An Investigation of Dance Based Aquatic and Zumba Exercise in Sedentary Women According to Motoric and Physiological Parameters

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Abstract

The aim of the study investigated the effects of zumba and aquatic exercises on anthropometric and motoric properties in sedentary women. This research consists of sedentary women (average age-sd= 41.90 ± 8.75) who regularly participate in zumba (n=30) and aquatic (n=30) exercises three days a week. Body composition analysis was determined using the bioelectrical impedance method. Body weight (kg) and height, waist, hip, chest, and thigh circumferences, flexibility and balance biomotor properties were measured for all subjects before and after the study. Paired-sample t-test and Wilcoxon signed-rank test were used for statistical analysis. When the pre- and post-exercise values of the groups were compared, it was determined that body weight (KG), body mass index (BMI), lean body mass (LBM), flexibility, balance, fat mass, chest, hip, waist circumference and body fat percentage were found in the aquatic exercise group. While there were statistically significant differences between these parameters, the women's body weight, body mass index (BMI), lean body mass (LBM), flexibility, balance, fat mass, chest, hip, waist circumference and body fat percentage (BFP) were found in the zumba exercise group. A statistically significant difference was found between the measurements. When the groups were compared, significant differences were found only in the parameters of fat mass, flexibility and balance.

Dans Temelli Akuatik ve Zumba Egzersizinin Sedanter Kadınlarda Motorik ve Fizyolojik Parametrelere Göre İncelenmesi

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Öz

Çalışmanın amacı, sedanter kadınlarda zumba ve akuatik egzersizlerinin antropometrik ve motorik özelliklere etkisini incelemektir. Bu araştırma, haftada üç gün düzenli olarak zumba (n=30) ve akuatik (n=30) egzersizlerine katılan yaş ortalaması (yaş ort.-ss= 41.90 ± 8.75) sedanter kadından oluşmaktadır. Vücut kompozisyon analizi biyoelektrik empedans yöntemi kullanılarak belirlendi. Tüm denekler için çalışma öncesi ve sonrasında vücut ağırlığı (kg) ve boy, bel, kalça, göğüs, uyluk çevresi ölçümleri ile esneklik ve denge biyomotor özellikleri ölçümleri yapıldı. İstatistiksel analiz olarak eşleştirilmiş örneklem t testi ve Wilcoxon işaretli sıra testi kullanıldı. Grupların egzersiz öncesi ve sonrası değerleri karşılaştırıldığında, vücut ağırlığı (KG), vücut kitle indeksi (VKİ) yağsız vücut kütle (YVK), esneklik, denge, yağ kütlesi, göğüs, kalça, bel çevresi ve vücut yağ yüzdesi olarak, akuatik egzersiz grubunda tüm bu parametreler arasında istatistiksel olarak anlamlı farklılıklar bulunurken, zumba egzersiz grubunda kadınların vücut ağırlığı, vücut kitle indeksi (VKİ), yağsız vücut kütle (YVK), esneklik, denge, yağ kütlesi, göğüs, kalça, bel çevresi ve vücut yağ yüzdesi (VYY) ölçümleri arasında istatistiksel olarak anlamlı bir fark bulunmuştur. Gruplar karşılaştırıldığında yalnızca (YVK), yağ kütlesi, esneklik ve denge parametrelerinde anlamlı farklılıklar bulunmuştur.

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INTRODUCTION

Exercise; planned, structured, repetitive, continuous activities aimed at improving one or more elements of physical fitness (Özer, 2001). Physical activity is one of the best ways to improve one's physical, psychological and emotional health (Amyhsiu et al., 2009). Physical activity has a protective effect against the development of coronary heart diseases, hypertension, obesity, diabetes, osteoporosis and some types of cancer. The vast majority of scientific studies have reported a significant reduction in the risk of these diseases in physically active people (İşleğen, 2009). In addition, regular physical activity and a healthy lifestyle are important in terms of feeling better, maintaining weight and maintaining health (Ateş et al., 2009). Sedentary life makes people lazy and can cause many diseases that will negatively affect human life. The most important problem that people face in our daily lives: The decrease in the need for movement leads to a kind of sedentary lifestyle, while today's technology is developing rapidly (Arslan et al., 2016). The decrease in the need to move also brings with it diseases and metabolism disorders, which are among the problems of today. Considering the situation in question, it is necessary to do physical activity at every opportunity and everywhere, and to activate the body (Aydoğan et al., 2015).

