



Conclusions

What draws the attention to the present study is that swimming is preferred as leisure activity for pleasure by most of the subjects (81%) and not for health (19%) and performance (0%). The results of this study aligns to the official statistics from the developed countries where swimming is one of the most popular leisure sports - indicator of the quality of life among active population. Meanwhile, swimming is and can be practiced as a means of kinesiotherapy in the recovery of various medical illnesses.

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THE EFFECTS OF EIGHT-WEEK STEP-AEROBIC EXERCISE PROGRAMS ON FLEXIBILITY AND BODY COMPOSITION OF SEDENTARY WOMEN

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Abstract

Purpose. The aim of this study is to investigate the effects of eight-week step-aerobic exercise programs on flexibility, body weight, body fat percentage and body circumference measurements of sedentary women.

Methods. 20 sedentary female volunteers participated in the study. Step-aerobic exercises were applied to for every participant for 8 weeks, three days a week and 45 minutes per day.

Data were analyzed by using SPSS 17.0 software. For statistical analysis, Paired-t test was used. Significance level was determined to be 0.05.

Results. Significant differences were found between mean values of pre-and post-tests (flexibility = 3.35cm; body weight = 4.48 kg; body fat percentage = 3.39%, and the number of heart beats = 4 beats/min) (p<0.05).

Conclusions. As a result of the step-aerobic exercises, flexibility and all parameters related with the body composition of the individuals were changed positively. The study showed similarity with the results of other studies.

Key words. Women, step-aerobic exercise, flexibility

Introduction

Step-Aerobic is a sport consisting of stretching exercises with a tempo accompanied by music. Aerobic exercises are performed by adapting combinations of

movements to music through a step platform. Research of the effects of such commonly used exercises on physical fitness parameters became more of an issue (Phrompaet, et al., 2011).

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Physical activity is quite important to prevent many diseases. Step-Aerobic and Pilates exercises help increase of muscle strength and flexibility as well as improvement of balance as a coordination motor skill (Richardson, Jull, 1995). Based on epidemiological proof, it is estimated that adults are required to perform moderate physical activities at least half an hour in the most days of the week (Bernardo, 2007).

Weight reducing programs decrease the risk of Coronary Artery Disease in women. and a sedentary life is one of the leading reasons of obesity disease caused by excessive increase of body weight. Many studies report that exercises done for a long period of time, regularly and moderately that have the characteristics of aerobic reduce bodyweight, body fat percentage and body mass index (Karacan, Çolakoglu, 2003).

Fat loss in terms the body low basal metabolism and lack of activity is very important. This opinion supported by Vakkonan Damar and Klent (1981) and Zorba (1999). The maintain an appropriate level of body fat ratio is not important just a sport performance but also for health body. The heart diseases, high blood affect,diabet and cancer for cronic degeneneration illness risk seems to be directly associated with body fat mass mentions (Zorba, 1999).This study has been applied to 20 sedentary women who do not apply any special nutrition program, have no health problem and do not participate in any regular exercise program. They were advised not to participate in any different exercise program during study. During eight weeks, experimental group were applied a step –aerobic program three days a week for 45 minutes by the same exerciser. Intensity of exercise has been determined as 40%-60% by Karvonen method. Body weight, resting heart rate, waist circumference, chest circumference, hip circumference (Mackenzie, 2001), body mass index, body fat percentage and lean body weight of all the subject were measured before and after the program (Carter, Health, Somatotyping, 1990), and at the end of

study, pretest and posttest values of groups were compared in itself. Arithmetic means and standard deviations of all the data were calculated. Comparison of the measurement values of subjects before and after exercise program was made with paired t-test. Significance level was determined as $p < 0.05 - 0.01$. At the end of study, a statistically significant decrease was seen body fat percentage, flexibility test and measurement test of anthropometric circumference in experimental group ($p < 0.05$). As a result, it could be said that eight weeks of regular. Pilates exercises are effective in reducing some cardiovascular risk factors in sedentary women.

Object

In this study, it is aimed to investigate the effects of 8-week step-aerobic exercises on flexibility, body fat percentage and circumference measures in sedentary women.

Methods

20 sedentary women whose average ages were 20.6 ± 1.7 (year) participated in study voluntarily. Participants were done step –aerobic exercise three days a week for 45 minutes during eight weeks. Obtained data were assesses in SPSS 17 paired t-test program.

Detailed information was provided related to exercises prepared in practice. TANITA body composition analyzer BC-418MA (Carter, Health, Somatotyping, 1990; Fatouros, et al., 2006) brand analysis device as used for body weight values, height, body mass index, some measures of anthropometric circumference and body fat rates of participants before and after exercise program.

