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Investigation of the Effects of a 12 Week Recreation Exercise Programme on Hand Grip Strength, Back Strength, Leg Strength, Elasticity and Body Composition of Sedentary Female

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Abstract

The aim of this study was to investigate of the effects of 12-week recreative exercise programme on body weight, hand grip strength, back strength, leg strength, elasticity and body composition of female. A total of 67 females, 32 subjects and 35 controls, participated in the study voluntarily. The mean age of the subject group is 43.12 ± 11.17, the control group is 36.82 ± 9.82 years. The first measurements were made before the exercise program of the subject group and the second measurements were made on the end date of the exercise program. Body weight, hand grip strength, back strength, leg strength, elasticity, push-ups, sit-ups and body fat measurements were measured depending on the exercise program of the subject group female and control group females. The obtained data were used t-test, with $p<0.05$ significance level, on SPSS programme to determine differences with subject group and control group. While the test results such as the body weight, hand grip strength, back strength, leg strength, elasticity, push-up, sit-ups and calf fat, were not obtained to be statistically significant between the subject and control group females ($p> 0.05$), the differences between the body fat measurement values of the females in the subject group were obtain to be statistically significant ($p <0.05$). After the 12-week recreational exercise program, there exist differences emerged in the participants in terms of physical, physiological and anthrepometric characteristics, depending on the exercise program applied as a result of the measurements taken from the subject group females before and after the exercise. Consequently, it was observed that the recreational exercise program improved the physiological and anthropometric characteristics of the subject group females.

Keywords: Exercise, sedentary, body composition, recreation

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1. INTRODUCTION

Sports, as strengthening social relations, competition, entertainment, health and audience, are a part of world culture and its place in human life has become more prominent recently (Yorulmaz, 2005). With the development of technology, people maintain a sedentary lifestyle. The sedentary lifestyle causes various diseases to comprise. It is well known that physical fitness as a consequence of regular exercises prevents strengthening of the organism, the development and progression of various diseases (Kin et al., 1996). Primary health institutions such as the World Health Organization (WHO) explain that sedentary lifestyle affects human health negatively. In developed and developing countries, it has been determined that regular exercise is the most effective and economical method in protector medicine (Ersoy, 2004). It is believed that exercise programs are the most effective method of combating against obesity and health deterioration caused by a sedentary lifestyle and unhealthy nutrition (Yıldız, 2017). The regular exercise habits, which is considered to be the most effective method of healthy life, should be made widespread in every environment and it is necessary to ensure the participation of people from all walks of life (Gerek, 2008). As a result of the searches, it has been determined that people participating in sports activities feel themselves physically, physiologically and psychologically stronger, healthier and happier. The American College of Medicine indicated that the exercise program should have certain qualities and quantities in order to improve physical fitness and made the following recommendations for this. The period of aerobic activity should be 15-60 minutes, and it should do 3-5 days a week regularly with the load intensity 60-90% of heart rate backup. The mode of activity must be rhythmic and aerobic, which can be performed continuously, including the large muscle group (Akgün, 1992). Especially in middle age and older periods, high blood pressure, obesity, muscular weakness, postural disorder, diabetes and increased coronary artery risk factors, loss of chest elasticity and losses of respiratory capacity, weakening of abdominal muscles and digestive and excretory difficulties occur. The physical and mental problems caused by obesity due to the inability to spend the excess energy generated by the food taken are the negative effects of long-term sedentary lifestyle on the organism (Biçer et al., 2005). The aim of this paper is to determine some anthropometric and physiological changes of middle-aged sedentary females who prefer aerobic exercise types.

2. METHOD

A total of 67 females, 32 subject group and 35 control group, participated in this study as volunteers. The mean age of the subject group was 43.12 ± 11.17, the mean age of the control group was 36.82 ± 9.82 years. The subject and the control group were informed about the date, day and time of the tests to be done one day before. Field and laboratory tests were performed to determine the anthropometric and some motor characteristics of the females. While the subject group females were subject to daily exercise programs, the control group females continued their daily life. The first measurements were made before the exercise program of the subject group and the second measurements were made on the end date of the exercise program. Body weight, hand grip strength, back strength, leg strength, elasticity, push-ups, sit-ups and body fat measurements were measured depending on the exercise program of the subject group female and control group females.

