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THE EFFECTS OF A 12-WEEK STEP-AEROBIC AND PILATES EXERCISE PROGRAM ON THE PHYSICAL PARAMETERS OF SEDENTARY WOMEN

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ABSTRACT

This study was conducted to investigate the effects of a 12-week step-aerobic and Pilates exercise program on the body composition of sedentary women. Its sample included 27 sedentary women who had no health problems, a mean age of 27.59±7.58 years and a mean height of 162.96±4.68 centimeters. They participated voluntarily and did 1.5 hours of step-aerobic and Pilates exercises at moderate intensity 3 days a week for 12 weeks. They did step-aerobic exercises for 1 hour and Pilates exercises for 30 minutes. Pre-test measurements were taken one day before the exercise program started, and the post-test measurements were taken two days after the exercise program ended. These physical parameters were measured: height, weight, respiration, flexibility, skin-fold thickness, waist and hip circumference. The measurements were intended to determine parameters such as respiratory function, flexibility levels, body fat percentages (BFP) and body mass indexes (BMI) of participants and also to determine changes after exercise.

SPSS 22.0 software was used for the statistical analysis of the data. Descriptive statistics were used for determining distributions, and the paired samples t-test was used when the difference between the first and last measurements was determined. The results are presented as means and standard deviations. A p-value of $p<0.05$ was taken to be statistically significant. While there was no significant difference between the pre-test and the post-test in the peak flow rate (PEF) values, the differences between pre-test and post-test weight, BMI, VLF, flexibility, hip circumference, waist circumference, forced vital capacity (FVC), forced expiratory volume in one second (FEV1) were found to be significant. This showed that the 12-week Pilates and step-aerobic exercises performed by women resulted in localized thinning and reduced body fat.

Key Words: Step-aerobics, Pilates, sedentary women

INTRODUCTION

Pilates and step-aerobics have recently become popular with by women. Their high visual and media profiles have made them important ways for women to make exercise a part of their lives. Today, advances in science and technology have increased the rates of industrialization and urbanization in society, making people less mobile. The sedentary lifestyle has been shown to be a common risk factor for the development of many chronic diseases such as diabetes, cancer, hypertension, cardiovascular diseases, bone and joint disorders and depression (Anderson and Shivakumar 2013; Cox et al., 1996; Daşkapan et al., 2005; Gerra et al., 2000; Gillison et al., 2009; Hacker, 2009; Laforge et al., 1999; Lantz et al., 1997; Netz et al., 2005; Norris et al., 1992; O'Conner et al., 1995; Papavasiliou, 2010; Riise et al., 2003). Many programs have been developed to reduce discomfort caused by inactivity, to give individuals the habit of exercising and to ensure that they adopt exercise as a lifestyle. Step-aerobics and Pilates are two popular exercise programs. A step-aerobics session involves a roughly 15 minutes of stretching and warm-up movements, a main section of targeted heart rate exercise for 30-35 minutes and 10 minutes of cool-down exercises (Clearly et al., 1984; Dowdy et al., 1985; Eickhoff et al., 1983; Garber et al., 1992; Williford et al., 1988). Several studies have reported that step aerobic exercises are an effective way to improve physical fitness when done for 8 to 12 weeks (Clearly et al., 1984; Dowdy et al.1985; Eickhoff et al., 1983; Garber et al., 1992; Milburn and Butts, 1983; Williford et al., 1988).

Step-aerobic exercises cause positive physiological changes (Zorba et al., 2000) and can improve body fat ratio, general physical competence, flexibility and endurance (Köksal et al., 2006). Pilates is suitable for all age groups, and it contributes to the development of balance, strength and flexibility in the hip, abdomen, and trunk muscles and the coordinated operation of multiple muscle groups (Latey, 2001; Selby, 2002; Souza and Vieira, 2006). While step-aerobic exercises cause a significant decrease in body fat percentages (Kurt et al.,2010), Pilates exercises help increase strength and stamina and prevent sports injuries (Şimşek and Katırcı, 2011) by taking the body into consideration as a whole. Physiological parameters may improve in a shorter time when step aerobics and Pilates exercises are done together for maximum benefit. This study investigates the effects of a 12-week step-aerobic and Pilates exercise program on the body composition of sedentary women.