It is conducted in the literature that doing activities in water is easier and more effective than land training in terms of relaxation, pain control and strengthening (Demirer, 2017). In-water exercises are applied in targeted pools of appropriate depth and temperature, depending on the disease and the person, and both physiological and physical properties of water are utilized in these activities. With the contact of water with the body, a great deal of comfort is provided in joint range of motion, joint flexibility and mobility (Demirdal, 2012). It has been observed that successful results have been obtained in the treatment of many diseases with in-water exercises. To illustrate; Flexibility increases, less load is placed on the body, muscles, tendons, ligaments (Abbas et al., 2017). For this reason, aquatic exercise has become the basis of physical therapy work programs (Yazigi et al., 2013). Besides, Zumba fitness is a new kind of dance exercise inspired by Latin American music and Latin American dances. This exercise is a basic combination of merengue, salsa, samba, cumbia, reggeaton and other Latin American dances using basic aerobic steps, additionally hip - hop, belly dance, Indian, African dance, etc. It is a type of exercise enriched with other dance compositions (Ljubojevic et al., 2014). Studies have validated that the use of various forms of the zumba fitness program has found statistically significant results in improving the functional and motoric abilities of individuals (Sebic et al.,

2016). When previous studies are examined, it is seen that aquatic exercises and zumba exercises are effective in some parameters on the body separately. However, there has not been a study comparing aquatic and zumba exercises together. It is aimed to examine the effects of aquatic and zumba exercises on anthropometric, body composition, balance, and flexibility levels in sedentary women. It was hypothesized that aquatic exercises because of the resistance against water would be more effective than zumba exercises that based on dry land.

METHODOLOGY

Subjects

A total of 60 sedentary women aged between 25-45 voluntarily participated in this study. The groups were randomly divided into two groups as (n=30) Aquatic Exercise Group (AEG) and (n=30) Zumba Exercise Group (ZEG), and the women were informed in detail about the exercise models before the study. The inclusion criteria for the study, including not having

any chronic or acute disease and pregnancy status, not smoking, not participating in any exercise program for at least one year before the study. The study was approved by Hitit University Non-Interventional Ethics Committee, and an informed consent form was signed by the women by the Declaration of Helsinki This study was conducted in Çorum Municipality Buhara Women's Cultural Center swimming pool and dance halls.

Applied Training Program

Aquatic and zumba dance exercises were applied to the participants during 8 weeks, 3 days times in a week, 50 minutes taken in each session, in addition, the intensity of exercise for both groups was determined by using corvonen formula as 50-60% of the heartbeat reserve (Ateş, Saygın, & Zorba, 2013).

The Music that was used for all sessions, was chosen by the researcher to include rhythms for women to use their heart rate reserve of 31%-37% for warming up and 50-60% for the main phase.

Aquatic Exercise

The program consisted of 10 minutes of warm-up, 30 minutes of exercise, and 10 minutes of cool-down, each session was made by a professional trainer, and those who interrupted or abandoned the work as much as the specified number of sessions were not included. In the aquatic exercise, the exercises detailed Table 1, were performed by using water-specific equipment in water gymnastics.

Warm-up phase

The exercise was initiated with a 10-minute warm-up period consisting of back-to-back moderate stretching exercises covering all joints and muscles. It was applied in the 27°C pool. These movements (simple to difficult movements, steps with increasing music from slow to fast, walking, walking side to side).

Main phase

1. Walking in water. (W)
2. Running in place by raising the knees. (R)
3. Jumping in place by moving the legs sideways to the right and left, respectively. (JS)
4. Jumping in place by moving the legs forward and backward. (J)
5. Pull the knees to the abdomen by jumping to the right and left, respectively. (PJ)
6. Reaching up with the right and left arms while pulling the knees up. (KU)
7. Hands locked up and down at the level of the abdomen. (H)
8. Do squat movements with a pool noodle in your hands with arms wide open and up and down. (HD)

Cooling phase

For cooling, stretching movements were performed for 10 minutes accompanied by light music. The dance-based exercise program is included in Table 1.

