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The Effect of Intermittent Fasting and Cardio Training Strategies on Body Composition Measurements among Female Fitness Center Members

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Abstract

This study aimed to identify the effect of intermittent fasting and cardio training strategies on body composition measurements (body weight, skeletal muscle mass, body fat mass, body fat percentage, and visceral fat level) among female fitness center participants. The study sample consisted of (23) participants in The Rock Club in Nablus Governorate. chosen intentionally, and the study relied on the experimental approach with pre-measurement, where pre-measurements were taken for the participants before starting to apply the intermittent fasting diet and cardio training, then the post-measurement was taken, after the study sample committed to the intermittent fasting diet for two months and practiced cardio training at a rate of (3) training sessions per week for two months, i.e. a total of (24) training sessions. The results showed that there are significant differences at the level (α≤0.05) between the two measurements in favor of the post-measurement in: (body mass, body fat mass, body fat percentage, and visceral fat level) , there are differences between the average ages of women aged (less than 30) years and the average (more than 40) years in favor of the average (more than 40) years in the body mass variable and there are differences between the average age of women who are (less than 30) years old, the average age of (30-40) years old, and the average age (more than 40) years old in the variable of muscle mass, in favor of the average age of women who are (more than 40) years old. The researchers suggest several recommendations the most important are it is better relying on the intermittent fasting strategy because of its positive effect on body composition measurements, and relying on cardio training because of its positive effect on body mass and muscle mass index in the body, especially for women who are over (40) years old.

Key words: *Intermittent fasting, cardio, body composition, weight loss.*

Introduction

Striving to improve body composition is an important goal for many individuals, by increasing muscle mass and reducing the percentage of body fat to maintain good and stable health and avoid obesity and overweight, which are among the most prominent global health problems facing contemporary societies, (World Health Organization). , 2023)

Obesity is not just a heavy weight, a large body, slow movement, and abnormal sizes, but rather it is one of the basic factors for the development of chronic diseases such as heart disease, blood vessel pressure, metabolism, and type 2 diabetes, in addition to psychological disturbance and lack of self-confidence, which negatively affects the individual's activity and performance (Khalafi et al, 2024).

Although the causes of obesity are complex, the imbalance between consuming calories and burning them is the main cause of obesity, overweight, and its associated diseases. Obesity is also associated with many complications, including imbalanced body composition, insulin resistance, high blood pressure, dyslipidemia, and endothelial dysfunction. Bloody(2016et al,Jiang). As a result of the current nature of human life that has

led to the spread of obesity in all parts of the world, there is a need for mechanisms to limit its spread and prevent and manage diseases associated with it, through modifying the diet of those affected, which is one of the first steps to prevent and treat obesity, and also through Exercising is an effective intervention and is associated with cardiovascular and metabolic health benefits such as improving insulin resistance, lipid index, and blood pressure (Battista, 2022). In light of this problem, which doctors classify as an epidemic of the twenty-first century (Abdel Majeed, 2023), many studies seek to identify effective strategies for losing weight and improving body composition, including the strategy of intermittent fasting and cardio exercises (Trepanowski et al, 2017).

Intermittent fasting is a dietary pattern that depends on dividing time between periods of fasting and periods of eating. The main idea is that instead of eating food continuously throughout the day, specific hours or days are specified in which eating is allowed, while other periods are designated for fasting, and the importance of fasting is crystallized. Discontinuous as explained by (Vasim et al, 2024):

- Helping with weight loss and improving metabolism in the body: Intermittent fasting helps in reducing daily calories, which stimulates the use of accumulated fat in the body as a source of energy, thus promoting weight loss. It also reduces blood sugar levels, which contributes to the prevention of type 2 diabetes. .
- Improving cardiovascular health: Following the intermittent fasting strategy reduces the incidence of cardiovascular diseases by reducing levels of harmful cholesterol (LDL) and triglycerides, and also helps improve blood pressure.
- Enhancing metabolism and cellular regeneration: During the fasting period, the body undergoes a process of "autophagy" in which damaged body cells are regenerated and tissue health is enhanced.

