Original Article

The Relationship of Static Core Training Methods Versus Traditional Step Aerobics

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Abstract

In recent years, epidemics and developments in the field of virtual communication have left people with an inactive lifestyle. For this reason, exercises that include all kinds of physical activity, endurance, and strength training have an important role in the lives of people of different ages. The study aimed to find out the effects of the step aerobic exercise and static core training programs on body composition in sedentary females. Totally 30 sedentary volunteer females (Age: 37.03 ± 4.28 years, height: 1.62 ± .07 m, and body weight: 70.48 ± 18.21 kg) were separated into 3 groups randomly: 1) Step-aerobic exercise group (n=10), 2), Step-aerobic + Core training group (n=10), 3) Control group (n=10). Participants in the Step-aerobic exercise group and the Step-aerobic + Core training group performed one of the exercise programs in a gym for 10 weeks. The circumference and body composition measurements were taken before and after the 10-week period. As a result of the study, a significant decrease was observed in the subjects' body weights (Z=-2.803; p=.005) and body fat percentages (p=.000). Statistical significance was observed in body water level (Z=-1.988; p=.047) and muscle amount (Z=-2.809; p=.005) in static core groups. In the study, it was determined that visceral fat ratios decreased statistically in the step-aerobic (Z=-2.121; p=.034) and static core groups (Z=-2.384; p=.017). In both groups, there was a significant decrease in the circumference of both the upper right and left arm and the right and left upper calf ($p<0.05$). The results of the study suggest that the step-aerobic exercises and core training together enhance body composition and circumference in sedentary female individuals. Future studies might focus on the effect of step-aerobic and core training with exercises of varying intensity and number.

Keywords: Step-Aerobic, Core Exercise, Sedentary Women.

I. INTRODUCTION

W It has been stated that regular physical activity will directly affect the quality of life and psychological well-being, and it is also closely related to healthy aging (Zaleski et al., 2016). Core training has become a part of the fields of fitness and sportive performance. Health clubs often offer core training-specific exercise programs to their clients. One-to-one training of individual trainers is also included in core exercises (Handzel, 2003). Strength and endurance training for the core area can improve trunk stability by activating force transmission to the lower and upper extremities (Ahmed et al., 2021). Core training is described as the work of stabilizing muscle groups that maintain a balanced position of the body (Rosania, 2004). Core training of the body is commonly known as one of the most important workouts targeting the abdominal muscles, paraspinal muscles, gluteal muscles, oblique muscles, pelvic muscles, and diaphragm muscles (Shinkle et al., 2012). Joseph Pilates defined core training as “the part of the body that surrounds it from the lower ribs to the lower gluteal crease of the hip” (Brungardt et al., 2006). Since the core region is the center of the kinetic chain during an activity, a raise of power in this region increases the power production in the arms and legs, providing balance and control of the movement. For this reason, it has been stated that the strengthening of the core muscles is of great importance to improve physical performance (Willardson, 2007).

It has been reported that one of the most popular activities in sports clubs is step-aerobic exercises due to its positive effects on circulation, respiration, endurance, and muscle strength (Rutkowska et al., 2017). Step-aerobics has been defined as an exercise that combines body weight resistance with exercise and uses various combinations of movement with music, climbing up, crossing and descending steps (Moraru, 2016).

There are not enough studies comparing the effectiveness of aerobic steps and core training. Therefore, it is thought that this study would contribute to the literature in terms of examining the effects of core exercises performed together with step aerobic

exercises on the physical performance of sedentary individuals. The study aimed to find out the effects of the step aerobic exercise and static core training programs on body composition in sedentary females.

II. Material and Methods

Participants

Totally 30 healthy sedentary females voluntarily joined the study (Age: 37.03 ± 4.28 years, height: 1.62 ± .07 m, and body weight: 70.48 ± 18.21 kg). They were separated into 3 groups randomly: 1) Step-aerobic exercise group (n=10), 2), Step-aerobic + Core training group (n=10), 3) Control group (n=10). Participants in the Step-aerobic exercise group and the Step-aerobic + Core training group performed one of the exercise programs in a gym for 10 weeks. All participants were included in measurements before and after the 10-week period.