Table 1

Dance-Based Aquatic Exercise Program

	Warm up (10 min) cool down (10 min)			**Exercise main phase (30 min)**		
Week	***Exercise***	**Intensity (%)**	***ACSM criteria***	**Type of exercise and frequency of movement**	**Intensity (%)**	***ACSM criteria***
1	Consecutive moderate stretches that cover all joints and muscles	30	Light	5 min-W, 5 min --R,JS, 5 min JS,J, 5 min –PJ, 5 min –KU,H 5 min H,HD, 5 min –JS, J	40-60	Moderate
2		30-40	Light	5 min-W, 5 min --R,JS, 5 min JS,J, 5 min –PJ, 5 min –KU,H 5 min H,HD, 5 min –JS, J	40-60	Moderate
3		30-40	Light	5 min-W, 5 min --R,JS, 5 min JS,J, 5 min –PJ, 5 min –KU,H 5 min H,HD, 5 min –JS, J	40-60	Moderate
4		30-40	Light	5 min-W, 5 min --R,JS, 5 min JS,J, 5 min –PJ, 5 min –KU,H 5 min H,HD, 5 min –JS, J	40-60	Moderate
5		30-40	Light	5 min-W, 5 min --R,JS, 5 min JS,J, 5 min –PJ, 5 min –KU,H 5 min H,HD, 5 min –JS, J	40-60	Moderate
6		30-40	Light	5 min-W, 5 min --R,JS, 5 min JS,J, 5 min –PJ, 5 min –KU,H 5 min H,HD, 5 min –JS, J	40-60	Moderate Hard
7		30-40	Light	5 min-W, 5 min --R,JS, 5 min JS,J, 5 min –PJ, 5 min –KU,H 5 min H,HD, 5 min –JS, J	60	Hard
8		30-40	Light	5 min-W, 5 min --R,JS, 5 min JS,J, 5 min –PJ, 5 min –KU,H 5 min H,HD, 5 min –JS, J	60	Hard

Walking in water (W); Running in place with knees raised (R); Jumping in place by moving the legs sideways to the right and left, respectively (JS); Hands locked up and down at the level of the abdomen (H); With the pool noodlee, squatting up and down in the hands with the arms shoulder-width apart (HD); Pulling the knees to the abdomen by jumping to the right and left, respectively (PJ); Reaching up with the right and left arms while pulling the knees up (KU); The training intensity was adjusted by ACSM recommendations as Heart Rate Reserve Percent (%).

Zumba Exercises

Choreography consisting of complicated movements accompanied by different dance music was applied to the participants in the dance hall. This application was created from 8-10 pieces of zumba music. Each music is completed in 1 to 3 minutes. Rest intervals were applied as 15-30 seconds. The participants began with a 10-minute warm-up period consisting of back-to-back moderate stretching exercises that covered all joints and muscles. Warm-up exercises consisted of simple to difficult movements, slow to fast steps with increasing music, walking, walking side to side. At the last of the zumba dance workout, stretching movements

were performed for 10 minutes accompanied by light music for cooldown. Before participating in the workout, the participants were asked not to eat at least 2 hours before.

Data Collection Tools

Anthropometric Measurements

Chest, hip, waist, and upper leg circumference measurements were performed with an anthropometric tape measure. All measurements were carried out by the same practitioner. Two measurements were taken from each region and the average was recorded.

Body Composition Measurements

Body composition analyses were made twice throughout the study, before and at the end of the study, by using the Tanita MC 780 Black body analyzer for both groups in the study. Physical measurements (Standardized test procedures) were made by the standards specified in the ACSM, and height, bodyweight measurements were taken at 08:00 in the morning on an empty stomach, and pre-tests and post-tests were performed by the same person.

Biomotor Tests

Balance

Flamingo balance test was used to determine participants balance. In this test, a 50 cm long, 4 cm high and 3 cm wide wooden beam and a Casio digital stopwatch were used. With this test, it is aimed to determine the participan's static balance. The participant was asked to hold one foot on the foot apparatus, bend the other foot back and hold it with the hand on the same side, and stand like a flamingo. At the beginning, the participant was kept in balance by holding the helper's arm. Then the time was started when the helper release the participant's arm. If the position is broken, the foot slips and the hand leaves the leg, the time was stopped. The number of falls within 60 seconds is recorded (Buzdağlı., 2018, s. 28).