Calibration control of testing tools used for measures was made before tests, and their reliability was tested.

Results

Arithmetic means, standard deviation values of 20 sedentary participant women whose average ages were 20.6 ± 1.7 (year) pertaining to their personal characteristics such as body weight, height, BMI, body fat percentage and heart rates are presented in Table 1.

Table 1. Demographic Characteristics of Participants before and after exercise program

	Variables	Mean \pm Sd	T	p
Body Weight	Before	69.25 \pm 10.38	-1.39	P<0.05*
	After	64.67 \pm 10.29		
Height (cm)	Before	160.17 \pm 1.29	0.9	P>0.05
	After	160.21 \pm 1.57		
BMI (kg/m²)	Before	26.2 \pm 1.29	0.16	P>0.05
	After	24.3 \pm 1.1		
Body Fat (%)	Before	26.21 \pm 3.66	-3.17	P<0.05*
	After	22.82 \pm 3.06		
The Number of Heartbeats	Before	157 \pm 10	1.15	P<0.05*
	After	153 \pm 7.9		

Best values and measurements before and after exercises of sportswomen who participated in study were compared with independent samples t-test. Analysis results are seen on Table 2.

Table 2. Comparison of Physical Fitness Values of participants before and after exercise program

	Variables	Mean ± Sd	t	p
Flexibility test (cm)	Before	25.3 ± 4.99	2.15	P<0.05*
	After	28.65 ± 4.85		
Chest Circumference (cm)	Before	94.4 ± 7.17	-0.803	P<0.05*
	After	92.6 ± 7.02		
Abdomen Circumference (cm)	Before	93.2 ± 9.79	-1.12	P<0.05*
	After	89.85 ± 9.17		
Waist Circumference (cm)	Before	81.00 ± 8.97	-1.04	P<0.05*
	After	78.05 ± 8.88		
Basin Circumference (cm)	Before	101.1 ± 7.29	-1.7	P<0.05*
	After	98.00 ± 7.26		
Leg Circumference (cm)	Before	55.45 ± 4.54	-1.34	P<0.05*
	After	53.55 ± 4.44		

Accordingly, measurements of sportswomen for per test before and after exercise are significantly different from each other (p<0.05).

There were significant elevation determined for the participants' flexibility test (3.35cm), chest circumference (1.8cm), abdomen circumference

(3.35cm), waist circumference (2.95cm), basin circumference (3.1cm), leg circumference (1.9 cm) values before and after exercise programmes (p<0.05). Relations of different test results are presented in Table 3.

Table 3. Relations of Different Test Results	r	r ²	P value
Body fat %	0.878**	0.77	P<0.001
Body Weight (kg)			
Body fat %	0.847**	0.72	P<0.001
Chest circumference (cm)			
Body fat %	0.714**	0.51	P<0.001
Abdomen circumference (cm)			
Body fat %	0.866**	0.75	P<0.001
Waist circumference (cm)			
Body fat %	0.863**	0.74	P<0.001
Basin circumference (cm)			
Body fat %	0.726**	0.53	P<0.001
Leg circumference (cm)			
Body fat %	0.626**	0.39	P<0.001
Flexibility test (cm)			
Body Weight (kg)	0.802**	0.64	P<0.001
Chest circumference (cm)			
Body Weight (kg)	0.681**	0.46	P<0.001
Abdomen circumference (cm)			
Body Weight (kg)	0.779**	0.61	P<0.001
Waist circumference (cm)			
Body Weight (kg)	0.881**	0.78	P<0.001
Basin circumference (cm)			
Body Weight (kg)	0.771**	0.59	P<0.001
Flexibility test (cm)			
Chest circumference (cm)	0.879**	0.77	P<0.001
Abdomen circumference (cm)			
Chest circumference (cm)	0.877**	0.77	P<0.001
Waist circumference (cm)			
Chest circumference (cm)	0.226**	0.05	P<0.001
Basin circumference (cm)			
Abdomen circumference (cm)	0.827**	0.474	P<0.001
Waist circumference (cm)			
Abdomen circumference (cm)	0.654**	0.43	P<0.001
Basin circumference (cm)			
Abdomen circumference (cm)	0.377**	0.14	P<0.001
Leg circumference (cm)			
Abdomen circumference (cm)	0.344**	0.11	P<0.001
Flexibility test (cm)			
Waist circumference (cm)	0.726**	0.53	P<0.001
Basin circumference (cm)			
Waist circumference (cm)	0.513**	0.26	P<0.001
Leg circumference (cm)			
Basin circumference (cm)	0.837**	0.70	P<0.001
Leg circumference (cm)			

Significant correlation results were obtained for the sedentary women (n=20) involved in this study (Table 3).