Data Collection

The body weight (kg), body fat percent (BF%), fat weight (kg), body muscle mass (%), body muscle weight (kg), and BMI (kg/m2) of the participants were taken by using a bioelectrical impedance analyzer (BIA, Tanita MC 780). For BIA measurement, participants should not do strenuous physical activity 24-48 hours before, do not consume alcohol 24 hours before, come with a fasting period of at least 4 hours, and do not drink large amounts of liquid (water, tea, coffee) before the test (at least 4 hours), and do not wear Care was taken to avoid metal objects [8].

Training protocols

Both training protocols were applied for 10 weeks. In the study, 6 static core strength-enhancing exercises were used. The core exercises were selected from exercises suitable for the age group of the participants. They were not complex exercises. At the beginning of each training unit, in terms of preparation for training, providing sufficient flexibility and preventing injuries; In order to increase body temperature and blood circulation, 15 minutes of warm-up (5 minutes of jog, 10 minutes of mobility, and dynamic stretching exercises) movements were performed.

The step-aerobic exercise training group performed classical step-aerobic workouts. In addition to the classical step-aerobics exercise training, which includes aerobic and anaerobic exercises, the Step-aerobic + Core training group performed 6 different core exercises (front plank, side plank (right), side plank (left), back plank, crunch, leg raise) with gradually increasing difficulty levels for 10 weeks. Training groups conducted the protocols 3 times a week.

The scope of exercise was determined as the duration of movement and the number of sets, and the number of sets was applied as 2 in the first weeks and 3 in the following weeks. In the first week, the duration of movement in the exercises is 20-40 seconds it was increased up to 30-50 sec by week 10. A 2-minute rest duration was given between sets. While the implementation of core training was 30-35 minutes with a warm-up, the total training time was determined as 50-60 minutes for Step Aerobics + Core exercise.

Table 1: Static Core Group Training Program

10-Week Static Core Training Program			
EXERCISES	**1 - 3 Week**	**4 - 7 Week**	**8-10 Week**
	Time / period	**Time / Period**	**Time / Period**
Front Plank	30 sn x 2	35 sn x 3	40 sn x 3
Side Plank (Sağ)	25 sn x 2	30 sn x 3	35 sn x 3
Side Plank (Sol)	25 sn x 2	30 sn x 3	35 sn x 3
Back Plank	20 sn x 2	25 sn x 3	30 sn x 3
Crunch (Statik)	35 sn x 2	40 sn x 3	45 sn x 3
Leg Raise (Statik)	40 sn x 2	45 sn x 3	50 sn x 3

Boyacı et al., 2018

Data Analysis

Data were presented as mean and standard deviation. Shapiro Wilk test was used for normality distribution. Mixed Anova distribution applied for those with normal settings. Kruskal Wallis H, Mann Whitney U and Wilcoxon tests were applied for abnormal ones. Statistical significance level was accepted as $p<0.05$. SPSS 22.0 package program was used for all statistical calculations.

III. Results

Table 2. Demographic characteristics of the subjects.

Variables	Groups	n	Mean ± SD
Age (Years)	Step Aerobics	10	37.70 ± 4.69
	Static Core	10	36.90 ± 4.63
	Control	10	36.50 ± 3.84
	Total	30	37.03 ± 4.28
Height (m)	Step Aerobics	10	1.64 ± .08
	Static Core	10	1.63 ± .06
	Control	10	1.60 ± .05
	Total	30	1.62 ± .07
Body Weight (kg)	Step Aerobics	10	75.43 ± 22.26
	Static Core	10	70.68 ± 17.90
	Control	10	65.33 ± 14.00
	Total	30	70.48 ± 18.21

Table 3. Body compositions of the subjects (Mean ± SD)