Flexibility

Flexibility was determined by using sit and reach test for each subject. The subject's legs are placed in a straight long sitting position. The degrees obtained by holding for two seconds after four stretches were recorded in centimeters (cm) (Simoneau., 1998).

Analysis of Data

Statistical analysis of the data was performed using SPSS 20.0 (Statistical Package for the Social Sciences, Version 22.0, SPSS Inc., Chicago, IL, USA). For the selection of parametric and non-parametric tests, the normality assumption distribution was evaluated with the Shapiro-Wilk test. The homogeneity of the groups was checked with the Levene test. Depending on the data distribution, numerical variables are presented as mean ± SD or median (minimum-maximum). Independent sample t-test was used for normally distributed data and Mann Whitney U test was used for non-normally distributed data to compare numerical measurements between two independent groups. Paired sample t-test was used for normally distributed data and Wilcoxon signed-rank test was used for non-normally distributed data to compare dependent measurements (Pre-post). The significance level was determined as $p<0.05$ for all tests.

FINDINGS

The average age, weight and height of the participants are presented in Table 2.

Table 2

The Characteristics features of groups

Variables	Aquatic (n=30)		Zumba (n=30)	
	$\bar{X} \pm SD$	Min - Max	$\bar{X} \pm SD$	Min - Max
Age	39.76±4.40	26 - 45	37.93±5.55	25 - 45
Body height (cm)	159.93±4.40	152 -170	158.43±5.92	149 - 173
Body mass (kg)	72.12±8.88	51.40 – 93.50	70.41±12.95	45.40 – 98.20

As seen in Table 2, the average age of the participants in the aquatic exercise group participating in the study was 39.76±4.40 years. The mean age of the Zumba group is 37.93±5.55. While the average height of the aquatic group is 159.39±.40, the average height of the zumba group is 158.43±5.92. While the average weight of the aquatic group is 72.12±8.88, the average weight of the zumba group is 70.41±12.95.

The effects of aquatic exercise on body composition regarding the body weight, body mass index, fat mass, and body fat percentage values were presented in Table 3.

Table 3

The effects of aquatic exercise and zumba on body composition.

		Aquatic			Zumba			
Variables	**Test**	$\bar{X} \pm SD$	**Δ %**	**p**	$\bar{X} \pm SD$	**Δ %**	**p**	**p**
BM (kg)	**Pre**	72.12±8.88	-4.09	**<0.001**[a]	70.41±12.95	-5.08	**<0.001**[a]	0.410[a]
	Post	69.17±8.66			66.83±11.35			
BMI (kg/m^2)	**Pre**	28.24±3.28	-6.23	**<0.001**[a]	28.14±2.28	-8.35	**<0.001**[a]	0.211[a]
	Post	26.48±3.70			25.79±5.28			
FFM (kg)	**Pre**	43.83±2.73	3.88	**<0.001**[a]	43.09±4.84	6.63	**<0.001**[a]	**0.006**[a]
	Post	45.60±2.62			46.15±5.10			
Fat Mass (kg)	**Pre**	34.25±7.20	-5.61	**<0.001**[b]	33.85±7.97	-8.15	**<0.001**[b]	**0.048**[b]
	Post	32.33±7.41			31.09±6.79			
Body Fat Percentage (%)	**Pre**	35.61±5.48	-5.62	**<0.001**[a]	37.14±7.93	-8.18	**0.010**[a]	0.286[a]
	Post	33.61±5.77			34.10±7.26			
Chest (cm)	**Pre**	99.06±7.89	-3.66	**<0.001**[b]	96.86±11.62	-5.12	**<0.001**[b]	0.941[b]
	Post	95.43±8.09			91.90±8.42			
Thigh (cm)	**Pre**	85.56±8.46	-3.1	**<0.001**[b]	84.10±13.97	-4.57	**<0.001**[b]	0.221[b]
	Post	82.83±8.94			80.26±12.13			
Hip (cm)	**Pre**	109.23±6.86	-8.03	**<0.001**[b]	105.80±98.90	-6.52	**<0.001**[b]	0.941[b]
	Post	100.46±13.93			98.90±11.57			

Table 3 (Cont.).

The effects of aquatic exercise and zumba on body composition.

