

# Analysing the effects of Zumba and Pilates on body composition in women

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## ABSTRACT

**Background:** Physical activities improve physical fitness by positively affecting body composition. For body composition improvement, in modern times, zumba and pilates practices have been popular exercises for sedentary women.

**Purpose:** In this study, the effects of Zumba and Pilates exercises on body composition of sedentary women were analyzed.

**Method:** 28 sedentary women who voluntarily participated in this study were randomly selected and joined the zumba exercise group (n: 13; age: 31,23 ± 2,5; height: 165,38 ± 1,3; weight: 74,53 ± 2,1; BMI: 26,09 ± 0,7) and Pilates (n: 15; age: 29,13 ± 1; height: 167,53 ± 1,1; weight: 69,88 ± 4,7; BMI: 24,26 ± 1,4). Waist circumference, hip circumference, BMI and waist / hip ratio measurements were taken from the participants before and after the exercise. Zumba and Pilates exercises were applied 3 days a week, 60 minutes a day for a total of 10 weeks. SPSS23 package program was used for data analysis.

**Results:** It was determined that the post-test values for body weight, BMI, waist circumference, hip, hipline and leg circumference separately for zumba and Pilates groups were statistically significant according to the pre-test results (p <0.05) obtained in the test. It was determined that there was no statistically significant difference in waist / hip ratio (p > 0.05). In addition, it was observed that there was no difference in any parameter (p > 0.05) when the posttest comparisons between zumba and Pilates groups were examined.

**Conclusion;** As a conclusion, it has been determined that 10-week zumba and Pilates exercises have significant effects on the BMI and body composition of sedentary women. It can be said that regular zumba and Pilates exercises can be preferred for the improvement of body composition and health in women.

**Keywords:** Zumba, Pilates, Body Composition, BMI, Physical Fitness

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## INTRODUCTION

According to The American College of Sport Medicine (ACSM), in order to maintain a healthy body weight and develop the respiratory system, physical exercises should be done for at least 150 minutes 3 days a week, covering at least 50-60% of the weekly heart rate<sup>2</sup>. It has been stated that, physical exercise has an effect on health components, body composition and body mass, skinfold thickness total, body mass index (BMI), anthropometric parameters (waist / hip, etc.) and happiness<sup>57,62</sup>. Body composition refers to the proportion of muscle, bone and fat in the body which is important for assessing overall health and, it is the largest measure of body size<sup>10,69</sup>. Measuring, evaluating and monitoring body composition is one of the major challenges for health science professionals<sup>1</sup>. Body weight, height, and waist circumference, hip circumference measurements, practicality are widely used body composition determination methods in the laboratory and in the field. BMI value (body weight / (height 2), waist-hip ratio, waist-height ratio can also be calculated with these measurement methods. Aspect ratio and body analysis are used<sup>44</sup>. Today, researchers are in an effort to understand and improve how new exercise techniques can affect body composition in humans<sup>19</sup>. In this context, for the control and modification of body composition, Pilates has recently become popular with its methods and applications<sup>47,68</sup>.

Pilates is a comprehensive method of muscle stretching and strengthening to develop strong anthropometric parameters and body composition under the philosophy of mind control over the body<sup>19,21,29</sup>. Von

Sperling and Brum (2006) reported that regular application of Pilates method will increase lean mass and hence muscle tone. Zumba, which is a fun and interactive exercise type of dance, has become a popular exercise that is preferred by women in modern times due to its effects on the improvement of health and body composition<sup>22,32</sup>. Zumba is a new fitness class that originated in Colombia in 1990s and is inspired by dance-based Latin American music and Latin American dances that are extremely popular around the world<sup>6,18</sup>. Although zumba and Pilates exercise programs are widely preferred, documentary scientific research on potential health benefits is not yet sufficient<sup>32,42</sup>.

In line with this information, the aim of our study is to analyze the effects of long-term Pilates and zumba exercises on body composition in women.

## MATERIALS AND METHODS

**Study Group:** As to Pilates (n: 15) and zumba (n: 13), total of 28 sedentary women, who had no back, knee and foot complaints, had no previous surgery and did not exercise regularly participated in this study voluntarily. The research is a quantitative research and it was designed as an experimental research model with pre-test and post-test control groups. Participants were given zumba and Pilates exercises for 60 minutes, 3 days a week for 10 weeks. Participants were told not to participate in any additional physical activity during the study. Pilates and zumba exercise programs were made in a private sports center in the province of Karaman under the supervision of an expert

trainer, and the temperature level of the hall was set to approximately 20°C.