Variables	Groups	Pre-test	Post-test
Weight (kg)	Step Aerobics	75.43 ± 22.26	72.37 ± 22.51*
	Static Core	70.68 ± 17.90	69.53 ± 17.84
	Control	65.33 ± 14.00	63.60 ± 12.52
BF (%)	Step Aerobics	33.36 ± 10.25	32.70 ± 10.02*
	Static Core	35.53 ± 8.18	32.23 ± 7.35
	Control	30.38 ± 6.88	30.37 ± 6.99
Total Body Water	Step Aerobics	46.79 ± 6.12	46.70 ± 5.95
	Static Core	44.51 ± 5.17	42.87 ± 5.54*†
	Control	50.00 ± 4.40	49.90 ± 3.87
Muscle Mass	Step Aerobics	44.40 ± 4.90	41.79 ± 12.58
	Static Core	44.05 ± 5.10	46.49 ± 5.48*
	Control	43.68 ± 5.03	43.86 ± 4.93
Visceral Fat	Step Aerobics	4.10 ± 2.18	3.68 ± 1.78*
	Static Core	4.75 ± 3.17	3.73 ± 2.34*
	Control	3.00 ± 1.70	3.00 ± 1.70

* Significantly lower than pre-test ($p<0.05$); † Significantly lower than Control Group ($p<0.05$); BF: Body Fat.

It was determined that there was no significant difference between the pre-test body weights of the research groups (X2= 0.781; p = .098), and similarly, there was no significant difference between the post-test body weights (X2= 0.677; p = .952). After the 10-week exercise program of the Step-Aerobics group, the body weight decreased significantly (Z=-2.803; p=.005) However, there was no significant change in body weight in the step + static core group (Z=-1.785; p=.074) and the control group (Z=0.000; p=1.000).

It was determined that the Time effect (F1,27=19.514, p = .000, $\eta 2$ = .420) and Time X Group interaction (F2,27=11.383, p = .000, $\eta 2$ = .457) were statistically significant for the fat variable, but the Group effect was not significant (F2,27=0.480, p = .624, $\eta 2$ = .034). It was determined that there was no significant difference in BF between the pre-test and post-test measurements in the Step Aerobics group (p = .213) and the Control group (p = .985), and the BF in the Step-Aerobics group decreased significantly in the posttest when compared with pre-test (p = .000).

When the total body water is examined; While there was no significant difference between the groups in the pre-test (X2= 5.007; p = .082), a significant difference was found between the groups in the post-test (X2= 7.201; p = .027). In the posttest, total body water in the Step-Aerobics group was not different from the Static Core (U=29.500; p=.123) and control (U=37,000; p=.353) groups. However, the total body water in the Static Core group was lower than the Control group (U=14.500; p=.005). At the end of the 14-week period, the total body water level did not change in the Step-Aerobics group (Z=-.663; p=.507) and the Control group (Z=-.526; p=.599). The total body water level in the Static Core group decreased significantly after the exercise program (Z=-1.988; p=.047). It was determined that the total muscle amount of the participants was not significantly different between the research groups in both the pretest (X2=.153; p=.926) and the posttest (X2=1.892; p=.388).

At the end of the 14-week period, the muscle mass did not change in the Step-Aerobics group (Z=-1.790; p=.074) and in the Control group (Z=-1.219; p=.223). The muscle mass in the Static Core group increased significantly after the exercise program (Z=-2.809; p=.005). There was no significant difference in the visceral fat among the groups in the pre-test (X2=2.433; p=.296). Similarly, in the post-test, it was determined that the visceral fat was not different between the groups (X2=.941; p=.625). When the pre-test and post-test values of each group were compared, it was determined that the visceral fat in the Step-Aerobics group (Z=-2.121; p=.034) and the Static Core group (Z=-2.384; p=.017) decreased significantly. There was no significant difference between the pretest and posttest in the control group (Z=.000; p=1.000).

Table 4. The circumference measurements of the subjects according to the groups (Mean ± SD).