		Aquatic			Zumba			
Variables	**Test**	**$\bar{X} \pm SD$**	**Δ %**	**p**	**$\bar{X} \pm SD$**	**Δ %**	**p**	**p**
Waist (cm)	**Pre**	85.56±8.46	-3.19	**<0.001[b]**	84.10±13.97	-4.60	**<0.001[b]**	0.202[b]
	Post	82.83±8.94			80.23±12.16			
Flexibility (cm)	**Pre**	11.06±1.98	95.30	**<0.001[b]**	10.80±1.98	68.80	**<0.001[b]**	**<0.001[b]**
	Post	21.6±2.26			18.23±1.83			
Balance (score)	**Pre**	33.96±5.52	-12.54	**<0.001[b]**	35.23±5.95	-6.53	**<0.001[b]**	**<0.001[b]**
	Post	29.70±6.61			32.93±6.14			

The results obtained in the physical parameters of the aquatic and zumba exercise group are presented in Table 3, respectively. When the effects of aquatic exercise on body composition were examined, the body weight, body mass index, fat mass, and body fat percentage were decreased significantly (-4.09%; -6.23%; -5.61%; -5.62% respectively) throughout the study. Besides, lean body mass increased the rate by 3.88% (Table 3). In the Zumba exercise group, significant decreases were found in body weight, body mass index, fat mass and body fat percentage (-5.08%. -8.35%. -8.15%. -8.18% respectively). Similar to the aquatic exercise model, there was an increase of 6.63% in lean body mass (Table 3).

DISCUSSION AND CONCLUSION

The study was carried out to compare the effects on body composition anthropometric and flexibility and balance during the two different exercise models. When the effects of aquatic exercise on body composition were examined, the body weight, body mass index, fat mass, and body fat percentage were decreased significantly (-4.09%; -6.23%; -5.61%; -5.62% respectively) throughout the study. Besides, lean body mass increased the rate by 3.88% (Table 3). In the Zumba exercise group, significant decreases were found in body weight, body mass index, fat mass and body fat percentage (-5.08%. -8.35%. -8.15%. -8.18% respectively). Similar to the aquatic exercise model, there was an increase of 6.63% in lean body mass (Table 3). In addition to these findings, it was revealed that zumba exercises provided a significantly greater increase in lean body mass in participants than aquatic exercises.

When the literature studies were investigated, Costa, Goncalves, Barbosa, Marinho, and Silva (2014) reported that as a result of exercise performed in water for 40 minutes two days a week, fat masses decreased and there was a significant improvement in body composition. In the research of Raffaelli, Milanese, Lanza, and Zamparo (2016), a significant decrease in fat mass (-3.8%) and a significant increase in fat-free mass of the arms (2.4%) and trunk (0.9%) as a result of in-pool aquatic exercises, in which each exercise was planned for 45 minutes, 2 days a week in 9 weeks. Bayrakdar, Kılınç, Kayantaş, and Günay (2020) reported a significant decrease in body weight (-4.80%). Subcutaneous fat thickness (-4.87%). and body fat percentage (-5.75%) in zumba exercises performed regularly for 12 weeks. Bergamin, Ermolao, Tolomio, Berton, Sergi, and Zaccaria (2013) stated that the fat mass of the individuals participating in the study decreased by 4%. The predominantly used forearm fat ratio decreased by 9.2% and the calf muscle density (1.8%) increased with the exercises they performed in the thermal pool in their study planned as 2 days a week for 6 months. Özcan, İrez, Saygın and Ceylan (2018) applied aqua-pilates exercises to healthy young women for 60 minutes 2 days a week for 12 weeks. They reported significant decreases in body weight

