The Effect of Pilates Exercises Applied to Overweight and Obese Women on Body Composition

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Abstract

The aim of this study was to examine the effect of mat pilates exercises applied to sedentary overweight and obese women on body composition. A total of 22 (11 training, 11 control) overweight and obese female individuals aged between 35-65 participated in the study voluntarily. While 45 minutes of mat pilates exercise was applied to the training group 3 days a week for 12 weeks, the control group was not included in any exercise program. Age, height, body weight, waist and hip circumferences of all participants (training + control) participating in the study were determined at the beginning of the study, and waist/hip ratio, body fat percentage (BFP), body fat mass (BFM), body mass index (BMI) were determined by Bioelectrical Impedance Analysis (Bodystat Quadscan 4000) method, lean body mass (LBM) and lean body mass index (LBMI)were measured and the measurements were repeated at the end of the study. SPSS 22.0 IBM statistical package program was used to evaluate the obtained data. While evaluating the study data, descriptive statistical methods (mean, standard deviation) and independent samples t-test for normally distributed variables and Paired Samples t-test for dependent groups were used. Mann-Whitney U test and Wilcoxon Signed Ranks test were applied for the variables that did not show normal distribution. Statistical significance level was accepted as 0,05. According to the research findings, when the pre-test-post-test values of the training and control groups were compared, the waist circumference, BFP, BFM and BMI values at the beginning of the study, and at the end of the study A statistically significant difference was determined in favor of the training group in all parameters except mass LBM and LBMI (p<0.05). As a result, it was concluded that regular pilates exercises applied to middle-aged sedentary overweight and obese women had a positive effect on the body composition of individuals.

Keywords: Overweight, Obese, Body Composition, Pilates Exercise.

Özet

Fazla Kilolu ve Obez Kadınlara Uygulanan Pilates Egzersizlerinin Vücut Kompozisyonu Üzerine Etkisi

Bu çalışmanın amacı fazla kilolu ve obez sedanter kadınlara uygulanan mat pilates egzersizlerinin vücut kompozisyonu üzerine etkisinin incelenmesidir. Araştırmaya yaşları 35-65 yaş arası değişen toplam 22 (11 antrenman, 11 kontrol) fazla kilolu ve obez kadın birey gönüllü olarak katılmıştır. Antrenman grubuna 12 hafta boyunca haftada 3 gün 45 dakika mat pilates egzersizi uygulanırken kontrol grubu herhangi bir egzersiz programına dahil edilmemiştir. Araştırmaya katılan tüm katılımcıların (antrenman+kontrol) çalışma başlangıcında yaş, boy uzunluğu, vücut ağırlığı, bel ve kalça çevreleri belirlenerek Biyoelektriksel İmpedans Analizi (Bodystat

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Quadscan 4000) yöntemi ile bel/kalça oranı, vücut yağ yüzdesi (VYY), vücut yağ kütlesi (VYK), vücut kütle indeksi (VKİ), yağsız vücut kütlesi (YVK) ve yağsız vücut kütle indeksi (YVKİ) ölçülmüş ve çalışma sonucunda da ölçümler tekrar edilmiştir. Elde edilen verilerin değerlendirilmesinde, SPSS 22.0 IBM istatistik paket programı kullanılmıştır. Çalışma verileri değerlendirilirken tanımlayıcı istatistiksel metotları (ortalama, standart sapma) ile beraber normal dağılım gösteren değişkenlerde bağımsız örneklem t testi (Independent Samples t-test), bağımlı gruplar için eşleştirilmiş t testi (Paired Samples t-test) kullanılmıştır. Normal dağılım göstermeyen değişkenler için ise Mann-Whitney U testi ve Wilcoxon Signed Ranks testi uygulanmıştır. İstatistiksel önem düzeyi 0,05 olarak kabul edilmiştir. Araştırma bulgularına göre antrenman ve kontrol grupları ön test-son test değerleri karşılaştırıldığında çalışma başlangıcında bel çevresi, VYY, VYK ve VKİ değerlerinde, çalışma sonucunda ise YVK ve YVKİ hariç bakılan tüm parametrelerde antrenman grubunun lehine istatistiksel olarak anlamlı bir farklılık belirlenmiştir (p<0,05). Sonuç olarak orta yaşlı fazla kilolu ve obez sedanter kadınlara uygulanan düzenli pilates egzersizlerinin bireylerin vücut kompozisyonları üzerinde pozitif yönde etki ettiği söylenebilir.