Women participating in the study were informed about the experimental design, procedures, methods, benefits and possible risks, and written informed consent was obtained from all. All measurements were taken according to the World Helsinki Declaration. The research was explained in detail in the Ethical application form and presented to the ethical committee. All the procedures of this article had been approved by the Social and Humanities Research and Publication Ethics Committee at Necmettin Erbakan University in Konya with the protocol number 2020/23.

**Body Composition, Height and Weight Measurements:** Participants' body weights were determined with Tanita BC 418 device with the bioelectrical impedance analysis method. Height measurement was made with the feet bare on a hard and smooth surface as the heels adjoint and in deep inspiration. Participants' body composition values were obtained in cm by recording the, waist (from the umbilicus level) in anatomical posture, hip (from the middle of the gluten), the hipline (from the lower part of the gluten), arm (from the middle of the biceps), leg (from the thickest part of the quadriceps), chest (from the armpit to the nipple level) and the circumference of the abdomen (at the level of the belly button).

**Zumba and Pilates Exercise Programs:** Zumba exercises were performed three days a week for 10 weeks between 19.00 and 20.00 in the evening for 60 minutes. Pilates

exercises were done twice a week for 60 minutes<sup>63</sup>. In our study, exercise intensities were determined at the rate of 50-60% of the initial heart rate with the carvonnen method. The intensity of exercise was increased gradually each week<sup>70</sup>.

Carvonnen Fo:  $HR_{max} = 220 - Age$ ,

$HR = HR_{max} - HR_{rest}$ ,  $60\% \text{ THR} = (0.60 \times HRR) + HR_{rest}$

**Zumba:** Basic steps (starting, step, stepping, stretching etc.) compatible with zumba music, warm-up (90-100 bpm) and cooling (70-80 bpm) exercises were performed for 8-10 minutes in each zumba exercise time. In the main phase of the exercise, 50 minutes of zumba® basic1 phases (merengue, salsa, samba, cha cha cha, reggation, cumbia, oriental, belly dance etc.) were applied<sup>46</sup>. In the main part of the Zumba exercise, 8-10 original zumba music was used for 3-4 minutes. Between the music changes, a 15-30 second rest break was given<sup>32</sup>.

**Pilates:** Pilates exercises have been reported to have both physical and psychological health effects when applied at low frequency (once a week or more) for 8-12 weeks<sup>58,11</sup>. Pilates exercises were done in the form of warm-up with low intensity joint and breathing movements for 10 minutes. In the main phase, mat exercises were done for 40 minutes. At the end of the exercise, 10 stretching was done and the exercise was finalised. The practice was implemented as a standard by the expert Pilates instructor with correct commands and motion demonstration. The Pilates exercise program is shown in Table 1.

Table 1. Pilates Exercise Program

Movements	1-2. Weeks	3-4. Weeks	5-6. Weeks	7-8. Weeks
Criscros Pushup series Hundred Up town Front back One leg circle Swimming prep Roll-Up Froggie Butterfly Spine Twist Side Leg Lift Staggered Legs Triceps Extension Heel Squeeze Prone Prone Hip Extension Prone Back Extension Cat Stretch Side Bend Prep Spine Stretch Rolling Like a Ball	Density 50-60% Number of sets: 2 Movement repetition: 6	Density 50-60% Number of sets: 2 Movement repetition: 8	Density 50-60% Number of sets: 2 Movement repetition: 10	Density 50-60% Number of sets: 2 Movement repetition: 12

SPSS23 package program was used for data analysis. The mean and standard deviation values of the pretest-posttest values in the subject groups are shown in a table. In order to show whether the statistical difference between the pretest and posttest averages of the subject and control groups was significant, the t test, which is one of the parametric tests was used because the groups showed normal distribution (BMI, body weight, waist / hip ratio, hip, legs, etc.).

## RESULTS

The data by statistically comparing the physical characteristics of the participants in our study according to the groups, are given in Table 2. Accordingly, when the age, height, body weight and body mass indexes of the groups were compared, no statistically significant difference was observed between the two groups.