In addition, intermittent fasting contributes to improving physical nutrition, as it improves endurance, maintains muscle mass while losing fat, improves the body's flexibility in the face of stress and fatigue, works to enhance general health, and protects against intestinal diseases and aging (Krista, 2021).

Cardio exercises, which are exercises that depend on increasing the heart rate and breathing rate and are also called cardiovascular exercises, have the role of improving and enhancing the functions of the vascular system (cardiovascular) by improving the flow of oxygen to the muscles and increasing the body's endurance capacity. It also contributes to It improves metabolism, improves mood, and increases energy. It also reduces the incidence of chronic diseases. Cardio exercises focus on the large muscles repeatedly and continuously, such as running, fast walking, swimming, cycling, and jumping rope.(kenney et al, 2019 , Plowman, 2014)

Rahmouni and Afouni (2020) indicated that cardio exercises have several health benefits, as they work to:

- Improving cardiovascular health, as it contributes to strengthening the heart muscle, which leads to improved blood pumping efficiency and reduces the risk of chronic heart diseases such as: atherosclerosis.
- Building endurance, as cardio exercises increase the ability to bear the burden and physical effort in the long term, which increases the body's efficiency in dealing with daily activities.
- Helping in losing weight and burning fat by increasing heart rate and oxygen consumption by practicing these exercises, which effectively burn calories and help reduce excess weight and fat.
-Regulating blood sugar levels by contributing to improving insulin resistance in addition to reducing blood sugar levels, which helps prevent type 2 diabetes.
-Improving mood and relieving stress, as these exercises secrete the "happy" hormone endorphins, which works to reduce feelings of anxiety and depression.
- Improving sleep quality by working to regulate the sleep cycle, in addition to enhancing rest during the night.

There are many studies that dealt with obesity and indicated the importance of aerobic exercise and intermittent fasting in having a positive effect on weight loss, including the study of (Abdel Fattah et al., 2021) and the study of (Chaudhary et al, 2010), and the study of (Song & Kim, 2023) confirmed that The intermittent fasting strategy is an alternative to continuous application of calorie restriction compared to traditional diets that are difficult to implement over long periods of time.While the study of (Afrianim et al, 2021) indicated that practicing cardio exercises on a regular basis works to reduce fat mass in the body by using fat as an energy source, and the results of the study of (Ransdell et al, 2021) confirmed that exercise helps to Maintaining and developing skeletal

muscle mass in women over the age of 40 years and contributing to improving the quality of life through the ability to carry out daily life activities smoothly.

Khalafi et al,(2024) concluded that exercising and following the intermittent fasting strategy together are effective ways to improve body composition and cardiac and metabolic health for adults who suffer from overweight and obesity. Bayoumi's study (2023) showed that there is a positive effect of adhering to an athlete's program with intermittent fasting on some physical measurements and biological variables in obese women, which led to their weight loss. Thus, the current study will shed light on knowledge of the effect of the intermittent fasting strategy and cardio training on body composition measurements. On a group of ladies in a fitness center.

Statement of Problem

As obesity rates continue to rise among individuals of all categories, according to World Health Organization statistics, in the first quarter of the year (2024) in the Middle East, the percentage of obesity among women reached (53%), among men it reached (45%), and among children and adolescents (8%), while (20.5) of them suffer from being overweight, and this indicator is dangerous as a result of chronic diseases that accompany both obesity and weight gain and negatively affect the body's composition and vital functions. This requires adopting strategies to reduce and reduce obesity, weight gain, and the side effects resulting from it, and among these strategies are intermittent fasting and cardio training. Although there are many studies that examine the effect of each of these factors individually on individuals' health and body composition, The effect of combining these strategies (intermittent fasting with cardio). It has not been studied adequately, and therefore researchers will attempt to study this effect by answering the main question of the study, which is: What is the effect of the intermittent fasting and cardio training strategy on body composition measurements among female fitness center participants?

The following sub-questions emerge from the main question:

-Are there statistically significant differences at ($\alpha \leq 0.05$) level in the effect of intermittent fasting and cardio training on body composition among female fitness center participants?