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2.1 Measurement Methods

Body Weight Measurement: Body weight measurements was done using electronic scales on the condition that they were wearing only shorts and t-shirts (Sensitivity 0.01 kg).

Back and Leg Strength: Back and leg strength of the subject was measured with a digital by dynomometer (Günay et al., 2006).

Vertical Jump: When the participants in the measurement is facing the wall, adjacent feet, body upright; they extends one arm upright and the highest point of contact is determined with chalk. Then the participants jump upwards with double feet and the highest point where his arm can reach is determined. The distance between the reach height and the jump height is measured with a tape measure. It records as the best value (cm) after two attempts (Ilgın, 1996).

Hand Grip Strength: The griph strength of both right and left hands was measured using a digital hand dynamometer. In standing position with the shoulder adductedand with the elbow in ful extension (Günay et al., 2006).

Flexibility: Measured by the sit-and-lie test. The participants sit on the floor and put their bare soles flat on the test bench. Lean forward on their legs and reach forward as far as they can reach with their hands in front of their body without bending their knees, then they try to stay at the farthest point for 1-2 seconds. This distance is recorded in centimeters (Günay et al., 2006).

Shuttle: Subjects performed sit-ups on the gym mat for 30 seconds, each occurrence of the movement was counted and recorded. (Kaya et al. 2011, Aydos and Koç, 2003)

Push-up: Push-up measurement is 30 seconds. Test The subjects repeated the push-up movement on the gymnastics mat for 30 seconds, and each repetition of the movement was counted. (Kaya et al. 2011, Aydos and Koç, 2003)

Body Composition Measurements: Measured by skinfold thickness the most common anatomic sites for skinfold measurement include biceps, triceps, chest, subscapula, abdominal, suprailiac, thigh, calf Measurements were applied twice and good values were recorded (Tamer, 2000, Akın, 2013).

2.2. Statistical Method

SPSS program was used to calculate the data. In the evaluation of the data obtained, t-test was used for two independent groups to determine the differences between pre-test and post-tests of women in the control group and the control group. The significance level of the results was accepted at $p < 0.05$ levels.

2.3 Recreative Exercise Program Applied to the Subject Group

Aerobics, skipping rope, treadmill walking, straight shuttle, push-up, medicine ball throwing and opening stretching exercises were applied to all subjects for 12 weeks and 3 days a week, 60 minutes a day. During the 12-week period, they were exposed to an exercise intensity that gradually increased in intensity and exercise heartbeat rate was around 100-120 per minute. The subjects were not given a special diet.

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3. RESULTS

Table 1. Comparison of Pre and Post Test Measurement Values of Anthropometric and Some Motoric Characteristics of Subject Group Females

Parameters	Pretest	Posttest	P
Body weight (kg)	69.98 ± 12.26	69.09 ± 12.26	.772
Back strength (kg)	45.70 ± 15.12	51.50 ± 16.56	.149
Leg strength (kg)	50.78 ± 15.58	56.95 ± 15.34	.116
Vertical jump (cm)	16.15 ± 4.26	17.39 ± 4.87	.285
Elasticity (cm)	23.12 ± 5.77	24.42 ± 8.55	.481
Shuttle	17.15 ± 5.03	19.68 ± 6.27	.080
Push-up	15.00 ± 3.68	15.87 ± 4.70	.411
Right hand grip strength (kg)	26.23 ± 4.67	27.11 ± 4.68	.453
Left hand grip strength (kg)	24.63 ± 4.96	25.35 ± 5.13	.568
Biceps (mm)	15.21 ± 4.00	12.46 ± 2.87	.002*
Triceps (mm)	20.96 ± 4.57	16.54 ± 3.15	.000*
Subscapula (mm)	18.92 ± 6.75	16.48 ± 4.16	.088
Abdominal (mm)	18.28 ± 5.73	14.27 ± 3.99	.002*
Suprailiac (mm)	18.35 ± 5.20	14.90 ± 3.33	.002*
Bust (mm)	17.65 ± 5.86	13.82 ± 3.86	.003*
Thigh (mm)	26.43 ± 6.78	20.69 ± 5.30	.000*
Calf (mm)	19.43 ± 6.37	16.87 ± 5.12	.082

