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The Effects of 10-Week Reformer Exercises on Postural Impairment and Physical Parameters

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Abstract

In this study, the effects of 10-week reformer pilates exercises on possible scoliosis and some physical parameters were investigated. Twenty-three sendanter women with a mean age of 29.13 ± 4.47 years participated in the study. A reformer pilates exercise program consisting of 60-minute sessions for 10 weeks/3 days was applied to the participants. Possible scoliosis and sit-reach flexibility tests were performed by taking the measurements of the participants height, body weight, chest, waist, hip and left leg circumference. All tests and measurements were carried out before starting the 10-week exercise program and after the 10-week program was completed. The data obtained from the study were analyzed using the SPSS 15.0 package program. The normality distribution of the data was made by the shapiro-wilk test. All parameters showing normal distribution were tested with one-way anova. According to the results of the data, a statistically significant decreases was found between the pre-post test data of scoliosis, body weight, body mass index, body fat ratio, chest-waist-hip-right-left leg circumference ($p<0.05$). There was a significant increase in sit-reach test results ($p<0.05$). As a result, it is possible to talk about the positive effect of our exercise program on posture disorders and physical parameters, it can be applied in this age group.

Keywords: Reformer pilates, Scoliosis, Flexibility, Body mass index.

10 Haftalık Reformer Egzersizlerinin Postür Bozukluğu ve Fiziksel Parametreler Üzerine Etkileri

Özet

Bu çalışmada 10 haftalık reformer pilates egzersizlerinin olası skolyoz ve bazı fiziksel parametreler üzerindeki etkileri araştırıldı. Çalışmaya yaş ortalaması 29.13 ± 4.47 yıl olan 23 sedanter kadın katıldı. Katılımcılara 10 hafta/3 gün boyunca 60 dakikalık seanslardan oluşan reformer pilates egzersiz programı uygulandı. Katılımcıların boy, vücut ağırlığı, göğüs, bel, kalça ve sol bacak çevresi ölçümleri alınarak olası skolyoz ve otur-uzan esneklik testleri yapıldı. Tüm testler ve ölçümler 10 haftalık egzersiz programına başlamadan önce ve 10 haftalık program tamamlandıktan sonra yapıldı. Çalışmadan elde edilen veriler SPSS 15.0 paket programı kullanılarak analiz edilmiştir. Verilerin normallik dağılımı shapiro-wilk testi ile yapılmıştır. Normal dağılım gösteren tüm parametreler tek yönlü anova ile test edilmiştir. Verilerin sonuçlarına göre skolyoz, vücut ağırlığı, vücut kitle indeksi, vücut yağ oranı, göğüs-bel-kalça-sağ-sol bacak çevresi ön son test verileri arasında istatistiksel olarak anlamlı azalma bulundu ($p<0.05$). Otur-eriş testi sonuçlarında anlamlı bir artış vardı ($p<0.05$). Sonuç olarak egzersiz programımızın duruş bozukluklarına ve fiziksel parametrelere olumlu etkisinden bahsetmek mümkündür ve bu yaş grubunda uygulanabilir.

Anahtar Kelimeler: Reformer pilates, Skolyoz, Esneklik, Vücut kütle indeksi.

INTRODUCTION

Pilates; It consists of more than 500 exercises ranging from beginner level to advanced level performed with mat work or pilates devices. These devices are: cadillac, wunda chair, reformer, barrel, spine corrector (19). Reformer; It is a tool that works against spring resistance with a sliding carrier, bar and ropes. The most important feature of this tool is that the studies are against springs, not against gravity (23). The main purpose of exercising on the reformer is to strengthen the body, as well as to give the body the right flexibility within the framework of its current potential, to correct posture disorders, and to remain loyal to the principles of fluent movement at an appropriate pace by keeping the correct breathing in control during all these practices (16). Pilates exercises have been included in general sports activities and rehabilitation programs in recent years (2).

Scoliosis is generally defined as the lateral curvature of the spine in the frontal plane. It is a pathology that can lead to cardiopulmonary complications if it progresses as well as causing deformation in the body. The cause of 75-80% of scoliosis cases is unknown (idiopathic), it emerges unnoticed over time in a normal healthy child and progresses with skeletal development (12, 13). Pilates has gained a popular place in both fitness and rehabilitation, although there is little scientific evidence about the possible benefits of pilates exercises in achieving postural symmetry. It is thought that pilates exercises can be recommended to reduce physical fall risk factors, as it has been observed that it reduces thoracic kyphosis even slightly in healthy elderly people and that balance, mobility and postural stability improve significantly (20, 7).

The effects of pilates exercises on chronic pain, scoliosis treatment, osteoarthritis treatment, mobility in hospitalized patients, activity development, flexibility and body composition in gymnasts have been the subject of research in a limited number of studies (25, 26, 18). In the literature, there are studies showing that pilates exercises improve flexibility and body composition (6, 9, 11).