-Are there statistically significant differences at ($\alpha \leq 0.05$) level in the effect of intermittent fasting and cardio training on body composition among female fitness center participants due to the age variable?

Significant of the Study

The significant of the current study is as follows:

- Providing effective solutions for managing weight and improving overall health, as intermittent fasting has become one of the popular dietary patterns used to achieve weight loss and improve health. By combining this strategy with cardio training, it can provide better results in reducing fat percentage and increasing muscle mass. Understanding the impact of this The combination will help women participating in fitness centers follow effective programs suitable for their health needs.

- Improving athletic performance and achieving physical balance. By combining intermittent fasting and physical training, athletic performance can be enhanced while maintaining strong muscle mass and a good balance between fat and muscle. Studying this topic will provide scientific evidence that supports the choice of these strategies by sports coaches and nutrition specialists.

Reducing health risks such as obesity and overweight are closely linked to many chronic diseases such as heart disease and diabetes, and research into the effectiveness of intermittent fasting with exercise may provide innovative solutions to reduce the risks of these diseases by improving body composition in a comprehensive manner.

-Enhancing participants' awareness and directing their health goals by understanding the integrated effect of intermittent fasting and cardio exercises helps participants achieve balanced and sustainable health goals, whether the goal is improving physical appearance or enhancing general fitness.

Objectives of the Study

The current study aims to find out the following:

-The effect of intermittent fasting and cardio training on body composition among female fitness center participants.
-The effect of intermittent fasting and cardio training on the body composition of female fitness center participants according to the variable chronological age.

Questions of the Study

This study aimed to answer the following questions:
1- Are there statistically significant differences at the level ($\alpha \leq 0.05$) in the effect of intermittent fasting and cardio training on body composition among female fitness center participants?
2- Are there statistically significant differences at the level ($\alpha \leq 0.05$) in the effect of intermittent fasting and cardio training on body composition among female fitness center participants due to the age variable?

Limitations of the Study

Location: The Rock Club in Nablus Governorate.
-Time specific: The time period between 5/1/2024 - 6/30/2024
-Human Determinant: Participants at The Rock Fitness Center

Terms of the Study

Intermittent fasting: Nutritional strategy that alternates between specifying periods of eating and specifying periods of fasting, in addition to restricting calories to lose weight (Shalabi et al, 2023).
- Body composition: It is a set of measurements that refer to a group of measurements that are used to evaluate the basic body components - and the current study will depend - on the measurements and proportions of each of: (body mass, skeletal muscle mass, body fat mass, body fat percentage , and the level of visceral fat), and the following is a definition of body composition measurements and proportions that will be addressed in the current study (Umipig, 2024 & Athletic lnsight, 2024):
-Total Body Mass: It includes all components of the body, including water, muscle, bone, and fat, and it is the total value that expresses the weight of the body as a whole.
Skeletal Muscle Mass: It represents the amount of muscle associated with the skeleton, which is responsible for movement and structural support. Increased muscle mass is associated with higher metabolic rates, greater strength, and better overall health.
- Body fat mass (Fat Mass): includes fat stored in the body, whether it is under the skin or around the organs. Fat mass is measured to evaluate the state of obesity or severe underweight. This mass does not include muscles, bones, or water.
- Body Fat Percentage: The percentage that represents the amount of fat compared to the total body weight. This percentage is considered an important indicator for evaluating fitness and health risks. High percentages are associated with an increased risk of heart disease and diabetes.
Visceral fat level: Fat that accumulates around vital organs such as the liver and stomach. An increase in this fat is linked to a higher risk of chronic diseases such as type 2 diabetes and heart disease.

Method

Experimental method with pre- and post-measurements was used due to its suitability to the nature of the study, its objectives and hypotheses, as pre-measurements were taken for the participants before starting to implement the intermittent fasting diet and cardio training and using the InBody Technology device, and the post-measurements were taken after committing to the intermittent fasting diet for two months. A commitment to practicing cardio training at a rate of (3) training sessions per week for two months, meaning a total of (24) training sessions, using the same device.

Study population:

The study population consisted of (50) participants in (The Rock) Club in Nablus Governorate during the period (5/1/2024 AD) until (6/30/2024 AD).