MATERIAL AND METHOD

This study's sample included 27 sedentary women who had no health problems, a mean age of 27.59±7.58 years and a mean height of 162.96±4.68 centimeters. They participated voluntarily. Their age was determined based on their identity cards. Height measurements were done in bare feet using a NAN brand height scale with a 0.01 cm sensitivity and recorded in cm. Weight measurements were measured with a 0.01 kg sensitivity electronic scale. Body mass index (BMI) was determined by dividing the weight obtained by the square of the height (Zorba and Ziyagil, 1995). The sit and reach test was used to determine elasticity ratios, and measurements were made using a tape measure (150 cm). Body fat percentages (BFP) were determined by skin fold caliper measurements using the Holstein Skinfold Caliper and calculated using the formula: % fat=0.358 x subscapula+0.26 x suprailiac+5.685 (Civar et al., 2002). Portable spirometry was used to assess respiratory functions (MIR-Medical International Research Minispir-Italy). The participants performed the test with maximum exhalation. This protocol was repeated 3 times, and the best result was selected for the record by evaluating forced vital capacity (FVC), forced expiratory volume in one second (FEV1) and peak flow rate (PEF) (Marangoz et al., 2016). The participants did 1.5 hours of step-aerobic and Pilates exercises at moderate intensity (40-60% maximum heart rate) 3 days a week for 12 weeks. Step aerobic exercises were done for 1 hour, and Pilates exercises were done for 30 minutes. Pre-test measurements were taken one day before the exercise program started, and the final test measurements were taken two days after the exercise program ended. SPSS 22.0 software was used for the statistical analysis of the data. Descriptive statistics were used for determining distributions, and the paired samples t-test was used when the difference between the first and last measurements was determined. The results are presented as means and standard deviations. A p-value of $p<0.05$ was taken to be statistically significant.

FINDINGS

Table 1: The Mean Age and Height of the Participants

Variables	n	Minimum	Maximum	X±*SD*
Age	27	18	52	27.59±7.58
Height	27	154	173	162.96±4.68

The table shows that the mean age of the participants was 27.59±7.58 years, and their mean height was 162.96±4.68 cm.

Table 2: Pre-test and Post-Test Variable Values

Variables	Units	n	X±*SD*
Weight 1 Weight 2	kg	27	76.10±11.10 73.68±10.26
BMI 1 BMI 2	kg	27	28.68±4.32 27.76±3.97
BFP 1 BFP 2	%	27	25.94±6.17 23.73±5.83
Elasticity 1 Elasticity 2	cm	27	33.48±6.14 34.85±5.43
Hip Circumference 1 Hip Circumference 2	cm	27	103.88±7.29 98.81±6.93
Waist Circumference 1 Waist Circumference 2	cm	27	86.70±10.14 81.85±10.07
FVC 1 FVC 2	l	27	3.07±0.64 3.30±0.76
FEV1 (1) FEV1 (2)	l	27	2.48±0.75 2.67±0.60
PEF 1 PEF 2	l	27	5.10±1.60 5.13±1.50

*first measurement=1, last measurement=2

Table 2 shows that the mean values for the first and last measurements of the participants were, respectively: 76.10±11.10 and 73.68±10.26 for weight, 28.68±4.32 and

27.76±3.97 for BMI, 25.94±6.17 and 23.73±5.83 for BFP, 33.48±6.14 and 34.85±5.43 for elasticity, 103.88±7.29 and 98.81±6.93 for hip circumference, 86.70±10.14 and 81.85±10.07 for waist circumference, 3.07±0.64 and 3.30±0.76 for FVC, 2.67±0.60 and 2.48±0.75 for FEV1, and 5.10±1.60 and 5.13±1.50 for PEF.