Positive correlations were obtained for all of the tests performed. The highest positive correlation between "body weight and basin circumference" and the lowest positive correlation between "chest circumference and basin circumference" were obtained 0.881 and 0.226, respectively ($p < 0.001$).

The Pearson correlations analyses (r) yielded a significant positive correlation between the body weight (kg) and basin circumference (cm) ($r = 0.881$, $p < 0.001$), the body fat (%) and the body weight (kg) ($r = 0.878$, $p < 0.001$), the body fat (%) and the chest circumference (cm) ($r = 0.847$, $p < 0.001$), the body fat (%) and the abdomen circumference (cm) ($r = 0.714$, $p < 0.001$), the body fat (%) and waist circumference (cm) ($r = 0.866$, $p < 0.001$), the Chest circumference (cm) and the abdomen circumference (cm) ($r = 0.827$, $p < 0.001$), and the basin circumference (cm) and the best 30-m run ($r = 0.837$, $p < 0.001$). All the results are presented in Table 3.

Discussions

Sedentary lifestyle brings with a number of serious health problems. Especially in middle age and later periods, depending on the physical decline, immobility, disordered eating resulted in many illness (high blood pressure, obesity, muscular weakness, posture hand disorders, flexibility, the weakening of the abdominal muscles consist of the difficulties with the digestive and excretory systems (Babayigit, et al., 2002).

Regular exercise helps to develop the parts related to the physical fitness. Part of the physical fitness related with health are the cardiovascular endurance, muscle strength, muscular endurance, body composition, flexibility, and nerve muscle relief (Günay, 1999).

In this study, the part of exercise program basically including Aerobic-Step exercises and generally develop of whole-body flexibility has been structured. Development of flexibility which is one of the important parameters of health-related physical fitness, following the exercise program we applied is a result of exercise program which is planned to be target-specific.

In their study, Karacan and Çolakoğlu, determined that 12-week aerobic exercise resulted in similar positive changes in body composition of middle-aged women and young women who were applied run-walk exercise program for three days a week for 30 minutes during 12 weeks, and that there have been positive changes in blood lipids mostly in favor of middle-aged women (Karacan, Filiz, 2003).

In these studies performed, it was shown that the flexibility, abdominal muscle strength and muscle activity could be developed by Pilates exercises (Phrompaet, et al., 2011).

Results of our study performed again had parallelism with literature available. In sedentary women, it's seen that significant developments were obtained in all the flexibility values (sit down-lie exercise, body, hyper-

extension, body lateral flexion, tests towards included in study with 12-week exercise program.

In a randomized controlled study on reliable cases, it was seen that 8-week pilates program applied two times a week for 45 minutes developed flexibility and increases body and pelvic movement (Kloubec, 2010). It could be told that step-aerobic exercise had a positive effect on resting heart rate, pulse after a 5 minute walk, flexibility, anaerobic power, aerobic capacity, leg power, hand grip strength, body fat percentage and systolic blood pressure values (Kurt, et al., 2010).

It is aimed to investigate the effects of eight-week basic step aerobics training on physical and motoric abilities of sedentary women aged 30-35. 15 sedentary women; aged 30-35 voluntarily participated in on 8 week basic step aerobic program. Age, height, weight, body fat percentage, body mass index, max VO₂, handgrip, systolic and diastolic blood pressure, heart rate and vertical jump parameters were measured for 8 post 8 week training programs (Kurt, et al. 2010).

According to data of Kurt, et al. (2010), no meaningful differences were found with the max VO₂, systolic and diastolic blood pressure, handgrip, heart rate and vertical jump parameters while meaningful differences were found with the body weight, body fat percentage, body mass, index parameters at the level of $p < 0.05$. As a result of the study, it was thought that decreasing body fat percentage through step aerobic trainings is important for protecting from cardiovascular risk factors.

Pepe, et al. (2010) aimed to investigate the effects of eight-week basic step aerobics training on physical and motoric abilities of sedentary women aged 30-35. For this study, 15 sedentary women, aged 30-35, voluntarily participated in an 8-week basic step aerobics training of Erciyes University Continuous Education Centre (ERSEM). According to data; no meaningful differences were found with the Max VO₂, Systolic and Diastolic Blood Pressure, Handgrip, Heart Rate and Vertical Jump parameters, while meaningful differences were found with the Body Weight, Body Fat Percentage, Body Mass Index parameters at the level of $p < 0.05$. As a result of the study, it was thought that decreasing body fat percentage through step aerobic trainings is important for protecting from cardiovascular risk factors (Pepe, et al., 2010).