Study sample:

The researchers selected a deliberate sample consisting of (23) participants from the original study population due to their commitment to implementing the intermittent fasting diet and their commitment to attending cardio training sessions during the study period. Table (1) shows the characteristics of the study sample.

Table (1): Characteristics of the study sample according to the variables of age, height, and body mass (n = 23).

VARIABLE	UNIT	MININUM	MAXIMUM	MEAN	S.D	**SKUNESS**
Age	Year	24	57	38.4	9.72	**0.517**
Tale	cm	148	170	161.13	4.83	**0.673-**
B.M	Kgm	61.20	99.30	80.24	11.08	**0.117-**

Table (1) indicates that the values of the skewness coefficient fall between (±3), and this indicates that the study sample is subject to moderate distribution.

Study tools:

The researchers used a set of tools that suit the nature of the study, which are as follows:

- In Body Technology device: released in 2023, to measure the following body composition variables (body mass, skeletal muscle mass, body fat mass, fat percentage, and visceral fat level) in the pre- and post-measurement.
- Intermittent fasting diet strategy calculated calories for each participant.
- A training program consisting of cardio exercises.

Results

To answer the first question of the study, which states (Are there statistically significant differences at the level ($\alpha \leq 0.05$) in the effect of intermittent fasting and cardio training on body composition among female fitness center participants?) a paired t-test was used and the results of Table (2) show that

Table (2): Results of the paired t-test for the significance of the differences in the study variables between the two measurements Pre and post n = (23)

Variable	Unit	Pre- test		Post- test		T	Sig.	Change Percentage
		Mean	S.D	Mean	S.D			
B.M	Kg	80.24	11.08	76.25	11.60	8.735	.000*	4.97-
Skeltal muscle mass	Kg	45.82	6.25	25.99	2.95	1.470	.566	43.28
Body fat mass	Kg	32.42	8.55	29.04	8.44	7.632	.000*	10.43
Body fat percentage	Kg	39.26	6.88	37.20	6.91	5.248	.000*	5.24
Visceral fat level	Indicator	14.73	4.07	13.34	4.18	4.362	.000*	9.44

Table (2) indicates that there are significant differences at the level of ($\alpha \leq 0.05$) between the two measurements and in favor of the post-measurement in (body mass, body fat mass, body fat percentage, and visceral fat level), while there are no significant differences in Skeletal muscle mass variable: Although the percentage of change was (43.28%), the researchers attribute this result to: Participants' commitment to the calorie-counted intermittent fasting program and commitment to attending cardio training classes, which demonstrated the effectiveness of applying the intermittent fasting and cardio training strategy in reducing body mass as a whole, lowering the percentage of body fat mass, and also reducing the visceral fat percentage index in the body. This is consistent with the study of (Yamaner, 2024), which confirmed that the aerobic exercise program significantly improved fat levels in women, which reduces the risk of cardiovascular disease, and the study of Abdel Fattah et al. (2021) that aerobic exercise and the fasting strategy Intermittent exercise has a positive effect on weight loss in elderly women. The results of the study of (Chaudhary et al, 2010) concluded that aerobic exercise helps in the process of burning fat, which affects reducing weight and the percentage of body fat. It also agrees with the study of (Song & Kim, 2023), which concluded that the intermittent fasting strategy helps control In body

weight, and a study (Afrianim et al, 2021) that highlighted that regular cardio exercises reduce body fat mass by using fat as an energy source.

To answer the second question, which is: "***Are there statistically significant differences at the level (α≤0.05) in the effect of intermittent fasting and cardio training on body composition among female fitness center participants due to the variable age?"***
One-Way ANOVA Test was used to identify the significance of the differences in the means according to the age variable. Tables (3) and (4) show this.
Table (3): Means and standard deviations for the age variable.