Anahtar Kelimeler: Fazla Kilolu, Obez, Vücut Kompozisyonu, Pilates Egzersizi.

INTRODUCTION

The rapid advancement of today's technology makes people's lives easier, but it also leads to a sedentary lifestyle. Most individuals work sitting down at work and spend most of their free time eating snacks in front of technological products (25). This situation causes people to get fat by taking more energy into their organisms than they spend and to face many health problems (16). It is known that women are more likely to lead a sedentary lifestyle away from exercise than men (14). As a percentage of body weight, women tend to gain weight more than men. Body fat increases in female individuals at the beginning of puberty with the effect of estrogen hormone, and a series of events including pregnancy and menopause are involved in this increase (31). The World Health Organization (WHO) identifies obesity as excessive fat accumulation in the organism to the level that affects health (9). The causes of obesity include sedentary lifestyle, excessive and malnutrition, metabolic, hormonal, genetic, psychological, psychological, gender, age and socioeconomic cultural factors (28). In order for individuals to continue their lives in a healthy way, it is very important to make exercise a way of life as well as giving importance to eating habits (17).

Overweight and obese individuals should prefer an exercise program that is suitable for them from a wide range of exercise methods for fighting health problems and treatment processes (10). Although Pilates exercise, one of these exercise types, is not generally used to reduce body weight, it is a very important reason of preference for overweight, obese and sedentary individuals who have difficulty in doing other exercises (5). In addition, the fact that it does not require much power during exercise and the ability to reach the desired result in a short time is another reason for preference. The aim of Pilates exercises is to protect general health, improve posture and coordination by increasing body flexibility, muscle strength, dynamic and static balance (6). Studies have reported that regular Pilates exercises with or without equipment improve sleep quality in obese and overweight individuals (11), reduce injuries caused by falls by improving balance (26), and give positive results on body composition by reducing body fat (20).

Therefore, the aim of this study was to determine the effect of mat Pilates exercises on body composition in overweight and obese sedentary women.

METHOD

The women participating in the study were divided into 2 groups as training group (n:11) and control group (n:11). The study was conducted based on the pretest-posttest model, one of the experimental models. The women in the training group received Pilates training 3 days a week for 45 minutes for a total of 12 weeks, including 4 weeks of adaptation training, while the control group did not receive any exercise and were asked to continue their normal lives. Before starting the study, the subjects were given detailed information about the risks and discomforts that may occur related to the research the consent form was read and signed.

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Measurements Used in the Study

The measurements of all participants (training + control) were repeated at the beginning and end of the study. It was ensured that the participant was wearing the lightest weight clothing during the measurement and that the measurements were taken in the morning after at least 12 hours of hunger.

Height and Body Weight Measurement: The height of the participants was measured using a wall scale in the anatomical position with their feet bare, arms hanging freely from the shoulders to the sides, taking a deep breath and being asked not to lift their toes off the ground in an vertical position, and the measurement point at the top of the head was recorded in cm in this position. Body weight was determined in kg in anatomical posture with a 100 g scale. BMI values were calculated according to the measured height and body weight values and women who were in the overweight and obese category according to WHO's BMI classification for adults (<18.5 kg/m2 underweight, 18.5-<25.0 kg/m2 normal, 25.0-<30.0 kg/m2 overweight, ≥30.0 kg/m2 obese) were included in the study.