(0.80%) body mass index (1.05%) and body fat percentage (1.34%). Bayrakdar et al, (2020) stated that in zumba exercises performed regularly for 12 weeks a significant decrease was found in body weight (-4.80%), subcutaneous fat thickness (-4.87%), and body fat percentage (-5.75%). Oktay (2018) reported that as a result of the participation in 8-week zumba exercises, it showed a significant improvement in body weight of -4.08% and body fat percentage of -8.86% at the end of the study. Domene et al, (2016) reported that there was a -1.2% decrease in body fat percentage in zumba exercise 1 to 2 days a week in an 8-week study period. Krishnan et al, (2015) reported that there was a significant decrease in body weight and body fat percentage according to pre-test and post-test measurements as a result of working 60 minutes 3 days a week in sedentary women who participated in 16-week zumba exercises. Saygın, Oktay, and Ceylan (2016) stated that there was a significant improvement in the values of body weight (0.80%) and body fat ratio (7.25%) as a result of pre-test and post-test measurements in their study, in which 8-week zumba and step aerobic exercises were applied to sedentary women for 60 minutes. 3 days a week. Pekel, Aydos, Uzun, Bozoğlu, and Demirel (2020) applied zumba and reformer training for 10 weeks, 3 days a week for 60 minutes and reported that a significant improvement was achieved in body weight (4.451%) and body mass index (3.827%) according to pre-test and post-test measurement values.

When the effects of aquatic exercise on anthropometric measurements were investigated the participants' chest, thigh, hip, and waist circumferences (-3.66%. -3.1%. -8.03%. -3.19% respectively) before and after the study were examined (Table 2). In the Zumba exercise group, there were significant decreases in the chest, thigh, waist, and hip circumferences (-5.12%. -4.57%. -4.60%. -6.52% respectively) (Table 2). When the literature studies examined, Costa et al. (2014) reported that as a result of exercise performed in water for 40 minutes two days a week, arm, waist, hip, and lower leg circumferences improved significantly. Özcan et al. (2018) applied aqua-pilates exercises to healthy young women for 60 minutes, 2 days a week for 12 weeks, and also reported that the subscapular (1.31%) provided a significant improvement in circumference measurement values. Bayrakdar et al. (2020) in zumba exercises performed regularly for 12 weeks it was found that a significant difference in the waist (-3.82%), hip (-3.91%), abdomen (-4.36%), thigh (-3.88%), chest (-2.69%), underbust (-4.01%), right leg (-5.07%), left leg (-4.76%), right calf (-5.42%), left calf (-5.00 %), right arm (-4.41%) and left arm (-3.78%). Pekel et al. (2020) applied Zumba and reformer training for 10 weeks, 3 days a week for 60 minutes. The study findings indicated that the waist (6.7%), arm (11.7%), hip (5.9%), chest (4.3%), and abdomen (6.3%) was changed significantly.

In our study, when the effects of aquatic exercise on the measurements of motoric skills were examined. It was determined that the participants had a significant increase in flexibility (95.30%) and a significant decrease in balance (-12.54%) before and after the study (Table 4.2). In the Zumba exercise group, there was a significant increase in flexibility (68.80%) and a significant decrease in balance (-6.53%). When the literature studies are examined; Raffaelli et al. (2016) reported that balance improved (34%) as a result of in-pool scull exercises in which each exercise was planned for 45 minutes two days a week during nine weeks. Ok (2017) stated that the sense of balance and flexibility developed in elderly sedentary women as a result of the exercise program applied in the pool for 60 minutes three days a week for three months. Bergamin et al. (2013) found that the flexibility levels of the individuals participating in the study improved (25.8%) with the exercises they performed in the thermal pool. In a study conducted by Özcan et al, (2018) healthy young women applied aqua-pilates exercises and they reported that there was a significant improvement in flexibility (0.96%) and balance (1.38%) values according to the pre and post-study. Oktay (2018) reported that

sedentary women participating in zumba exercises provided a 15.24% improvement in flexibility throughout the study. Saygın et al. (2016) reported that there was a significant improvement in flexibility values (-4.91%) in their study in which 8-week zumba and step aerobic exercises were applied to sedentary women for 60 minutes 3 days a week.

When comparing the groups, a significant difference was found in lean body mass and fat mass (Table 3). The difference is in favor of fat mass in the aquatic exercise group in lean body mass in the zumba group. In addition, the improvement of flexibility and balance performance was in favor of the aquatic exercise group (Table 3). Bergamin et al. (2013) reported that flexibility improved in the water and dry-land exercises in similar levels besides a more significant improvement in dynamic balance was seen in the water exercises.

It would be suggested that the reason for the aquatic exercise having the effects on more parameters is the eliminating the gravitational property of water and creates a greater effect with the acceleration that water creates on the body.