Variables	Groups	Pre-test	Post-test
Chest (cm)	Step Aerobics	96.30 ± 12.75	95.05 ± 12.42*
	Static Core	96.80 ± 9.93	91.20 ± 13.21*
	Control	90.90 ± 7.11	91.00 ± 7.04
Waist (cm)	Step Aerobics	82.13 ± 15.02	80.40 ± 14.38
	Static Core	79.10 ± 11.83	79.60 ± 12.36
	Control	76.10 ± 7.81	76.20 ± 7.98
Hip (cm)	Step Aerobics	104.80 ± 25.35	105.70 ± 19.87
	Static Core	111.60 ± 13.38	107.20 ± 12.87
	Control	97.60 ± 19.15	98.00 ± 19.24
Right Thigh (cm)	Step Aerobics	61.50 ± 7.66	59.70 ± 7.39*
	Static Core	62.80 ± 9.43	60.70 ± 8.72*
	Control	58.35 ± 6.04	58.50 ± 6.88
Left Thigh (cm)	Step Aerobics	61.40 ± 7.90	59.40 ± 7.59*
	Static Core	62.55 ± 8.67	59.40 ± 7.59*
	Control	58.60 ± 6.70	60.75 ± 8.51
Right Biceps (cm)	Step Aerobics	29.40 ± 5.28	28.45 ± 5.35*
	Static Core	30.40 ± 6.82	28.50 ± 5.91*
	Control	27.40 ± 3.41	26.60 ± 4.12
Left Biceps (cm)	Step Aerobics	29.45 ± 5.23	29.00 ± 4.71
	Static Core	30.60 ± 6.69	28.70 ± 5.77*
	Control	27.50 ± 3.44	28.30 ± 3.97

* Significantly lower than pre-test ($p<0.05$).

The chest circumference did not differ significantly among all groups in both the pretest (X2=1.168; p=.445) and the posttest (X2=.308; p=.857). Compared to the pretest, chest circumferences in the Step-Aerobics group (Z=-2.565; p=.010) and the Static Core group (Z=-2.812; p=.005) were significantly decreased in the posttest. There was no significant difference between the pretest and posttest measurements in the control group (Z=-1.000; p=.317).

For waist circumference measurement, Time effect (F1.27=.075, p = .786, η2 = .003), Time X Group interaction (F2.27=.250, p = .781, η2 = .018) and Group effect (F2.27=0.524, p = .598, η2 = .037) were not significant.

The Time effect (F1,27=.579, p = .453, η2 = .021), Time X Group interaction (F2,27=1.548, p = .231, η2 = .103) and Group effect (F2,27=1.018, p = .375, η2 = .070) for hip circumference measurements did not significant.

The right thigh circumference of the participants did not differ significantly among the groups in both the pretest (X2=.833; p=.659) and posttest (X2=.160; p=.923). Compared to the pretest, the right thigh circumference was significantly reduced in the Step-Aerobics group (Z=-2.714; p=.007) and the Static Core group (Z=-2.831; p=.005) in the posttest. There was no significant difference between the pre-test and post-test measurements in the control group (Z=-.365; p=.715).

The left thigh circumference in the pre-test did not differ significantly among the groups (X2=1.123; p=.570), similarly, the left thigh circumference measurements in the post-test did not differ among the groups (X2=.360; p=.835). Compared with the pre-test, the left thigh circumference decreased after exercises performed in both the Step-Aerobics group (Z=-2.694; p=.007) and the Static Core group (Z=-2.699; p=.007). However, the left thigh circumference measurements between pre-test and post-test were not different in the control group (Z=-.577; p=.564).

Time effect was significant (F1,27=13.668, p = .001, η2 = .336) in the right bicep circumference, but Time X Group interaction (F2,27=1.095, p = .349, η2 = .075) and Group effect (F2,27=.618, p = .546, η2 = .044) was not found to be significant. In the pre-test and post-test comparisons, the right biceps circumference decreased in the Step-Aerobics group (t=8.143; p=.000) and Static Core group (t=5.460; p=.000), but any change was not found in the Control group (t=.873; p=.405).

Time effect (F1,27=3.290, p = .081, η2 = .109) and Group effect (F2,27=.330, p = .722, η2 = .024) for the left bicep circumference were not significant, whereas Time X Group interaction was significant (F2,27=7.501, p = .003, η2 = .357). The difference among the groups in the pretest (F=.878, p=.427) and posttest (F=.052, p=.950) was not significant. In the pre-test and post-test comparison, the left biceps circumference in the Step-Aerobics group (t=.719; p=.490) and the Control group (t=-1.714; p=.121) was not different. The left biceps circumference in the Static Core group decreased after the period (t=5.460; p=.000).

