quantitative approach like this, research can provide a deeper understanding of the effectiveness of physical exercise programs in changing body composition in obese individuals.

Table 1. Structure

Warming up	Main exercise 1	Main exercise 2
Warm up treadmill elliptical air bike Dynamic streach Asis static streach	Upper body • lat pulldown • shoulder press • chest press • pectoral machine • machine fly Lower body • leg extension • leg raise • leg curl • rear kick • adduction • abduction Full body • high knees • side lunges • v pass	• crunches • russian twist • sit up • roll up • plank • knee to elbow • dead bug • flutter kick

The training timetable is structured efficiently, maintaining a consistent routine: it commences with low- intensity sessions on Monday and Wednesday, moderate-intensity sessions on Tuesday and Saturday, and high- intensity sessions on Thursday. This program extends over a period of two months, in accordance with the established agreement between Kilang Pertamina Internasional and Klinik Utama Eminence.

Table 2. Workout Schedule

Frequency	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
Intensity	Low	Moderate	Low	High	Low	Moderate	Low
Time	Walk 10k steps	*Workout* 60 minute *Streaching* 10 minute *Core* 15 menit *Compound movement* 30 minute *Asis static stretch* 5 minute	Walk 10k steps	*Workout* 60 minute *Streaching* 10 minute *Core* 15 menit *Compound movement* 30 minute *Asis static stretch* 5 minute	Walk 10k steps	*Workout* 60 minute *Streaching* 10 minute *Core* 15 menit *Compound movement* 30 menit *Asis static stretch* 5 minute	Walk 10k steps
Type	Aerobic		Aerobic	HIIT/Circuit Training	Aerobic		Aerobic

The training schedule is well-organized and follows a regular pattern: it starts with light-intensity sessions on Monday and Wednesday, moderate-intensity on Tuesday and Saturday, and high-intensity on Thursday. This schedule spans two months, adhering to the agreed program between Kilang Pertamina Internasional and Klinik Utama Eminence.

The independent variable examined in this study is the KPI Fit Journey physical exercise program offered through the Corporate Wellness Program (CWP). Developed by Klinik Utama Eminence, this program focuses on treating and supporting weight loss among employees identified as obese within KPI. Specifically tailored for KPI staff and supported by the CWP team, KPI Fit Journey entails physical training sessions. Following the FITT Training Program guidelines (Frequency, Intensity, Time, Type), the program prescribes training three times weekly, at an intensity level ranging from 65-85% of maximum heart rate, each session lasting 60 minutes and customized to session-specific needs.

The exercise regimen includes warm-ups, dynamic stretches, combined movements, core exercises, and static stretches. The study's dependent variables include body fat percentage and muscle mass, measured using the Tanita Type 5BC545N scale, which provides segmental body composition data within 15 seconds, covering arms, legs, and midsection. This data facilitates evaluation of participants' overall health and progress in the KPI Fit Journey program under the CWP. Sample selection employed purposive sampling, aligning samples with specific research objectives. Data processing involved editing, coding, entry, cleaning, and analysis using Microsoft Office Excel 2013 and SPSS version 26 software.

C. RESULTS AND DISCUSSION

Table 3. Characteristic of Subjects

Variable	Average ±SD
Age (y.o)	38.18±8.15
Body Weight (kg)	80.54±15.83
Height (cm)	164±4.90
Sex	1.45±0.52
Male	6/11
Female	5/11

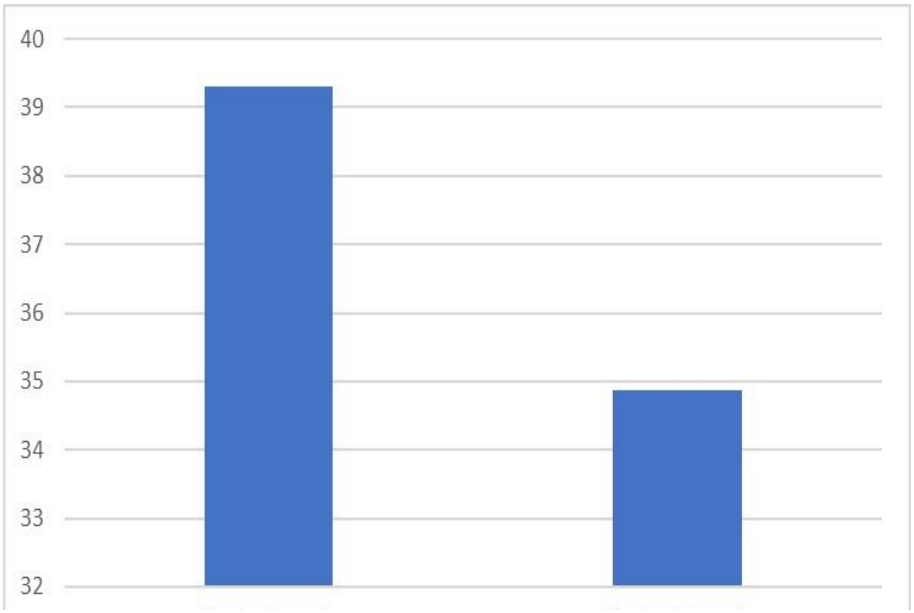
The study enrolled participants aged 27 to 51 years, with an average age of 38.18±8.15 years. Their weights ranged from 64.6 kg to 117.3 kg, averaging 80.54±15.83 kg, while heights varied from 156 cm to 172 cm, averaging 164±4.90 cm. Body mass index (BMI) ranged from 24.31 to 40.29, averaging 29.79±4.75. The research included 6 male participants and 5 female participants.