***p<0.05**

Table 2. Comparison of Pre and Post Test Measurement Values of Anthropometric and Some Motoric Characteristics of Control Group Females

Parameters	Pretest	Posttest	P
Body weight (kg)	73.55 ± 13.41	73.76 ± 13.44	.949
Back strength (kg)	46.25 ± 14.38	46.25 ± 14.44	.999
Leg strength (kg)	51.91 ± 14.57	51.97 ± 14.57	.987
Vertical jump (cm)	17.82 ± 4.61	18.35 ± 3.97	.615
Elasticity (cm)	23.62 ± 6.81	23.86 ± 6.44	.880
Shuttle	18.37 ± 7.78	18.97 ± 6.94	.735
Push-up	13.14 ± 7.07	13.51 ± 6.71	.823
Right hand grip strength (kg)	26.36 ± 4.55	26.45 ± 4.52	.935
Left hand grip strength (kg)	24.80 ± 4.87	24.86 ± 4.85	.959
Biceps (mm)	14.58 ± 4.11	14.95 ± 3.59	.693
Triceps (mm)	21.42 ± 4.91	21.55 ± 4.84	.916
Subscapula (mm)	18.30 ± 6.21	18.36 ± 6.19	.963
Abdominal (mm)	17.77 ± 5.28	17.87 ± 5.23	.935
Suprailiac (mm)	18.57 ± 4.57	18.63 ± 4.54	.954
Bust (mm)	16.58 ± 5.38	16.68 ± 5.32	.938
Thigh (mm)	24.44 ± 5.29	24.52 ± 5.30	.948
Calf (mm)	19.98 ± 5.68	20.08 ± 5.63	.941

***p<0.05**

4. DISCUSSION

While the average body weight measurement results of the subject group females before exercise was 69.98±12.26kg and after exercise was 69.09±12.26kg, control group females first measurement was 73.55±13.41kg and second measurement was 73.76±13.44kg. The difference between the first and second measurement values of the control group females was not found to be statistically significant

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(p> 0.05). It is thought that the body weight of the females in the subject group was positively affected by the exercise they did. Ocak (2016) obtained that physical education and sports college students weighed 68.61±7.13 kg when they started their first year, in the fourth year 76.92±6.76 kg. Zileli et al. (2016) found that the mean body weight of 79 volunteer females done recreational walking exercise, aged 18-54, was 79.29±14.61kg.

It was determined that while the average back strength measurement results of the subject group females before exercise was 45.70±15.12kg and after the exercise was 51.50±16.56kg, the first measurement of the control group females was 46.25±14.38kg, and the second measurement was 46.25±14.44 kg. The difference between the first and second measurement values of the subject group females and control group females was not found to be statistically significant. It is thought that the back strength measurement of the subject group females positively affects by the exercise they did. Şenel and Göral (2014) determined the back strength of sedentary females, aged 21.00, was 68.49±3.29kg, Çınar et al. (2009) found back strength of Handball female's, aged 21.60±1.35, was 88.28±17.22kg.

It was determined that while the average leg strength measurement results of the subject group females before exercise was 50.78 ± 15.58 kg and after the exercise was 56.95±15.34kg, the first measurement of the control group females was 51.91±14.57kg, the second measurement was 51.97±14.57kg. The difference between the first and second measurement values of the subject group females and control group females was not found to be statistically significant. It is thought that the leg strength measurement of the subject group females positively affected by the exercise they did. Ateş (2017) determined that leg strength measurement values of Turkey Biathlon Women national team athletes were 100.2±19.6kg.

It was determined that while the average vertical jump measurement results of the subject group females before exercise was 16.15±4.26cm and after the exercise was 17.39±4.87cm, the first measurement of the control group females was 17.82 ± 4.61 cm, and the second measurement was 18.35±3.97cm. The difference between the first and second measurement values of the subject group females and control group females was not found to be statistically significant (p> 0.05). Karacan and Günay (2003) measured the vertical jump of sedentary females, aged 21, as 23.50 cm. The results of the research support our study.