Body composition is a key element of a person's health and physical fitness profile. Obesity is a serious health problem that decreases life expectancy by increasing the risk of developing coronary artery diseases, hypertension, type II diabetes, pulmonary diseases that cause obstruction, osteoarthritis and some types of cancer. Too little fat is also a health risk because the body needs a certain amount of fat for normal physiological functions (21). Long-term lack of movement in the human body causes some functional abilities not to be used as desired, which leads to many diseases (obesity, blood pressure, diabetes, cardiovascular diseases, heart attack, etc.). It is known that exercise and an active lifestyle have a very important role in preventing such diseases. Exercise, which is likened to a drug that improves human health, is reported to improve body composition and physical fitness parameters when done regularly (8). In this study, the effect of reformer pilates exercise program on posture disorders and some physical parameters was examined. With the data we have obtained, it can be said that the exercise program that individuals can easily apply can be beneficial in protecting their posture health.

METHOD

23 healthy sedentary women (n = 23) with an average age of 29.13 ± 4.47 who attended the pilates center participated in the study voluntarily. Exercises were performed in a private gym under the supervision of expert trainers. All participants were informed about the study and a voluntary consent form was signed. The physical activity levels of the volunteers were evaluated by filling in the "International Physical Activity Questionnaire (IPAQ)" (17), and those with a metabolic equivalent (MET) <600 were included in the study.

Training Protocol

A reformer pilates exercise program was applied to the participants for 10 weeks / 3 days (Table 1). The exercises were carried out between 9:00 - 10:30 in the morning. Exercises started with 10 minutes of warm-up movements and finished with 10 minutes of cooling movements. Sessions lasted 60 minutes. All participants were verbally motivated during the exercise, and the movements were implemented fluently and accurately by expert trainers.

Scoliosis and sit-lie flexibility tests were performed by taking the measurements of the participants' height, body weight, chest, waist, hip and left leg. All tests and measurements were carried out by applying a full rest 1 day before the 10-week exercise program and 1 day after the 10

week exercise program. Participants were warned to avoid strenuous physical activity for 10 weeks.

Table 1. Reformer pilates exercise program

Exercises	Rep	Set	Intensity (%)	Time (minute)	Frequency (week)
Double Leg Press	10	3	%40-60	60	3
Feet in Starps	10	3	%40-60	60	3
Froggie	10	3	%40-60	60	3
Standing Abduction	10	3	%40-60	60	3
Bridge	10	3	%40-60	60	3
Chest Fly	10	3	%40-60	60	3
Pulling Straps	10	3	%40-60	60	3
Lunge Stretch	10	3	%40-60	60	3
Teaser	10	3	%40-60	60	3
The Half Swan	10	3	%40-60	60	3
The Gift	10	3	%40-60	60	3
Twist Stomach	10	3	%40-60	60	3

Anthropometric Measurements

In our study, body weight, fat percentage and body mass index (BMI) were measured with the Tanita-TBF 300 (Japan) device. Height was measured with Seca 769 (Hamburg, Germany). Chest, waist, hip and left leg measurements were recorded at 0.1 cm sensitivity level, while the participants were measured in a standing upright position using a tape measure.

Sit-Reach Flexibility Test

Participants sat with their knees extended in full extension and their heels firmly resting on the test box. They put their right hand on their left hand with their long fingers evenly and were asked to reach forward as far as they could stretch their hands along the measuring board without bending their knees, and wait 2 seconds at the last point where they reached out. The score (in centimeters) is the greatest distance the fingertips come into contact with across the toes. The measurement was repeated three times and the highest value was recorded (4).

Adam's Forward Bend Test

It is a fast and reliable test to diagnose scoliosis. The participant is first asked to stand upright and then lean forward 90 degrees from the waist. In the meantime, knees and toes should be straight, and there should be 10 cm distance between the feet. The palms of the hands should face each other, the arms should hang down loosely. The curvature of the spine was evaluated with the Scoliometer (Orthopedic Systems Inc., Hayward, CA). Suspected scoliosis is diagnosed if one side of the rib cage and / or lower back shows asymmetry. If this curvature is more than 10 degrees, it should be evaluated radiologically (24).

Statistical analysis

The data obtained from the study were analyzed using the SPSS 15.0 package program. The normality distribution of the data was made by the shapiro-wilk test. All parameters showing normal distribution were tested with one-way analysis of variance. All parameters of the participants were shown as minimum, maximum, mean and standard deviation. Significance value was accepted as $p < 0.05$.

RESULTS

Descriptive parameters of the participants are shown in Table 2.