Baştuğ, Akandere, Yıldız, (2011) investigated the effect of 8-week aerobic exercise program on physical self description values of women not doing exercise. 80 women not doing exercise regularly, having no special dietary program and having no health problem to prevent the application of exercise participated in the study voluntarily. An aerobic exercise program was applied to the research group for 45-55 minutes and 3 days a week at 50-60% intensity. The measurements of weight, body mass index, sub-dimensions of physical self-description scale such as appearance and self-confidence values were obtained before and after exercise. It was reported that 8-week aerobic exercise



program caused a significant decrease in body weight and body mass index values of sedentary women ($p < 0.05$). It was also determined that 8-week aerobic exercise positively affected body composition and physical self-description values of sedentary women (Baştug, Akandere, Yıldız, 2011).

Tortop, Ön, Ögün, 2(010) also determined the effects of the some physical fitness' parameters on the young women, during 12 weeks step-aerobic exercises' program. The subjects performed step aerobic exercise three days per week and each session lasted for 60-90 min, the intensity of the heart rates was % 60-80. It was reported that significant differences were found for the values of the body weight, body mass indexes, back strength, flexibility, right and left hand grip, vertical jump and aerobic power (MaxVO₂) ($p < 0,01$). The body fat percentage (%) also showed significant differences level of 0,05. But leg power and anaerobic power values ($p > 0,05$) didn't show significant differences statistically. According to the results, it was concluded that at the end of 12 weeks' aerobic exercises in some parameters physical fitness caused positive differences on the young women. (Tortop, Ön, Ögün, 2010).

In another study, Çolakoglu and Karacan (2006) studied the effects of 12 week aerobic (jog-walk) exercise program on some physical and physiological parameters in young and middle aged women. The groups were composed of the women who had not done exercise regularly, who had not followed a special diet and who did not have any health problems preventing them doing any kind of exercise. During 12 weeks, both groups participated in a jog-walk exercise program with the duration of 30 min. and 3 times per week. The results of Çolakoglu and Karacan (2006) indicated that there was a significant decrease in body weight, body mass index and rest pulse values of both groups ($p < 0,05$) and there was a significant increase in vertical jump, anaerobic power, aerobic power and flexibility values. Consequently, it was understood that a twelve-week aerobic exercise develops aerobic and anaerobic powers and decreases rest pulse in young and middle aged women; however, it does not cause any significant change in their blood pressures.

In another research study, Zorba et al. (2000) studied to determine the effects of step on the physical fitness of 8-week step on the physical fitness of 33-40 aged female group. Study showed that doing exercising made positive effects on the body composition significantly ($p < 0.01$).

Zorba et al. (2000) studied the effects of step on the physical fitness of 8-week step on the physical fitness of 18-24 age female group. Results similar to the one obtained in Zorba et al. (2000) were also found in this study.

Imamoglu, Akyol, Bayram (2002) studied the effects of three month aerobic exercise on physical fitness, body composition and blood parameters in sedante women. According to the result of this study, three months low

intensity aerobic exercises have resulted in the improvement in physical fitness and by the changes of body fat and blood parameters, it can be concluded that risk of cardiovascular problems may decrease (Imamoglu, Akyol, Bayram, 2002).

These studies have parallelism with our studies. Flexibility values of research group were measures as 25.30 ± 4.99 before exercise program and 28.65 ± 4.85 after exercise program. In many studies, it was revealed that exercises created a significant increase on flexibility (Ransdell, et al., 2004).

In our study presented, it was aimed to positively reshape body composition that is one of the health-related physical fitness parameters and to increase body flexibility.

Pilates exercises are of vital importance in respect of body awareness, body control, development of straight muscle activation, prevention of injury and sportive performance as well as development of coordination skills such as power, flexibility, strength, speed, agility (Bauman, 2004; Fatouros, et al. 2006; Otto, et al. 2004; Segal, Hein, Basford, 2004).

With the configuration of exercises in intensity and quality fit for purpose, as we expected, there have been positive developments in all the parameters in respect of body compositions of individuals and their body flexibilities have been developed ($p < 0,05$). Thus, positive effects of exercise programs to develop physical fitness on body composition and body flexibility is confirmed one more time together with the results of our study.

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