It was determined that while the average elasticity measurement results of the subject group females before the exercise was 23.12±5.77cm and after the exercise was 24.42±8.55cm, the first measurement of the control group females was 23.62±6.81cm and the second measurement of the control group females was 23.86±6.44cm. The difference between the first and second measurement values of the subject group females and control group females was not found to be statistically significant (p> 0.05). Gerek (2008) female folk dancers' elasticity was measured 27.45 ± 8.47cm, physical educators' elasticity was measured 32.51 ± 5.32cm. Karacan and Günay (2003) sedentary females' elasticity, aged 21, as 26.79cm. The results of the research support our study.

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It was determined that while the average 30 sec. measuring mean number of shuttles pulls of subject group females before the exercise was 17.15±5.03 and after the exercise was 19.68±6.27, the first measurement of the control group females was 18.37±7.78, the second measurement of the control group females was 18.97 ± 6.94. The difference between the first and second measurement values of the subject group females and control group females was not found to be statistically significant (p> 0.05). It is observed that there is an increase in the number of shuttles of the subject group females. This increase is thought to result from the exercises. Bozdoğan and Kızılet (2017) found that the number of straight shuttles of Young Female Footballers in 30 seconds was 45.4±10.

It was determined that while the average 30 sec. number of push-ups of subject group females before the exercise was 15.00±3.68 and after the exercise was 15.87±4.70, the first measurement of the control group females was 13.14±7.07 and the second measurement was also 13.51±6.71. The difference between the first and second measurement values of the subject group females and control group females was not found to be statistically significant (p> 0.05).

It was determined that while the average right-hand grip strength measurement results of the subject group females before the exercise was 26.23±4.67 kg and after the exercise was 27.11±4.68 kg, the first measurement of the control group females was 26.36±4.55 kg and the second measurement of the control group females was 26.45±4.52 kg. The difference between the first and second measurement values of the subject group females and control group females was not found to be statistically significant (p> 0.05). Moreover, it was determined that while the average left-hand grip strength measurement results of the subject group females before the exercise was 24.63±4.96 kg and after the exercise was 25.35±5.13 kg, the first measurement of the control group females was 24.80±4.87kg and the second measurement of the control group females was 24.86±4.85 kg. The difference between the first and second measurement values of the subject group females and control group females was not found to be statistically significant (p> 0.05). Gerek (2008) measured that hand grip strength of female folk dancers was 28.36 ± 3.97kg measurement of the hand grip strength of female body educators was 30.11±3.79kg. Moreover, in a study performed on folk dancers, Kaya (2009) measured the right-hand pence strength as 23.94±2.80 kg. for females playing Zeybek, as 26.20 ± 3.06 kg for females playing Horon; left-hand grip strength as 20.94 ± 4.33 kg for females playing Zeybek, as 25.22 ± 3.99 kg for females playing Horon. The results of the research support our study.

It was determined that while the average biceps measurement results of the subject group females before the exercise was 15.21±4.00 mm and after the exercise was 12.46±2.87 mm, the first measurement of the control group females was 14.58 ± 4.11 mm and the second measurement of the control group females was 14.95±3.59 mm. While the differences between the first and second measurement results of the subject group females were statistically significant, the control group females' measurements were not found to be significant (p> 0.05). It is thought that the decrease of the biceps fat measurement values of the subject group females is due to the exercise program.

It was determined that while the average triceps measurement results of the subject group females before the exercise was 20.96±4.57 mm and after the exercise was 16.54±3.15 mm after the exercise, the

first measurement of the control group females was 21.42±4.91 mm, and the second measurement of the control group females was 21.55 ± 4.84 mm. While the differences between the first and second measurement results of the subject group females were statistically significant, measurements of the control group females were not found to be significant (p> 0.05). Yıldız (2017) found that triceps measurement of adult females was 26.8 ± 6.5 mm. The results of the research support our study.

It was determined that while the average subscapula measurement results of the subject group females before the exercise was 18.92 ± 6.75 mm and after the exercise was 16.48 ± 4.16 mm, the first measurement of the control group females was 18.30 ± 6.21 mm and the second measurement of the control group females was 18.36 ± 6.19 mm. The difference between the first and second measurement values of the subject group females and control group females was not found to be statistically significant (p> 0.05). It is thought that the decrease in the subscapula fat measurement values of the subject group females is due to the exercise program applied. Gökdemir et al. (2009) found that female handball players' subscapula fat measurements were 6.9 ± 0.7 mm.