IV. Discussion and Conclusion

Step aerobics is an exercise that involves stepping up and down on a rectangular or circular platform that improves overall fitness, reduces fat, and boosts your cardiovascular health. Step aerobics has all the benefits of high-intensity cardio training without putting pressure on your joints.

It can be stated that the main purpose of core exercises is to stabilize the spine by preventing degenerative damages, as well as to protect the spine from the pain it causes Core exercises have been reported to be used in the treatment of people with musculoskeletal disorders to strengthen muscles and promote stability (Boyacı et al., 2018; O'Sullivan et al., 1997).

As a result of our study, a significant decrease in body weight was observed after the 10-week exercise program of the Step-Aerobics group ($p<0.05$). It was determined that the body fat percentages of the Step-Core group decreased significantly in the post-test.

Atalay (2020) stated in his study that the effects of pilates exercises on core strength and musculoskeletal system diseases in women were examined, there was no significant difference in body fat percentage and body weight variables of the research group and the control group. It is thought that the reason for this may be related to the active living standards of white-collar individuals . In addition, Atıcı (2013) stated that there was no significant difference in body fat percentage and body weight of the experimental and control groups in his study that investigated the effect of core training on some physiological and motoric parameters in women between the ages of 18-24 who do swimming. It was thought that the reason for this might be because the sample group consisted of individuals engaged in active sports.

Atış (2021) examined the effect of core training exercises applied to sedentary individuals on selected motoric and physiological parameters and exercise perception, and reported that although there was no statistical difference in body weights of the training group compared to the control group, there was a decrease in body weights of both groups. In the study conducted by Bayram (2020), it was seen that after 12 weeks of pilates exercise, a significant decrease in body fat and fat mass in women aged 70 years on average supports our study ($p<0.05$). Amano et al (2001) reported that there were significant reductions in body weights, body mass indexes and body fat percentages of obese men and women during aerobic exercise for 12 weeks. Gökdemir et al (2007), as a result of 8-week aerobic training applied 3 days a week, found significant changes in body fat percentage according to the measurement results obtained from the individuals forming the research population. All these results support our study. (Table 3).

Bayram (2020) also examined the effect of pilates exercises on body composition, falling and bone mineral density in elderly individuals; he reported that after 12 weeks of pilates exercise, lean body mass and total body water increased on average in women aged 70 years. In addition, the waist and hip circumferences of the sample group were also statistically significantly reduced in her study. In our study, while the total body water level of the Static Core group decreased significantly after the exercise program ($p<0.05$), no significant difference was found for waist circumference and hip circumference measurements ($p<0.05$). It is thought that the limited research on step aerobics and the difference in results in different studies examining similar parameters are due to the age group and different training methods. In the study, right and left upper calf circumferences decreased statistically in both step aerobic and static core groups ($p<0.05$), while an increase in total muscle amount was detected in the static core group ($p<0.05$). While significant (Table 3) was found in the chest circumference and right upper arm circumference measurements of the step aerobic and static core groups, the left upper arm circumference was significantly decreased in the static group ($p<0.05$). In the study of Görner and Reineke (2020), in which strength and endurance exercises were applied, the findings obtained in muscle ratio, chest circumference measurement, right-left upper calf and arm circumference differed with the research. It was thought that this was due to the young age group and the short duration of exercise.

As a result, it can be said that the application of step aerobics and core training in sedentary women gives good results. The study had a noticeable effect on body composition parameters in women. The fact that people are sedentary while making use of their spare time will bring about a corresponding decrease in their physical levels. Encouraging people of any age to engage in physical activity and exercise is crucial to their health benefits. These and similar studies may cause women to prefer a healthy lifestyle with physical activity in their normal lives in the coming years. While applying this, it can be preferred to do

it by blending it with different training forms besides the classical step aerobic exercise. This study was applied to sedentary women who experienced physical changes with the effect of 10-week step-aerobic and core training. It can be recommended to be applied for more than 10 weeks in other age groups and different genders, and to be supported by more and more similar studies.

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