Waist and Hip Circumference Measurement: Waist circumferences were measured while the participants were standing, abdomen free, feet together and arms parallel to the legs, from the narrowest part of the upper torso to the lowest rib bone and the crystalloid in the horizontal plane with a tape measure. Hip circumferences were measured in the horizontal plane from the highest point on the side of the person being measured. According to WHO, the upper limit for waist/hip ratio in women is ≤ 0.85 cm and the high risk is ≥1.

Bioelectrical Impedance Analysis (BIA): A Bioelectrical Impedance Analysis (BIA) device (Bodystat-Quadscan 4000) was used to determine some of the components of each individual's body composition (waist/hip ratio, basal metabolic rate, body fat percentage, body fat mass, body fat mass, body mass index, lean body mass and lean body mass index). First, the predetermined height, body weight, age, waist and hip circumference measurements of each participant were entered into the device. Participants were positioned for the BIA measurement by lying on their backs on the massage table with their arms approximately 30° from their body and their legs approximately 45° apart. Two electrodes were attached to the participant's right hand and wrist; one on the dorsal surface of the hand 1 cm proximal to the 3rd metacarpopharyngeal joint (ground electrode) and one on the dorsal surface of the wrist at the center of the wrist line at the head of the ulna (measurement electrode). Two electrodes were glued on the participant's right foot and ankle; one on the dorsal surface of the foot 1 cm proximal to the 2nd metatarsophalangeal joint (ground electrode) and the other on the dorsal surface of the ankle, centered between the lateral and medial malleolus (measurement electrode). All electrodes were placed on the participant's hands and feet with a distance of at least 5 cm between them. Before the BIA measurement, the participants were kept lying down for 3 minutes to stabilize the BIA values due to postural change (22). As a result of the measurements, waist/hip ratio, basal metabolic rate, body fat percentage, body fat mass, body fat mass, body mass index, lean body mass and lean body mass index values were recorded.

Pilates Exercise Program for the Training Group

The women in the training group followed the Pilates exercise program specified in Table 1 below for 45 minutes 3 days a week for 12 weeks. Women in the control group were not included in this program and were asked to continue their daily activities and not to do any regular exercise.

Table 1. Pilates exercise program applied to the training group

Movements	Number of Repeats	Number of Set	Rest Duration (min)
Bridge	15	3	1
Corkscrew	15	3	1
Tail Wag	15	3	1
Toe Tap	15	3	1
Side Leg Lift	15	3	1
Side Kick	15	3	1
Seated Row	15	3	1

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Heel Squeeze Prone	15	3	1
Prone Hip Extension	15	3	1
Prone Back Extension	15	3	1
Cat Stretch	15	3	1
Spine Stretch	15	3	1

Ethical approval and institutional permission

The permission of Selçuk University School of Physical Education and Sports Ethics. No diet program was applied to all participants in the study.

Statistical Analysis

SPSS 22 program was used for statistical analysis while evaluating the data obtained in the study. While evaluating the study data, descriptive statistical methods (Mean, Standard deviation), Independent Samples t-test, Paired Samples t-test for dependent groups were used for variables with normal distribution, while Mann-Whitney U test and Wilcoxon Signed Ranks test, which are non-parametric tests, were applied for variables that do not show normal distribution. Statistical significance level was accepted as $p<0.05$.

FINDINGS

The mean age of all participants (training + control) was 45.49 ± 9.94 years and the mean height was 159.81 ± 6.82 m. The mean body weight was 85.76 ± 14.59 kg in the pre-test and 85.88 ± 16.27 kg in the post-test.

The body composition values of all women participating in the study according to the research groups at the beginning and end of the study are presented in Table 2.