It was determined that while the average abdominal measurement results of the subject group females before the exercise was 18.28 ± 5.73 mm after the exercise was 14.27 ± 3.99 mm, the first measurement of the control group females was 17.77 ± 5.28 mm and the second measurement of the control group females was 17.87 ± 5.23 mm. While the differences between the first and second measurement results of the subject group females were statistically significant, the control group females' measurements were not found to be significant (p> 0.05).

It was found that subrailiac measurement results of the subject group females before the exercise was 18.35±5.20 mm and after the exercise was 14.90 ± 3.33 mm, the first measurement of the control group females was 18.57 ± 4.57 mm and the second measurement of the control group females was 18.63 ± 4.54 mm. While the differences between the first and second measurement results of the subject group females were statistically significant, the control group females' measurements were not found to be significant (p>0.05). The significant decrease in subrailiac fat ratios is thought to be due to the exercise program applied. Yıldız (2017) found that suprailiac measurements of adult females were 32.3±5.4mm, Gökdemir et al. (2009) found that female handball players' iliac fat measurements were 13.6±2.8 mm. These studies conducted support our research results.

The average of the pectoralis major (chest) measurement of the subject group females before exercise was 17.65 ± 5.86 mm and after the exercise 13.82 ± 3.86 mm, the first measurement of the control group females was 16.58±5.38 mm and the second measurement of the control group females was 16.68 ± 5.32 mm. While the differences between the first and second measurement results of the subject group females were statistically significant, the control group females' measurements were not found to be significant (p>0.05).

It was determined that while the average thigh measurement results of the subject group females before exercise were 26.43±6.78 mm and after the exercise were 20.69±5.30 mm, the first measurement of the control group females was 24.44 ± 5.29 mm and the second measurement of the control group

females was 24.52 ± 5.30mm. While the differences between the first and second measurement results of the subject group females were statistically significant, the control group females' measurements were not found to be significant (p> 0.05). It is thought that the significant decrease in thigh fat ratios is due to the exercise program applied. Yıldız (2017) found that the thigh measurements of the adult female were 35.4 ± 6.0mm. Studies conducted support our research results.

It was determined that while the average Calf measurement results of the subject group females before exercise were 19.43 ± 6.37 mm and after the exercise were 16.87 ± 5.12 mm, the first measurement of the control group females was 19.98 ± 5.68 mm and the second measurement of the control group females was 20.08 ± 5.63mm. The differences between the first and second measurement results of the control group females and the subject group females were not statistically significant (p> 0.05). It is thought that the significant decrease in the Calf fat ratio of the subject group females was due to the exercise program applied. Ateş (2017) found Calf fat ratio values of female athletes as %21.8 ± 4.34. Zileli et al. (2016) determined that the Calf fat ratio of 79 volunteer females, aged 18-54 doing recreational walking exercise at Bilecik Şeyh Edebali Stadium, was %37.6 ± 6.47mm. Kolukisa (2017), in his study on 52 obese sedentary females, middle aged (32.00 ± 0.9), the average of body fat of females was 36.69mm. On the other hand, Kaya (2009) found that the Calf fat ratio of playing females Zeybek was %13.93 ± 4.18 mm and the Calf fat ratio of playing females Horon was %1910.05 ± 2.77mm in a study conducted on folk dancers.

After the 12-week recreational exercise program, there exist differences emerged in the participants in terms of physical, physiological and anthrepometric characteristics, depending on the exercise program applied as a result of the measurements taken from the subject group females before and after the exercise. As a result, it was observed that the exercise program applied improved the physical, physiological and anthrepometric characteristics of the subjects.

5. CONCLUSION

The aim of this study was to investigate of the effects of 12-week recreative exercise programme on body weight, hand grip strength, back strength, leg strength, elasticity and body composition of female. While the test results such as the body weight, hand grip strength, back strength, leg strength, elasticity, push-up, sit-ups and calf fat, were not obtained to be statistically significant between the subject and control group females (p> 0.05), the differences between the body fat measurement values of the females in the subject group were obtain to be statistically significant (p<0.05).

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Author Contributions

All authors contributed to the article equally.

Conflict of Interest

The authors did not state any conflict of interest in their study and publication.

Ethical text

"In this article, the journal writing rules, publication principles, research and publication ethics, and journal ethical rules were followed. The responsibility belongs to the author (s) for any violations that may arise regarding the article. "

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