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The Effects of 8-week Dance-Based Aerobic Training in Body Composition Features and Balance Ability

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Abstract

The study aims to determine the effects of 8-week dance-based aerobic training in body composition features and balance ability in middle age people aged between 43.2±6.37 years old of both ages. The study consists of an experimental method of testing the effects of applied training by comparing the control and experimental sample groups which contain 20 people aged 35-55 years old (43.2±6.37). The measurement tools consist of body composition features, balance ability tests, and dance-based aerobic training which are determined in certain sections of the study. The data analysis has been tested by using Shapiro-Wilks and Kolmogorov-Smirnov tests, Two Way Repeated Measure ANOVA Box's Test of Equality of Covariance Matrices. The results of the study have shown a significant effect of dance-based aerobic training on body composition features such as body mass index, fat percentage, etc (<0.05). There were no significant effects of the same training on balance ability (>0.05). Practising dance-based aerobic training effects positively the body mass index, fat percentage, muscle mass, etc. However, the same training effects on the balance ability seem to be not significant, and the reason for this is considered the short time of application of the program. In order to see the effects of this training on balance ability there needed a longer time of application of the program. Also, this kind of training has a tendency to be more suitable for middle age people because of the characteristics of the training which seem to not have a potential risk of injury.

Keywords: Aerobic Dance, Body Mass Index, Static Balance, Health, Middle Age

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8 Haftalık Dans Temelli Aerobik Antrenmanının Vücut Kompozisyon Özelliklerine ve Denge Yeteneğine Etkileri

Öz

Araştırmanın amacı, 43.2±6.37 yaş ortalaması olan yaşlı bireylerde 8 haftalık dans ağırlıklı aerobik antrenmanın vücut kompozisyon özellikleri ve denge yeteneği üzerindeki etkilerini tespit etmektir. Araştırma, yaşları 35-55 arasında değişen 20 kişiden oluşan kontrol ve deneysel grupları karşılaştırılarak uygulamalı eğitimin etkisinin test edildiği deneysel bir çalışmadır. Ölçme araçları, çalışmanın belirli bölümlerinde belirlenen vücut kompozisyon özellikleri, denge yetenek testleri ve dansa dayalı aerobik antrenmanlardan oluşmaktadır. Verilerin analizi Shapiro-Wilks, Kolmogorov-Smirnov testleri yanısıra iki yollu tekrarlanabilir ANOVA Box testleri ve Kovaryans Matrisleri kullanılarak yapılmıştır. Çalışmanın sonuçları, dans tabanlı aerobik antrenmanın vücut kitle indeksi, yağ yüzdesi vb. vücut kompozisyonu özellikleri üzerinde önemli bir etkisi olduğunu göstermiştir (<0.05). Aynı antrenmanın denge yeteneği üzerinde anlamlı bir etkisi bulunmamaktadır(>0.05). Dansa tabanlı aerobik antrenman yapmanın vücut kitle indeksi, yağ yüzdesi, kas kütlesi vb. üzerinde olumlu etkileri vardır. Ancak aynı antrenmanların denge yeteneği üzerindeki etkilerinin anlamlı olmadığı görülmektedir ve bunun nedeninin uygulama süresinin kısa olmasıdır. Bu antrenmanın denge yeteneği üzerindeki etkilerinin görülebilmesi için programın daha uzun süre uygulanmasına ihtiyaç duyulmuştur. Ayrıca, bu tür bir antrenman, potansiyel bir yaralanma riski taşımayan ve antrenman özelliklerinden dolayı orta yaşlı insanlar için daha uygundur.

Anahtar Kelimeler: Aerobik Dans, Vücut Kitle İndeksi, Statik Denge, Sağlık, Orta Yaş.