Table 2. Body composition pre/post test values by study groups (Mean ± SD)

	Group	Pre-test	Post-test	Difference
Body Weight (kg)	TG	82.07±16.96	79.04±15.99	3.03±2.27
	CG	89.45±11.38	92.72±14.05	-3.36±4.05
Waist Circumference (cm)	TG	99.10±11.82	97.45±12.75	1.64±7.31
	CG	112.54±1360	120.18±13.10	-7.64±6.53
Hip Circumference (cm)	TG	113.73±11.93	109.82±10.1	3.91±2.45
	CG	123.09±13.02	121.64±11.77	1.45± 2.88
WHR (cm)	TG	.867±.057	.873±.069	-.006±.042
	CG	.913±081	.982±.035	-.069±.066
Body Fat Percentage (%) (BFP)	TG	39.62±6.63	38.50±6.50	1.11±1.92
	CG	49.27±6.50	50.24±6.26	-.973±2.26
Body Fat Mass (kg) (BFM)	TG	33.35±12.21	31.16±10.92	2.19±2.58
	CG	44.53±10.41	47.53±12.03	-2.99±3.14
Body Mass Index (kg/m²) (BMI)	TG	30.85±5.70	29.64±5.55	1.22±.867
	CG	36.46±4.56	37.25±6.00	-.790±2.38
Lean Body Mass (kg) (LBM)	TG	48.64±5.86	47.87±6.53	.772±1.04
	CG	44.93±4.32	45.64±4.08	-.718±2.28
Lean Body Mass Index (lbs) (LBMI)	TG	18.33±1.55	17.99±1.81	.336±.420
	CG	18.25±1.08	18.48±.869	-227±.796
EG: Training Group, CG: Control Group, WHR: Waist-to-Hip Ratio.				

No significant difference was found in the pre-test body weight scores of the participants in the control and training groups (U= 43.00; p>0.05). There was a statistically significant difference in post-test body weight scores (t=2.13; p<0.05) (Table 3).

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Table 3. Comparison of pre-test and post-test body weight (kg) scores of training and control groups

	Group	x̄± SD	Rank Mean	Sum of Ranks	U	p
Pre-Test	TG	82.07±16.96	9.91	109.00	43.00	.250
	CG	89.45±11.38	13.09	144.00		

	Group	x̄± SD	Levene's Test F	Levene's Test p	df	t	p
Post Test	TG	79.04±15.99	.048	.829	20	2.13	.046*
	CG	92.72±14.05					

*p<0.05 x̄: Mean, SD: Standard Deviation

Statistically significant differences were found between the pre-test (t=2.47; p<0.05) and post-test (U=10.0; p<0.05) waist circumference values of the training and control groups (Table 4).

Tablo 4. Comparison of pretest-posttest waist circumference (cm) values of training and control groups

	Group	x̄± SD	Levene's Test F	Levene's Test p	df	t	p
Pre-Test	TG	99.10±11.82	0.98	.758	20	2.47	.022*
	CG	112.54±13.60					

		x̄± SD	Rank Mean	Sum of Ranks	U	p
Post Test	TG	97.45±12.75	6.91	76.0	10.0	.001*
	CG	120.18±13.10	26.09	177.0		

* p <0.05

When comparing the pre-test values of body composition between the training and control groups in the study, a statistically significant difference was found in BFP, BFM, and BMI values (p<0.05), while there was no statistically significant difference in other parameters (p>0.05). When comparing the post-test values of the training and control groups, a statistically significant difference was observed in all parameters except LBM and LBMI values (p<0.05), as indicated in Table 5.