**Table 2.** Comparison of Physical Characteristics of Participants according to Groups

Variables	Group	N	Avr.	Ss.	t	P
Age	Pilates	15	29,13±1,4	5,604	,755	,457
	Zumba	13	31,23±2,5	8,936		
Hight	Pilates	15	167,53±1,1	4,356	1,257	,220
	Zumba	13	165,38±1,3	4,682		
Wage	Pilates	15	69,88±4,7	18,055	,864	,396
	Zumba	13	74,53±2,1	7,573		
BMI	Pilates	15	24,26±1,4	5,447	1,522	,140
	Zumba	13	26,09±0,7	2,512		

P&lt;0,05

The values belonging to the pre and post tests of the Pilates group athletes participating in our study, are given in Table 3. Accordingly, the post-test values of the athletes' body weight, BMI, waist thickness, arm, chest, abdomen, hip, hipline, leg, circumference showed a statistically significant tendency to decrease compared to the pre-test values ( $p < 0.05$ ). On the other hand, there was no statistically significant change in waist / hip ratio ( $p > 0.05$ ).

**Table 3.** Pretest-posttest comparisons of sedentary women performing Pilates exercise

Variables N=15	Group	Avr.	Ss.	T	p
Body weight	Pretest	69,9±4,6	18,055	3,332	,005*
	Posttest	68,5±4,5	17,649		
Arm	Pretest	31,5±1,3	5,166	3,935	,001**
	Posttest	29,4±1,4	5,717		
Chest	Pretest	96,6±2,9	11,287	2,197	,045*
	Posttest	94,6±2,8	11,102		
Waist circumference	Pretest	82,7±2,9	11,176	4,530	,000**
	Posttest	79,2±2,8	10,975		
Abdomen	Pretest	90,5±3,5	13,710	4,718	,000**
	Posttest	86,3±4	15,379		
Hip	Pretest	106,1±3,4	13,188	5,939	,000**
	Posttest	101,9±3,2	12,486		
Basen	Pretest	101,5±2,7	10,398	4,711	,000**
	Posttest	98±2,8	11,006		
Leg	Pretest	63±1,9	7,587	2,739	,016*
	Posttest	61±1,9	7,578		
BMI	Pretest	24,7±1,4	5,447	3,364	,005**
	Posttest	24,3±1,4	5,297		
Waist / Hip	Pretest	0,78±0,1	,048	,463	,650
	Posttest	0,78±0,1	,044		

P&lt;0,05

**Table 4.** Comparison of pre-test and post-test in sedentary women performing Zumba exercise

Variables N=13	Group	Avr.	Ss.	T	p
Body weight	Pretest	74,5±2,1	7,57359	8,082	,000**
	Posttest	71,3±1,8	6,46652		
Arm	Pretest	33,6±0,7	2,50128	13,188	,000**
	Posttest	30±0,6	2,32600		
Chest	Pretest	100,6±1	3,54459	4,942	,000**
	Posttest	96,4±1,3	4,78914		
Waist circumference	Pretest	88,3±1	3,72793	7,343	,000**
	Posttest	82,5±1,1	3,84308		
Abdomen	Pretest	96,3±2,7	9,97111	2,715	,019*
	Posttest	90,6±1,3	4,75287		
Hip	Pretest	109±1,1	3,93700	7,582	,000**
	Posttest	103,4±0,9	3,33205		
Basen	Pretest	102,4±1,8	6,56525	5,877	,000**
	Posttest	96,7±1,2	4,32791		
Leg	Pretest	64,3±1,2	4,31158	11,776	,000**
	Posttest	59,6±1,1	3,79440		
BMI	Pretest	27,2±0,7	2,51255	8,603	,000**
	Posttest	26,1±0,6	2,16209		
Waist / Hip	Pretest	0,81±0,1	,04309	2,164	,051
	Posttest	0,80±0,1	,03264		

P<0,05

The values of the pre and post tests of the zumba group athletes in our study are given in Table 4. Accordingly, the post-test values of the athletes' body weight, BMI, waist thickness, arm, chest, abdomen, hip, hipline, leg, circumference showed a statistically significant tendency to decrease compared to the pre-test values ( $p < 0.05$ ). On the other hand, there was no statistically significant change in waist / hip ratio similar to the Pilates group ( $p > 0.05$ ).

The pre-test and post-test-data of the Pilates and zumba exercise group athletes in the study are compared in Table 5. According to the pre-test and post-test-measurements, there was no statistically significant difference between the two groups in terms of body weight, BMI, waist thickness, arm, chest, abdomen, hip, hipline, leg circumference and waist / hip ratio ( $p > 0.05$ ).

Table 5. Comparison of Pretest-Posttest Results in sedentary women performing Pilates and Zumba exercises.