Fitness is exclusively concerned with endurance as it relates to the maximum capacity of oxygen consumption. Physical fitness indicates a person's ability to perform tasks physically without significant fatigue (Ruiz et al., 2015). Most of the subjects had a moderate level of fitness (47.2%). The reason is that the fitness test measurement is carried out in the morning between 08.30-11.00 WIB, so Pertamina employees are still in a relaxed condition and do not experience stress. However, 39% of Pertamina workers have poor fitness levels.

The results of this study are in line with Viandra research (2015) which shows that

72% of Pertamina employees have poor physical fitness. As many as 33.9% of the subjects had a level of physical fitness that was not supported by the results of the 2x24-hour Physical Activity Recall data, where most Pertamina employees still lacked physical activity (45.3%) and the nutritional status of most of the subjects. experiencing obesity (41.5%). %). A person's fitness and health level is influenced by age, gender (Fatmah, 2011), genetics, smoking habits, nutritional status, physical activity, hemoglobin levels (Williams et al., 2012), and nutritious food intake (Ruiz et al., 2015). Individuals who are used to exercising will lose about 19-20% of VO2 max and significantly decrease muscle strength after 1 month of not exercising (Sharkey, 2011).

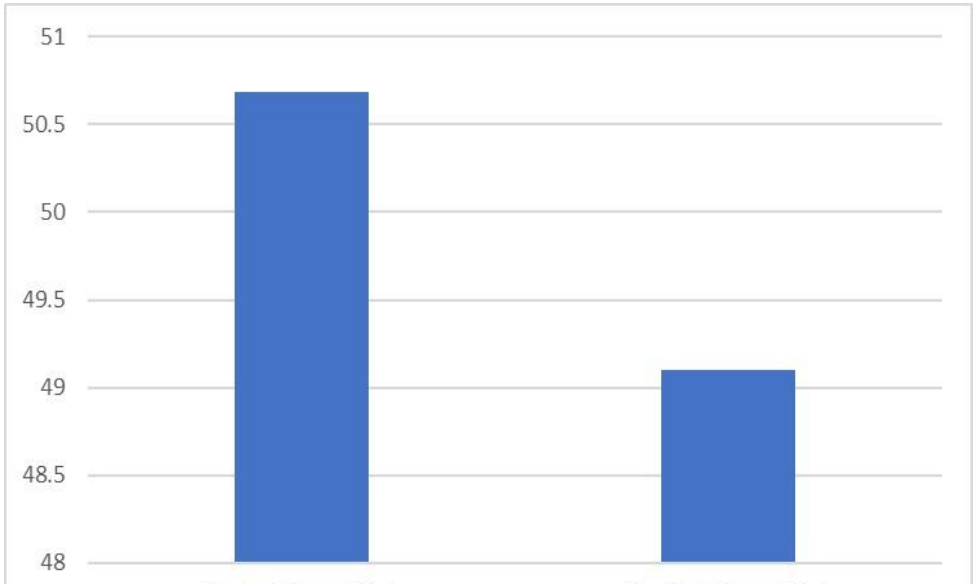
Table 4. Body fat Percentage changed



Pretest body fat percentage *Posttest body fat percentage*

A notable reduction in body fat percentage was evident among obese Kilang Pertamina International employees. The study findings underscored the exercise program's effectiveness, revealing significant decreases in body fat. Specifically, pretest data recorded an average of 39.3 ± 8.63, whereas posttest measurements showed a decrease to 34.86 ± 9.62, indicating a mean reduction of 4.43 ($p < .05$).