Tablo 5. Pre-test and post-test body composition values of training and control groups

Grup			x̄± SD	Levene's Test F	Levene's Test p	df	t	p
Hip Circumference (cm)	Pre-test	TG	113.73±11.93	.00	.998	20	1.758	.094
		CG	123.09±13.02					
	Post-test	TG	109.82±10.18	0.88	.769	20	2.517	.020*
		CG	121.64±11.77					
WHR (cm)	Pre-test	TG	.867±.057	.656	.427	20	-1.542	.139
		CG	.913±081					
	Post-test	TG	.873±.069	12.059	.002	20	-4.653	.000*
		CG	.982±.035					
BFP (%)	Pre-test	TG	39.62±6.63	.014	.908	20	3.447	.003*

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		CG	49.27±6.50				
	Post-test	TG	38.50±6.50	.045	.833	20	4.313	.000*
		CG	50.24±6.26				
BFM (kg)	Pre-test	TG	33.35±12.21	.205	.656	20	2.311	.032*
		CG	44.53±10.41				
	Post-test	TG	31.16±10.92	.182	.674	20	3.339	.003*
		CG	47.53±12.03				
BMI (kg/m²)	Pre-test	TG	30.85±5.70	1.163	.294	20	2.547	.019*
		CG	36.46±4.56				
	Post-test	TG	29.64±5.55	0.18	.896	20	3.088	.006*
		CG	37.25±6.00				
LBM (kg)	Pre-test	TG	48.64±5.86	1.634	.216	20	1.694	.106
		CG	44.93±4.32				
	Post-test	TG	47.99±1.81	2.121	.161	20	.959	.349
		CG	45.64±4.08				
LBMI (lbs)	Pre-test	TG	18.33±1.55	2.019	.171	20	.128	.900
		CG	18.25±1.08				
	Post-test	TG	17.99±1.81	6.677	.018	20	-.812	.427
		CG	18.48±.869				

*p <0.05 WHR: Waist-to-Hip Ratio

When the body weight and waist circumference values of the training (pre-post test) and control (pre-post test) groups were compared, it was determined that there were statistically significant differences in the pre-post test comparison of both the exercise (t=4.423; p<0.05) and control (Z=-2.807; p<0.05) groups according to the body weight values. In the waist circumference values, it was determined that there was no statistically significant difference in the pre-post test comparison of the training group (Z=-668; p>0.05), but there was a statistically significant difference in the pre-post test comparison of the control group (t=-3.880; p<0.05) (Table 6).

Table 6. Comparison of Body Weight and Waist Circumference Values of training (pre-test to post-test) and Control (pre-test to post-test) Groups

	Group	Pre-test x̄± SD	Post test x̄± SD		N	Mean Rank	Sum of Ranks	t / z	df / p	p
Body Weight (kg)	EG	82.07±16.96	79.04±15.99					4.423	10	.001*
	CG	89.45±11.38	92.72±14.05	Negative Ranks	0	.00	.00	-2.807		.005*
				Positive Ranks	10	5.50	55.00	55.00		
				Ties	1					
Bel çevresi (cm)	EG	99.10±11.82	97.45±12.75	Negative Ranks	8	5.06	40.50	-.668		.504
				Positive Ranks	3	8.50	25.50			

			Ties	0			
					t	sd	p
CG	112.54±13.60	120.18±13.10			-3.880	10	.003*

* p < 0.05

When comparing the body composition values of the training (pre-test to post-test) and control (pre-test to post-test) groups, it was found that in the training group, there was a statistically significant decrease in hip circumference, BFM, BMI, LBM, and LBMI values when comparing pre-test to post-test values (p<0.05). However, no statistically significant difference was observed in waist to hip ratio (WHR) and BFP values (p>0.05). In the control group, no significant differences were found in hip circumference, BFP, BMI, LBM and LBMI values when comparing pre-test to post-test values (p>0.05), but there was a statistically significant increase in WHR and BFM values (p<0.05), as observed in Table 7.

Tablo 7. The body composition values of the training (pre-post test) and control (pre-post test) groups were compared.