Variables	Group	N	Pretest			Posttest		
			Avr.	t	P	Ort.	t	P
Body weight	Pilates	15	69,9±4,7	-,864	,396	68,5±4,6	-,546	,590
	Zumba	13	74,5±2,1			71,4±1,8		
Arm	Pilates	15	31,5±1,3	-1,322	,198	29,4±1,5	-,398	,694
	Zumba	13	33,6±0,7			30,1±0,7		
Chest	Pilates	15	96,6±2,9	-1,331	,201	94,6±2,9	-,589	,562
	Zumba	13	100,7±1			96,5±1,3		
Waist circumference	Pilates	15	82,7±2,9	-1,714	,086	79,2±2,8	-1,103	,285
	Zumba	13	88,3±1			82,5±1,1		
Abdomen	Pilates	15	90,5±3,5	-1,273	,214	86,3±4	-1,023	,320
	Zumba	13	96,4±2,7			90,6±1,2		
Hip	Pilates	15	106,1±3,7	-,820	,424	101,9±3,2	-,427	,673
	Zumba	13	109±1,1			103,5±0,9		
Basen	Pilates	15	101,5±2,7	-,297	,769	98±2,8	,402	,691
	Zumba	13	102,5±1,8			96,7±1,2		
Leg	Pilates	15	63±1,2	-,581	,566	61±2	,563	,562
	Zumba	13	64,4±1,4			59,7±1,1		
BMI	Pilates	15	24,7±1,4	-1,522	,140	24,3±1,4	-1,163	,255
	Zumba	13	27,3±0,7			26,1±0,6		
Waist / Hip	Pilates	15	,78±0,1	-1,766	,089	,78±0,1	-1,412	,170
	Zumba	13	,81±0,1			,80±0,1		

P<0,05

## DISCUSSION

This study was conducted to examine the effects of zumba and Pilates exercises on body composition in women. In the study conducted according to Tables 3 and 4, it was found that zumba and Pilates exercise programs were effective on body weight, BMI, waist thickness, arm, chest, abdomen, hip, hipline, leg circumference parameters in relation to body composition and, the results were found to be statistically significant. When the studies conducted in the field are examined, it has been determined that regular aerobic and fitness exercise programs in different groups have significant effects on the development of functional and motoric abilities in women, as well as causing positive changes in body composition and BMI and a positive reduction in body weight<sup>36,51,27,4,30,13</sup>. According to WHO (2008), women with a waist circumference of  $\geq 80$  cm are at risk for metabolic diseases and a waist circumference of  $\geq 88$  cm is in the high-risk group. In this study, waist circumference pre-test values of women participating in both exercise groups were determined to be 82.7 cm for Pilates, 88.3 cm for zumba, while the post-test values for Pilates were 79.2 cm and zumba 82.5 cm and, it is seen that the exercise programs applied have an effect on the waist circumference in women and reduce the risk of cardiovascular diseases.

It has been defined in this study that, while the average body composition measurements of women participating in the Pilates exercise program decreased by 3.4% in waist circumference, 4.5% in abdominal circumference, 4% in hip circumference and 3.5% in hipline circumference (Table 3), the average of the measurements of women participating in the zumba exercise program, decreased by 4.4% in body weight, 4.3% in BMI, 10% around the arm, 4.2% around the chest, 6.5% around the waist, 6% around the abdomen, 5.2% around the hips, 7,3% around the leg Percentage (table 4). In the study Çetinkaya and İmamoğlu (2018) examined the effects of Pilates-aerobic exercises on body composition and body image in obese women, it has been found a decrease in body weight and a decrease in fat percentage, and this supports the results of this study. In researches on body composition, it is thought that the results are due to the duration and frequency of exercises<sup>19,37,24</sup>, scope, intensity, number of repetitions<sup>56,37,19,1,33</sup>. The results of this study are thought to be similar to the literature. Waist / hip ratio in women should not be above 0.80 (WHO 2000). Waist circumference and waist / hip ratio are used for risk assessment for chronic diseases. The waist / hip circumference risk cut-off point was reported as  $\geq 1.0$  for men and  $\geq 0.85$  for women (WHO, 2000). In this study, the average waist / hip ratio was found to be 0.78 for the first