Table 3. The Differences Between the Pre-test and Post-test Variables

Variables		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Weight 1–Weight 2	2.41852	1.85680	.35734	1.68399	3.15305	6.768	26	.000
Pair 2	BMI 1–BMI 2	.91364	.69785	.13430	.63758	1.18970	6.803	26	.000
Pair 3	BFP 1–BFP 2	2.21311	1.45635	.28027	1.63700	2.78922	7.896	26	.000
Pair 4	Elasticity 1–Elasticity 2	-1.37037	1.80593	.34755	-2.08477	-.65597	-3.943	26	.001
Pair 5	Hip Circumference 1–Hip Circumference 2	5.07407	2.03670	.39196	4.26838	5.87977	12.945	26	.000
Pair 6	Waist Circumference 1–Waist Circumference 2	4.85185	5.95305	1.14566	2.49691	7.20680	4.235	26	.000
Pair 7	FVC 1–FVC 2	-.22741	.31106	.05986	-.35046	-.10436	-3.799	26	.001
Pair 8	FEV1 (1)–FEV1 (2)	-.19148	.34613	.06661	-.32841	-.05456	-2.875	26	.008
Pair 9	PEF 1–PEF 2	-.03148	.82917	.15957	-.35949	.29653	-.197	26	.845

Table 3 shows that the differences in weight, BMI, BFP, elasticity, hip and waist circumferences, FVC and FEV1 were all statistically significant ($p<0.05$), whereas no significant difference in PEF was found.

DISCUSSION AND CONCLUSION

The mean age of the participants was 27.59±7.58 years. Their mean height was 162.96±4.68 cm. The first and last measurements of weight were 76.10±11.10 and 73.68±10.26. The first and last measurements of BMI were 28.68±4.32 and 27.76±3.97. The first and last measurements of the BFP were 25.94±6.17 and 23.73±5.83. The first and last measurements of elasticity were 33.48±6.14 and 34.85±5.43. The first and last measurements of hip circumference were 103.88±7.29 and 98.81±6.93. The first and last measurements of waist circumference were 81.85±10.07. The first and last measurements of FVC were 3.07±0.64 and 3.30±0.76. The first and last measurements of FEV1 were 2.67±0.60 and 2.48±0.75, and the first and last measurements of PEF were 5.10±1.60 and 5.13±1.50. While there was no significant difference between pre-test and post-test PEF values, the differences between the pre-test and post-test values were significant for weight, BMI, BFP, elasticity, hip circumference, waist circumference, FVC and FEV1.

Numerous studies in the literature have obtained results that are similar and/or conflicting with our results. Of the similar studies, Arslan et al. (2012) reported that mat Pilates exercise done by obese middle-aged women with menopausal onset caused a statistically significant decrease in body weight and BMI. Tortop et al. (2010) reported a statistically significant difference in body weight and BMI after a step-aerobic exercise program of 60-80% target heart rate carried out for 60-90 minutes 3 days a week for 12 weeks. In a 3 days a week for 12 weeks study of middle-aged women and men, the effects of Karvonen's method, aerobic and resistance exercises at 60-70% intensity on body composition were examined, and a statistically significant post-test reduction of waist circumference, waist circumference, waist-to-hip ratio was reported (Kafkas et al., 2009). Unlike our study, Sekendiz et al. (2007) found that Pilates exercise did not change BMI values. Another study evaluated the effects of 6 months of Pilates exercise on body composition and flexibility with 45 female and 2 male subjects, and no statistically significant differences were found in BMI or body weight (Segal et al., 2004).

Regular exercise leads to a psychologically and physically healthy organism for all age groups. It provides an adaptive foundation and increases preparedness. The results of our study show that women who do Pilates and step-aerobics (among the most popular exercise activities in our time) experience a positive change in visual body structure, reduced body fat and increased aerobic stamina.

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