Introduction

There is a huge literature and practical applications in order to prevent health problems such as heart diseases, respiratory issues, muscle atrophy, etc (Mortensen et al., 2023; Tucker et al., 2022; Razi et al., 2022). However, not all activities and literature are usable in order to improve the health of middle age people whose sensitivity, injury risk, and fall risks are more susceptible to injuries (Ekkekakis, 2016; Potach et al., 2016). For more, many exercise applied for health prevention are limited to certian age groups, gender, or special category of people. Thus, the activities which can be applied for physical and psychological health prevention of middle age overweight people should not threaten heart diseases or carry fall risks, the activities should be cyclic rather than acyclic, and age groups such as 35-55 need attractive activities in order to be more motivated for participation (Alvardo et al., 2015; Joseph et al., 2017; Baillot et al., 2021) So, when all mentioned requirements are preconditions in designing activities for health prevention in the middle age we see that current literature and practical application seem to be limited. Based on the absence of health prevention training specific to age groups as included in the study we designed dance-based aerobic training which can be applied in order to prevent health issues such as heart disease, respiratory issues, muscle atrophy, etc. Also, this type of training is based on daily life and content of training improvements of physical abilities which are related directly to the quality of life. This type of training is designed to improve heartbeats, respiratory system, muscle tonus and mass, body mass index, etc., and all of these are supposed to happen without threatening the weak points of people caused by age or avoiding stimulations of the recovered injures and being more enjoyable for practitioners. Even if the is not direcly to this training the current literature indirectly proved the positive effects on the body composition features such as fat percentage, muscle mass, body mass index etc (Sulistyoningrum and Candrawati, 2016; Oktay, 2018; Serin, 2020). Nevertheless, the effects of this kind of training on balance ability are not proven in current literature, and the absence of the research can be seen. When it is mentioned the quality of life and daily tasks, it means that performing all daily tasks without having a fall risk which is related to balance ability. Because of dynamic balance is related more to a movement with high intensity, or movements in an unstable floor, static balance is more stationary and is related to e movements with low intensity or low range of motions, this study is focused on static balance.

In order to enlighten the effect of dance-based aerobic training, and analyze the effects these training on the balance ability we designed this study where the aim is specified as it can give specific results about the effects of 8-week dance-based aerobic training in body composition features and balance ability in middle age people aged between 35-55 years old of both ages.

Materials and Methods

The group consists of 10 middle age whose ages are between 35-55 years old living in the Istanbul district, Zeytinburnu area. The participants were informed by the written form about the aim of the study, benefits, and risks (even if there is no potential risk), and participation has been voluntary. In order to avoid the potential risk of coronary issues beacuse of the ages of participants during the application of training and tests sistematically has been measured heart rate by usonc carvonen formula (Reuter, 2016).

Model of the Research

The study model is based on an experimental method where control and experimental groups are divided in order to control the effects of the training which is applied 8 weeks on the middle age.

Population and Sample

The group consists of 10 middle age whose ages are between 35-55 years old 43.2±6.37 living in the Istanbul district, Zeytinburnu area.

Data Collection Tools

Body Composition

Body composition features such as W, F%, and BMI have been measured by using "Tanita BC 545 N Innerscan Segmental personal body analysis", while body height has been used Stadiometer, 8 inches 82 inch/20 cm-210 cm Measuring Unit: cm + inch. To get the most reliable reading it is important to use your Body Composition Monitor at a consistent time of day under consistent conditions; the measurement has been made in the morning after at least 6 hours of sleep, one night before there was no consumption of water, food, or there was not applied any kind of training.

Static Balance (SIGMA balance platform)

SIGMA balance platform is developt in order to measure balance and proprioreceptive exercises level ("Balance Platform Sigma", 2022). In our study we applied two protocols, while in the protocol one there was used easiest (XL) platform, and test length has been adjusted as 30 seconds, and in the second protocol the platform fifficulty has been selected as easy (L), with the same length time as the first protocol. The tests were realized afternoon, the participants were informed of the protocol, also they had consumed a meal 3 hours before the tests.

Soul Beat (dance-based aerobic training)

Soul Beat is a specially designed dance-based aerobic exercise model which emerged from the combination of jazz dance, fitness and pilates movements. The aim of workout is to improve body composition and joint mobility, increase muscle mass, provide endurance and gain flexibility. A combo exercise performed with the movements that support the big muscles groups, consisting of various dance choreographies, without a break for 50 minutes, keeping the heart rate around 60-70% accompanied by popular music (Sulistyoningrum and Candrawati, 2016; Benjamin and Daves, 2015).