Table 2. Descriptive parameters of participants

Parameters	Minimum	Maximum	Mean±SD
Age (years)	22.00	40.00	29.13±4.47
Height (cm)	155.00	177.00	165.21±5.59
Body weight (kg)	49.00	90.50	70.42±12.89
Body mass index (kg/cm^2)	19.60	32.00	25.66±3.98
Body fat (%)	17.40	43.30	33.24±7.22

The comparison of the pre and post test values of the 10-week reformer pilates exercises is shown in Table 3. According to this; There was a statistically significant

difference between the pre-post test data of scoliosis, body weight, body mass index, body fat ratio, sit-lie down, chest-waist-hip-right-left leg circumference measurements ($p < 0.05$).

Table 3. Comparison of the pre and post test values of the participants

Parameters	Pre Test		Post Test		p
	Min-Max	Mean±SD	Min-Max	Mean±SD	
BW (kg)	49-90.50	70.42±12.89	48-86.20	67.72±11.16	.01*
BMI (kg/cm²)	16.60-32	25.66±3.98	19-29	24.19±3.35	.00*
Body fat (%)	17.40-43.30	33.24±7.22	17.40-41	31.73±6.75	.00*
Sit-reach (cm)	7-23	13.82±4.01	10-33	21±5.94	.00*
Possible scoliosis (°)	5-9	6.91±1.41	2-7	4.30±1.18	.00*
Chest circumference (cm)	78-117	93.69±8.99	77-110	89.04±7.49	.00*
Waist circumference (cm)	71-104	82.86±8.03	62-88	74.95±7.40	.00*
Hip (cm)	91-129	105.86±10.44	85-118	99.82±8.40	.00*
Left leg (cm)	60-75	58.56±12.80	48-71	56.69±5.36	.00*
Right leg (cm)	59-76	58.12±11.52	49-71	56.55±6.21	.00*

*p<0.05; BW: Body weight, BMI: Body mass index.

DISCUSSION

It is stated that sedentary life, which has an important effect on human health, is at a higher level in women and causes a serious decrease in daily energy consumption with the advancement of age. In recent years, the effect of pilates, which is a very popular exercise approach especially among women, on postural disorder and some physical parameters has been investigated. In a study, the effects of pilates reformer exercises on thigh circumference measurement and hamstring flexibility in sedentary women were examined. As a result of an exercise program performed for 8 weeks/3 days, it has been found that it is beneficial by causing an increase in the flexibility of the posterior thigh muscles-hamstring (14). Another study examined the effects of pilates reformer exercises on body weight, muscle circumference, and flexibility. As a result of the exercise program applied to volunteering women for 6 weeks/2 days; It was reported that there was a decrease in thigh circumference, lower leg and body weight values, and an increase in upper arm, flexibility and hand grip strength values (15). Emery et al. (2010) investigated the effects of a 1-hour pilates training program twice a week on arm-body posture, strength and flexibility. He applied Pilates exercise to his studies. As a result of the study, it was reported that the Pilates training program was effective in improving abdominal strength, stabilizing the upper spine posture as well as the central posture (10). In another study, the effects of 8-week reformer pilates exercises applied to sedentary women on body composition and some physical fitness parameters were examined. As a result, it was determined that 8-week reformer pilates exercises significantly improved body fat percentage, circumference measurements (leg, hip, waist and chest regions) and physical fitness parameters (flexibility, balance, strength, body fat percentage) (1). Aslan (2019) examined the effect of 3 months/week 2 days, 90 minutes mat and reformer pilates training program on body composition. When the pre-test and post-test values were compared, it was found that there was a significant difference in chest circumference, waist circumference, abdominal circumference, hip circumference, right arm circumference, left arm circumference, right leg circumference, left leg circumference, body weight and BMI in both groups. (3). In another study, it was reported that 8-week reformer pilates exercises had a positive effect on flexibility and accelerated weight loss in women (22). Bastik and Cicioğlu (2020) reported that 8-week mat and reformer pilates exercises have positive effects on waist-hip ratios and body compositions of middle-aged sedentary women (5).

In this study, a statistically significant difference was found between the pre-post test data of scoliosis, body weight, body mass index, body fat ratio, flexibility, chest-waist-hip-right-left leg

circumference measurements of 10-week reformer pilates exercises. When our results are compared with the study results in the literature, it is possible to talk about the positive effect of pilates exercises on posture disorders and body composition.

RESULTS

Regular participation of the person in pilates exercises can be used effectively in the positive change of body composition, in the treatment of posture disorders, and in gaining flexibility. In Pilates exercises, the benefits of both mat work and different training models with pilates devices have been shown in the studies in the literature. In the exercise program we applied in this study, there was a significant decrease in scoliosis, body weight, body mass index, body fat ratio, chest-waist-hip-right-left leg circumference measurements, and a significant increase in the sit-reach test in sedentary women whose mean age was 29.13±4.47 years. has created. It is possible to say that the exercise program we applied had positive effects on the parameters we examined.

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