	Grup	Pre-test	Post-test	t	df	p
		x̄± SD	x̄± SD			
Hip Circumference (cm)	EG	113.73±11.93	109.82±10.18	5.297	10	.000*
	CG	123.09±13.02	121.64±11.77	1.677	10	.124
WHR (cm)	EG	.867±.057	.873±.069	-.491	10	.634
	CG	.913±081	.982±.035	-3.435	10	.006*
BFP (%)	EG	39.62±6.63	38.50±6.50	1.917	10	.084
	CG	49.27±6.50	50.24±6.26	-1.425	10	.184
BFM (kg)	EG	33.35±12.21	31.16±10.92	2.817	10	.018*
	CG	44.53±10.41	47.53±12.03	3.157	10	.010*
BMI (kg/m²)	EG	30.85±5.70	29.64±5.55	4.660	10	.001*
	CG	36.46±4.56	37.25±6.00	-1.103	10	.296
LBM (kg)	EG	48.64±5.86	47.87±6.53	2.470	10	.033*
	CG	44.93±4.32	45.64±4.08	1.042	10	.322
LBMI (lbs)	EG	18.33±1.55	17.99±1.81	2.655	10	.024*
	CG	18.25±1.08	18.48±.869	-.947	10	.366

* p <0.05

DISCUSSION AND CONCLUSION

Regular and consistent exercise programs carried out in line with goals create more than one benefit for people. The intensity, type, duration and frequency of exercise should be planned in the best way for the exercise to produce the right results. It has been reported that regular and correctly performed activities have a positive effect on weight and metabolism (15). BIA, which is one of the methods used in the evaluation of body composition of obese individuals, is frequently used in the evaluation of body composition because it is

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both safe and low cost and gives effective results. In this study, the differences in body composition were determined by using the BIA method of 12-week pilates exercises applied to overweight and obese women. According to the results of the current study; When the pre-test values of the exercise and control groups were compared, a statistically significant difference was found in waist circumference, BMI, BMR and BMI values (p<0.05). This is thought to be due to the fact that although all participants in the study were selected from individuals who were overweight and obese according to BMI values, women in the control group were more overweight/obese than women in the exercise group. When the post-test values of the exercise and control groups were compared, a statistically significant difference was determined in favor of the exercise group in body weight, waist circumference, hip circumference, waist/hip ratio, BMI, BMR and BMI values (p<0.05).

When the pre-test and post-test values of the exercise groups were compared, it was determined that there was a decrease in all parameters, but there was a statistically significant difference only in body weight, hip circumference, body weight, hip circumference, BMI, BMI, HRV and BMI values (p<0.05). As a result of these data, 12-week pilates exercises positively affected the body composition of overweight and obese individuals. In contrast to this situation, when the pre-test-post-test values of the control groups were compared, it was determined that there was an increase in all values, but there was a statistically significant difference only in body weight, waist circumference, waist/hip ratio and BMI values (p<0.05).

The results of many studies conducted in the literature to determine the effect of exercise on body composition are in parallel with the results of the present study (19, 7, 2, 32, 8, 23, 29, 24, 26, 3, 4).