Our study findings indicated that sedentary individuals participating in aquatic exercise and zumba exercises lead to similar improvements in physiological, anthropometric and motoric characteristics. However, according to the findings it could be stated that the aquatic exercises showed better improvement than the zumba exercises on an improvement of flexibility and balance.

Support And Agreement

As author, I have no support or appreciation for the process of conducting the research.

Conflict Statement

I declare that I, as author of the study, have no interests/conflicts.

Publication Ethical Statement

All the rules stated in the framework of "Scientific Research in Universities and Publication Ethic Codes were followed throughout the process (planning, implementation, data collection and analysis). None of the actions stated under the title "Actions that violate scientific research and Publication Ethics " which is the second part of the codes that must be considered. During the writing process of the manuscript, the rules of scientific ethics and citation were followed, no falsifications were made to the collected data, and this study was not sent to any other academic publication environment for evaluation.

REFERENCES

Açıkada, C., & Ergen, E. (1990) Hacettepe üniversitesi eğitim fakültesi spor bilimleri ve teknolojisi bölümü müfredat programının incelenmesi. *Spor Bilimleri Dergisi, 3*(4). 31-39.

Arslan, E., Aras, D., & Can, S. (2016). Sporcu ve sedanter kadınlarda günlük enerji harcaması ve fiziksel aktivite düzeylerinin karşılaştırılması.

Ateş, B, Saygın., Ö., & Zorba E. (2009). Ev hanımlarının fiziksel kapasitelerinin ve yaşam kalitelerinin belirlenmesi. *Uluslararası İnsan Bilimleri Dergisi, 6*(2), 357-367.

Bayrakdar, A., Kılınç. H., Kayantaş. İ., & Günay, M. (2020). The effect of 12-week regular zumba exercises on anthropometric properties. *Journal of Human Sciences, 17*(1), 154-161.

Bergamin, M., Ermolao. A., Tolomio. S., Berton. L., Sergi. G., & Zaccaria, M. (2013). Water-versus land-based exercise in elderly subjects: effects on physical performance and body composition. *Clinical İnterventions in Aging*. *8*. 1109.

Cugusi, L., Manca, A., Bergamin, M., Blasio, A. D., Yeo T. J., Crisafulli. A., & Mercuro. G. (2019). Zumba fitness and women's cardiovascular health: a systematıc review. *Journal of Cardiopulmonary Rehabilitation and Prevention. 39*(3). 153-160. doi: 10.1097/HCR.0000000000000326.

Costa, M. J., Goncalves. C., Barbosa. T. M., Marinho. DA & Silva .A. J. (2014). Short-and long-term effects of a head-out aquatic exercise program on body composition. anthropometric and cardiovascular response of middle-aged women. *International SportMed Journal. 15*(1). 41-49.

Colado, J. C., Tella. V., Triplett. N. T., & González. L. M. (2009). Effects of a short-term aquatic resistance program on strength and body composition in fit young men. *The Journal of Strength & Conditioning Research. 23*(2). 549-559.

Demirdal, Ü. S. (2012). Benefits of aquatic exercises in patients with osteoporosis. *Turk J Osteoporos. 18*(37).

Demirel, A. (2017). Rehabilitasyon: su içi egzersiz eğitimi. *Türkiye Klinikleri Fizyoterapi ve Rehabilitasyon-Özel Konular. 3*(2). 103-112.

Domene, P. A., Moir, H .J., Pummell, E., Knox, A., & Easton, C. (2016). The health-enhancing efficacy of Zumba fitness: An 8-week randomized controlled study. *Journal of Sports Sciences. 34*(15). 1396-1404.

Galadys, S. F. L., Frank, J. H. L., & Amyhsiu, H. W.. (2009). Exploring the relationships of physical activity. emotional intelligence. and health in taiwan college students. National chung cheng university. *Journal of Exercise Science & Fitness. 7*(1). 55-63.

İşlegen, Ç., (2009). Fiziksel aktiviteyle yaşam süresinin uzatılması. *Türkiye Klinikleri Tıp Bilimleri Dergisi. 29*(5). 80-83.

Krishnan, S., Tokar., T. N., Boylan, M. M., Griffin, K., Feng, D., Mcmurry, L., & Cooper, J. A. (2015). Zumba dance improves health in overweight/obese or type 2 diabetic women. *American Journal of Health Behavior. 39*(1). 109-120.