Age (Total Degree)		**N**	**Mean**	**S.D**
B.M	Less than 30	5	65.96	6.99
	30-40	11	75.75	12.05
	More than 40	7	84.40	7.3
Skeltal muscle mass	Less than 30	5	22.86	1.55
	30-40	11	26.39	2.73
	More than 40	7	27.60	2.53
Body fat mass	Less than 30	5	24.22	5.11
	30-40	11	27.84	10.04
	More than 40	7	34.38	4.50
Body fat percentage	Less than 30	5	36.44	4.48
	30-40	11	35.36	
	More than 40	7	40.62	
Visceral fat level	Less than 30	5	11.40	
	30-40	11	12.45	
	More than 40	7	16.14	

Table (10) shows that there are differences in means of the levels of the ***age*** . In order to show these differences, One Way ANOVA test was used and Table (4) shows the results
Table (4)
Results of One Way ANOVA of Body composition among female fitness center participants according to the age variable (n=23).

Variable	**Age**	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
B.M	Between Groups Within Groups **Total**	997.178 1971.919 2969.097	2 20 22	498.589 98.596	5.057	.017*
Skeltal muscle mass	Between Groups Within Groups **Total**	68.897 122.921 191.818	2 20 22	34.449 5.145	5.605	.012*

Body fat mass	Between Groups Within Groups **Total**	331.894 1235.544 1567.437	2 20 22	165.947 61.777	2.686	.093
Body fat percentage	Between Groups Within Groups **Total**	122.268 930.392 1052.660	2 20 22	61.134 45.520	1.314	.291
Visceral fat level	Between Groups Within Groups **Total**	82.433 302.784 385.217	2 20 22	41.216 15.139	2.722	.090

*** The mean difference is significant at the 0.05 level.**

Table (4) shows that there are statistically significant differences in body compositions (body mass, muscle mass), while there are no statistically significant differences in the variables (fat mass, fat percentage, fat level) due to the age variable.

To determine the source of the differences, the researchers used the least significant difference test (LSDTest) for post-hoc comparisons

Between the averages, the results of Table (5) show this.

Table (5): Results of the least significant difference (LSD) test for post-hoc comparisons regarding the significance of the differences between the means of body mass and muscle mass according to the variable age.

Variable	**Levels**	Less than 30	30-40	More than 40
B.M	Less than 30		.083	.005*
	30-40			.087
	More than 40			
Skeltal muscle mass	Less than 30		.016*	.004*
	30-40			.325
	More than 40			

*** The mean difference is significant at the (α≤0.5) level.**

Table (5) shows that there are differences between the arithmetic average of women (less than 30) years old and the average of women who are (more than 40) years old, in favor of the average of women who are (more than 40) years old, in the variable Body mass, while there are no differences between the average age of women who are (less than 30) years old and the average age of women who are (30-40) years old in the body mass variable.There is also a difference between the arithmetic mean for women who are (less than 30) years old, the mean for women who are (30-40) years old, and the mean for women who are (more than 40) years old in the muscle mass variable. In favor of the average for women over 40 years of age. The researchers attribute this result to the loss of body mass in women who are over 40 years old, and the increase in their muscle mass because the muscle mass was inactive due to the lack of physical activity and that the seriousness and commitment in applying the intermittent fasting diet and attending cardio training classes led to their weight gain, in addition to their approaching the safe age - menopause - and their keenness to avoid chronic diseases associated with obesity, overweight, and the safe age and to enjoy a quality of life far from the complications of obesity and the diseases associated with it, led to their commitment to the diet and training program and had

a positive impact on Muscle mass, and this is consistent with the study of (Ransdell et al, 2021). Bayoumi's (2023) study concluded that there is a positive effect of adhering to an athlete's program with intermittent fasting on some physical measurements and biological variables in obese women, including increasing muscle mass.

Conclusions:

- There is a positive effect of using the intermittent fasting and cardio training strategy on body composition measurements (body mass, body fat mass, body fat percentage, and visceral fat level) among female fitness center participants.

Applying the strategy of intermittent fasting and cardio training contributed to increasing muscle mass among participants aged (40 years and over).

Rrecommendations:

In light of the study results, the researchers recommend the following:

- Introducing studied cardio exercises into the programs of fitness centers to maintain and develop muscle mass among participants of different age stages.
- Relying on the intermittent fasting strategy because it has a positive effect on body composition measurements.

Conduct a similar study on the effect of intermittent fasting and resistance exercises on body composition.

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