test results of Pilates exercises, while the final test results were 0.78. While the first test results were 0.81 in zumba exercises, the final test results were determined as 0.80 and, it was found that the difference between the averages was not statistically significant. It has been stated that Zumba and Pilates exercises are important in terms of their effects on intensity, duration and frequency, body weight, anthropometric characteristics and body composition<sup>39,41,53</sup>. Regular zumba exercises have been found to reduce body fat percentage, BMI and body weight in women<sup>23,45</sup>. Özenoğlu et al. (2016) reported that the mean body weights of 12-week aerobic exercises pre-test and post-test values were  $70.34 \pm 11.54$  kg and  $69.07 \pm 10.94$  kg, and their BMI averages were 27.14 kg and 26.58 kg. They stated that the first and last measurements of waist circumference were  $84.39 \pm 9.90$  cm and  $81.89 \pm 9.76$  cm, hip circumference was  $107.22 \pm 7.92$  cm and  $104.98 \pm 7.77$  cm. In our study, aerobic zumba exercises in pre-test and post-test results, the body weight is defined as 74.5 kg and 71.3 kg, BMI averages 27.2 kg and 26.1 kg, waist circumference 88.3 cm and 82.5 cm, and hip circumference was determined to be 190 cm and 103.4 cm. It has been stated that Zumba and Pilates are programs that affect the development of the cardiovascular system in women and are programmed to achieve a healthy and ideal body composition<sup>60,54,46,20,7,64,16,40</sup>. In studies examining the effects of zumba exercises on body weight and body composition in women, it was stated that zumba exercises reduced total body weight, provided a positive change between fat percentage and lean body weight, and was an effective aerobic on women's body composition<sup>32,60,5,31</sup>. It has been reported that zumba exercises have positive effects on BMI in sedentary and overweight women<sup>18,17,64</sup>. They stated that 8-week Pilates exercises have effects on body composition, body weight and anthropometric elements (waist, abdomen, etc.) in overweight and sedentary women. Çetinkaya et al. (2018) reported that 8-week Pilates exercises had positive effects on body composition in 30 sedentary middle-aged women. Vaquero-Cristóbal et al. (2015) found that 16-week Pilates mat exercises provide changes in body composition and some body type characteristics in sedentary women. According to Tolnai et al. (2016), regular Pilates exercises performed once a week, provide positive physical and physiological improvements in young adult women at the end of 10 weeks. Wong et al. (2020), who investigated the effects and physiological effects of 12-week Pilates exercise on body fat in young obese women, they reported that the physiological effects of Pilates exercises were positive and it was effective in changing body composition by reducing body fat. Correio, et al. (2020) stated that 20-week Pilates exercises have positive effects on body composition. In a similar study, Maliheh, Majid & Firouzeh (2018) reported that, 8-week Pilates exercise was positively effective in reducing body mass index (BMI) in overweight young women. In some studies in the literature, it was stated that precise experimental information about the effects of Pilates exercises on body composition, anthropometric properties and BMI is not sufficient<sup>28,9,1</sup>, but Tsai et al (2013) and Da Cruz et al (2014) did not mention any effect of Pilates exercises. However, Uzun and Demir

(2020) reported in their latest study that, Pilates has positive effects on body composition.

In this study, it was observed that there was no difference between age, height, weight and BMI values, and the homogeneity of the groups made the study standard in terms of exercise (table 2). Accordingly, when the results obtained from the 10-week zumba and Pilates exercise groups in our study were compared, it was concluded that there was no statistical difference between the effects of both basic exercises on body composition, BMI and anthropometric properties in sedentary women (Table 5). Saygin et al 2016, compared the effects of zumba exercises and different aerobic exercises on body composition and they reported that there was no difference between both exercises. In the literature, there are mostly studies comparing zumba and Pilates exercises with other aerobic and anaerobic exercises<sup>47</sup>. Öztürk (2008) applied step-aerobics and plates exercise program for 8 weeks, 3 days a week for 60 minutes on 30 women aged 35 and over. As a result, it was found that there is no significant difference between the results of the Pilates subjects, but a significant difference between the pre and post test results of the women who do step aerobic exercise. Baştuğ et al. (2016) reported that, zumba, Pilates and crossfit exercises showed a significant positive improvement in body composition and body image development in sedentary women for the exercise group. In another study, it was reported that Pilates can be more effective on body composition by adding 10 minutes of aerobic exercise in addition to 16-week Pilates exercises<sup>38,67</sup>.

## CONCLUSION

As a result, it has been shown that 10-week zumba and Pilates basic exercises have significant effects on BMI, body composition and anthropometric properties in women and contribute to the development of physical fitness.

In the studies to be planned, by paying attention to the correct methodology and nutrition programs, the effects of zumba and Pilates exercises on general health and body composition in sedentary women and men can be evaluated.

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