Ljubojević, A., Jakovljević, V., & Popržen, M. (2014). Effects of Zumba fitness program on body composition of women. *SportLogia. 10*(1). 29-33.

Luettgen, M., Foster, C., Doberstein, S., Mikat, & Porcari, J. (2012). ZUMBA®: Is the "fitness-party" a good workout*? Journal of Sports Science & Medicine. 11*(2). 357.

Norouzi, E., Hosseini, F., Vaezmosavi, M., Gerber, M., Pühse, U., & Brand, S. (2020). Zumba dancing and aerobic exercise can improve working memory. motor function. and depressive symptoms in female patients with fibromyalgia. *European Journal of Sports Science. 20*(7). 981-991.

Ok, H. A. (2017). The effects of aquatic group exercise on body composition and mental health of elderly women. *Journal of the Korean Society of Physical Medicine. 12(*1). 103-112.

Oktay, G. (2018). Investigation of effects of 8 weeks zumba exercise of women on health-related physical fitness factors. *European Journal of Physical Education and Sport Science. 4*(6).

Özer, K. (2001). Fiziksel uygunluk. *Nobel Yayın Dağıtım.*

Özcan, R., İrez. G. B., Saygın. Ö., & Ceylan, H. İ. (2018). Aqua-pilates exercises improves some physical fitness parameters of healthy young women. *Journal of Physical Education & Sports Science. 12*(3).

İşlegen, Ç. (2009). Fiziksel Aktiviteyle Yaşam Süresinin Uzatılması. *Türkiye Klinikleri Tıp Bilimleri Dergisi, 29*(5), 80-83.

Krishnan, S., Tokar, T. N., Boylan, M. M., Griffin, K., Feng, D., Mcmurry, L., & Cooperi, J. A. (2015). Zumba dance improves health in overweight/obese or type 2 diabetic women. *American Journal of Health Behavior. 39*(1). 109-120.

Raffaelli, C., Milanese, C., Lanza, M., & Zamparo, P. (2016). Water-based training enhances both physical capacities and body composition in healthy young adult women. *Sport Sciences for Health. 12*(2). 195-207.

Savaşhan, Ç., Erdal, M., Sarı, O., & Aydoğan, Ü. (2015). İlkokul çağındaki çocuklarda obezite görülme sıklığı ve risk faktörleri. Türkiye Aile Hekimliği Dergisi, 19(1), 14-21.

Saygın, Ö., Oktay, G., & Ceylan, H. İ. (2016) Kadınlara uygulanan 8 haftalık zumba ve step-aerobik egzersizlerinin sağlık ilişkili fiziksel uygunluk. Internatıonal Refereed Academıc Journal of Sports. *Health and Medical Sciences. 19*. Doi: 10.17363/SSTB.20161919748.

Šebić, L., Ljubojević, A., Nožinović, A., Omerhodžić, Š., & Kajević, D. (2016*). Effects of cırcuıt training on body composition of women. Homo Sporticus. 18*(2).

Simoneau, G. G. (1998). The impact of various anthropometric and flexibility measurements on the sit-and-reach test. *J Strength Cond Res. 12*(4):232-7.

Pekel, H. A., Aydos, L., Uzun, A., Bozoğlu, M. S., & Demirel, M. (2020). The effect of zumba and reformer exercises on female body composition. *IJEEC. 5*(11). 2316-2339.

Pires, D. Cruz, E. B. & Caeiro, C. (2015). Aquatic exercise and pain neurophysiology education versus aquatic exercise alone for patients with chronic low back pain: a randomized controlled trial. *Clinical Rehabilitation. 29*(6). 538-547.

Yázigi, F., Espanha, M., Vieira, F. Messier, S. P. Monteiro, C. & Veloso, A. P. (2013). The PICO project: aquatic exercise for knee osteoarthritis in overweight and obese individuals. *BMC Musculoskeletal Disorders. 14*(1). 320.

Zoheiry, I. M., Ashem, H. N., Ahmed, H. A. H., & Abbas, R., (2017). Effect of aquatic versus land-based exercise programs on physical performance in severely burned patients: a randomized controlled trial. *Journal Of Physical Therapy Science. 29(*12). 2201-2205.