Table 5. Mucle Mass Changes



The findings highlighted the effectiveness of the exercise program, demonstrating significant reductions in muscle mass. Specifically, pretest measurements averaged 50.68 ± 10.48, while posttest results showed a decrease to 49.10 ± 9.82, indicating an average reduction of 1.58 ($p < .05$).

Discussion

Body fat has an important role in the functioning of the human body. First, as an energy store, fat is efficiently used as fuel during activities. Second, as a heat catalyst, fat helps regulate body temperature and serves as a heat insulator. Third, as a shock absorber, fat protects internal organs from physical impacts. In addition, fats contain essential fatty acids such as linoleic acid and arachidonic acid that are important for health. Although women tend to have more body fat than men (25% vs. 15% on average), this does not guarantee that women will be obese. Obesity can occur in anyone who leads an unhealthy lifestyle. Excess weight in humans can be caused by a lack of regular physical activity and excess fat due to irregular diet. Obesity due to excess fat carries health risks, including cardiovascular disease because it increases blood pressure. Excessive fat consumption can also cause heartburn symptoms and adversely affect arteries and increase cholesterol levels in the blood (29).

In this study, participants participated in a two month physical exercise program,

exercising three times a week. As a result, the percentage of body fat decreased significantly from 39.3% to 34.86%, showing a decrease of 4.43%. Body fat percentage can be calculated by comparing body weight and overall fat weight. These measurements can be made in a laboratory or by measuring body weight below the surface of the water. Because fat has a different density than bone, changes in water weight can indicate a change in body fat percentage. Although obese children have physical activity similar to children with normal weight, the difference lies in the duration and frequency of activity. Unhealthy habits and lifestyles, including the consumption of ready-to-eat or instant foods, also affect obesity rates in adolescents.

The causes of obesity in children, adolescents, and adults are often related to the consumption of high- calorie foods that exceed the body's needs. Even with an excess of 100 calories above the daily requirement, a person can gain about 4 kg in one year. Obesity occurs due to an energy imbalance, where calorie consumption is much greater than the energy used in physical activity. The results of this study are in line with previous research that found a relationship between low physical activity and obesity in women. A slower metabolism of women also contributes to the tendency to obesity in women (31).

In this study, participants participated in a two-month physical exercise program, exercising three times a week. As a result, it showed a significant decrease in muscle mass, from 50.68% to 49.10%, showing a decrease of 1.58%. Physical activity has an important role in regulating body weight and body composition. Through regular physical exercise and appropriate intensity, one can burn more calories and lower body fat percentage. Aerobic exercises such as jogging, swimming, or cycling, as well as strength exercises such as weight lifting, have been shown to be effective in reducing body fat. Physical activity can also increase basal metabolism, which can help with weight loss and body fat reduction. In addition to reducing body fat, physical activity also plays a role in increasing muscle mass. Strength or resistance training such as weight lifting has been shown to be effective in increasing muscle mass. If done regularly, these exercises stimulate muscle growth and improve muscle strength and function. Increased muscle mass also has a positive impact on metabolism, as muscles need more energy to maintain than fat. This can help in regulating weight and improving overall body composition.

Obese people often have high levels of body fat and low muscle mass, which can increase the risk of various chronic diseases. But with the right physical exercise program, they can

experience a decrease in body fat and an increase in muscle mass. The response to physical activity can vary depending on factors such as the type of exercise, intensity, frequency, and duration of exercise, as well as individual factors such as age, gender, and underlying health conditions. It is important to regularly evaluate physical activity and body composition in obese populations. Measurements of body fat percentage and muscle mass can be performed in a variety of ways, such as anthropometric measurements, bioelectrical impedance analysis (BIA), or the use of specialized equipment such as double densitometry (DXA). By monitoring changes in body composition and response to physical exercise programs, we can evaluate the effectiveness of interventions and make necessary adjustments to achieve weight loss and health improvement goals. Thus, physical activity has an important role in regulating body fat percentage and mass index.

D. CONCLUSION AND SUGGESTIONS

To overcome obesity, physical activity plays an important role in lowering body fat percentage and increasing muscle mass. A well-planned physical exercise program can help obese individuals achieve a healthy weight and improve overall health. Regular measurement and evaluation of body composition is essential for monitoring progress and adjusting exercise programs. With a commitment to an active and healthy lifestyle, individuals can achieve positive changes in body composition and improve the Health of KPI workers.

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