Çakmakcı (7) reported a statistically significant difference in waist/hip ratio, BMI and BMI parameters in both exercise groups compared to pre-exercise values as a result of mat pilates and ball exercise program applied to sedentary obese women for 60 minutes 4 days a week for 8 weeks. In another study, when the pre-test and post-test values of mat pilates exercise applied to 66 middle-aged and overweight sedentary women in the menopause period for 6 weeks, 3 days a week for 1 hour were compared, it was determined that a significant decrease occurred in body composition parameters, while there was no significant difference in the control group (2). As a result, the findings of this study support our study and support the effects of Pilates mat exercise program on weight loss and body composition. Dikici (8) divided 65 female obese individuals aged 18-65 years into three groups as low aerobic exercise + diet, high intensity aerobic exercise + diet and diet only. At the beginning and end of the 12-week study, all subjects were subjected to an exercise test on a bicycle ergometry device and measurements were performed with the BIA method. It was found that both training groups had similar statistically significant decreases in BMI, fat mass, muscle mass, waist and hip circumferences compared to the diet only group. n another study examining the effects of a mat pilates program on middle-aged overweight women's body composition and anthropometric measurements, it was reported that a 16-week pilates exercise intervention resulted in statistically significant decreases in women's BMI, fat mass, and muscle mass scores (30). Şavkın and Arslan (26) conducted a study to investigate the impact of pilates exercise on body composition in sedentary overweight and obese women. A total of 37 female participants with a mean age of 43.79 ± 4.88 were included, divided into two groups: 19 in the exercise group and 18 in the control group. Bioelectrical impedance analysis (BIA) was used to determine participants' body composition, and an 8-week pilates exercise program was administered for 90 minutes, three days a week. At the end of the program, the exercise group exhibited statistically significant reductions in body weight, body fat percentage (BFP), BMI, waist, and hip circumference scores, whereas the control group showed significant increases. In another study aimed at observing the effects of aerobic exercises of varying durations and intensities on abdominal obesity, 60 middle-aged obese women volunteered to participate. Divided into three groups, they engaged in a 12-week aerobic exercise program involving high-to-moderate intensity treadmill walking and pedometer-based home exercises. The results of the study revealed that all groups experienced statistically significant reductions in BMI, BFP, body weight, and waist circumference values (3). Başkan et al. (4) examined the effects of a 12-week aerobic combined resistance exercise program on body composition in 50 healthy overweight and obese women aged between 20 to 54 years. The participants engaged in aerobic combined resistance exercises for 30 minutes, three days a week. The study highlighted that such exercises could be effective in terms of weight loss and changes in body composition values. They emphasized that there was a greater weight loss observed within the obese group compared to other groups.

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When the above research results are examined, it is emphasized that regular exercises applied to overweight and obese individuals in different age groups have a positive effect on reducing obesity and body composition parameters in obese and overweight individuals. The studies conducted in this context are in parallel with the results of the current study. However, there are studies in the literature that show similarities with the results of the present study as well as studies that do not (13, 21, 29, 1, 18, 12).

Topyıldız (29) applied pilates exercise for 60 minutes 3 days a week for 4 weeks to 50 volunteer women aged 25-60 years who were overweight and found no statistical difference in body weight and lean body weight values, although increases were observed compared to pre-study values. Aktaş (1) reached similar results and investigated the effects of step-aerobic program to be applied for one hour 3 days a week for 6 weeks on the body composition of sedentary and overweight women. As a result of the study in which a total of 22 sedentary volunteer women aged 23-52 years participated, it was concluded that there was no significant difference in terms of body mass index, body fat ratio, waist hip ratio when the pre and post test values were compared. In another study, when the pre-test and post-test values were compared as a result of 8-week mat pilates exercises applied to obese sedentary women, a decrease was observed in the body weight, waist circumference, hip circumference, BMI and BMI values of the experimental group, but this change was not statistically significant. In the control group, it was determined that there were statistically significant increases in waist circumference, hip circumference, body weight and BMI values (18).

Although the results of all the variables examined in the current study are compatible with many studies in the literature, they are not in parallel with the results of the values in the studies mentioned above. This situation is thought to be due to different factors such as the duration of the research, the mean age of the subjects participating in the study, having different physical capacities, the measurement methods applied, the precision of the practitioner, the nutritional habits of the subjects, the type, duration, intensity, intensity, number of repetitions, rest interval, etc. of the exercise applied.

In this study, the effect of regular Pilates exercises on body composition of overweight and obese women was investigated. As a result, it was concluded that regular pilates exercises applied to middle-aged sedentary overweight and obese women had a positive effect on the body composition of individuals. The results we obtained in our study are generally compatible with the literature, although there are contrary opinions. In this context, it can be recommended that overweight and obese individuals should be included in an exercise program suitable for them in addition to their nutrition programs in order to lead a healthy life in their daily lives. Also exercise can improve the standard of living of overweight and obese individuals and it was recommended that they integrate exercise into their daily lives.

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