Table 1

8-Week Dance-Based Aerobic Training

No	Song (min)	Eights	Movements		
			Lower Body	Upper Body	Cardio
1	**Lordy- Feder feat Alex Aiono 3:51**			Warm - Up	
2	**Slow Dance - Gran Errow 3:00**	2 x 8 x 4 L x + 4 R	-	Freestyle	V - Step
		2 x 8 x 8 R L	-	Hands Up than Drop Down	Side Step, Cross Leg to the back
		2 x 8 x 4 R L	-	Freestyle	DBL Side Step
		2 x 8 x 4 R L	Front Leg Kick	Freestyle	-
		2 x 8 x 4 R L	-	Reach Side to Side, C Side Stretch	-
		1 x 8 x 4	Leg Bending	Clapping	-
3	**Bomba Estereo, Sofi Tukker Playa Grande 4:05**	İntro - Outro 2 x 16	Leg Bending	Freestyle	-
		2 x 8 x 8 R L	Knee Up for 4 Step	Opposite H to the Knee	Step - Touch
		4 x 8 x 8 R L	Kick to the Front and Step Back with Op. Leg	H Up than Reach the Floor, C Flexion - Extension	Back Step
		4 x 8 x 8 R L	Plie for 3 Counts	H Open to the Sade then Bent, C Rotations	Knee Up for 1 Count
4	**Oh Nanana 2:13**	Breakdown	Heels Up in Plie Position	H on Back of Head, C Half Circle Rotations	-
		1 x 8 x 4 R L	Static Plie Position	H on Back of Head, C Rotations from Side to Side	-
		3 x 8 x 12 R L	-	H Up - Down, C Flexion - Extension	Diagonal Knee Up
		3 x 8 x 32 R L	-	Half Circle	Knee Up Jumping
5	**Lirico En La Casa- Marianela 3:09**	4 x 8 x 8 R L	Hips Swinging	H Open and Close to the Front	-
		4 x 8 x 8 R L	-	Freestyle	Knee Up Jumping
		4 x 8 x 8 R L	-	Op. Elbow to the Knee	DBL Side Step
		Breakdown 1 x 8 x 4	F Heel kick	Freestyle	-
6	**Major Lazer ft J Balvin - El Alfa 2:50**	İntro 1 x 8 x 16	Leg Bending	Straight H Push to the Back	-
		4 x 8 x 12 R L	High Kick the Side and Side Step	H Up - Down	-
		4 x 8 x 8 R L	Front Back Kick	Freestyle	Bounce
		2 x 8 x 8 R L	Jumping Lunge	Freestyle	Jumping
		2 x 8 x 4 R L	Straight Leg Up for 3 Count	Freestyle	Brisk Walking
7	**Joanne – Twist İn My Sobriety 2:21**	2 x 8 x 16 R L	Side Kick - Knee up	Biceps curl	-
		2 x 8 x 8 R L	Squat	Freestyle	-
		2 x 8 x 16 R L	-	Freestyle, C Side Rotations	Skaters
		2 x 8 x 8 R L	Side Squats for 2 Count	Freestyle	-
		2 x 8 x 8 R L	Lounge with Knee Up	Freestyle	-
8	**Tokyo Drift – Teriyaki Boyz 4:20**	4 x 8 x 8 R L	Jumping Jack from Side to Side	H Drop Down, open and close	-
		1 x 8 x 12 R L	-	Elbow to knee	Knee to Elbow with Jump
		3 x 8 x 12 R L	Squat	H Bend, Close and Open wide, C Side Bending	-
		1 x 8 x 12 R L	Leg Bending	H Cross and open	-
9	**CamelPhat, Jem Cooke –**	2 x 8 x 8 R L	Side Lunge with F Kick	Freestyle	-
		3 x 8 x 8 R L	Knee Up	Freestyle	Jumping at the place

	Rabbit Hole 3:33	3 x 8 x 8 R L	-	Freestyle	Walking F B
		2 x 8 x 8 R L	Plie Position	Open Wide	-
		2 x 8 x 8 R L	Static Squat	Open Wide and Close to the Front, C Side Rotations	-
10	**Elilluminari – Weke Weke 3:37**	3 x 8 x 16 R L	Drop toe to the side	Biceps Curl	Jumping
		3 x 8 x 16 R L	Side Leg Opening in Squat Position	Bent H Position than Side Openings	-
		3 x 8 x 16 R L	Front Toe Tap in Squat Position	H on Hips	-
11	**Tropikalla - Bola Rebola 3:13**	3 x 8 x 8 R L	Squats	H Cross than Open, C Flexion - Extension	Side High Jumps
		3 x 8 x 8 R L	Front Kick	Freestyle	Bounce
		3 x 8 x 4 R L	-	Freestyle	Step - Touch
12	**Saint Jhn – Roses (İmanBerk remix) 2:55**	3 x 8 x 16 R L	-	H Open to the Side then Bend	Jumping Jack
		3 x 8 x 16 R L	-	H Up to the F	Jump and Turn to the Side
		3 x 8 x 16 R L	Squat	Freestyle	Jumping
		Breakdown	Open and Wide	H Open to the Side, C slaying	-
13	**Bigshop Briggs – River 3:34**	Dynamic Stretching to all Big Muscle Groups			

Abbreviations: R: Right, L: Left, F: Front, B: Back, Op: Opposite, DBL: Double, H: Hands, C - Core

Analysis of Data

Data analysis has been carried out by using SPSS 26 packet. The normality of the data has been tested by using Shapiro-Wilks and Kolmogorov-Smirnov tests. Based on the results of the analysis which show parametric data, the existence of dependent groups, continued variables type, and the same variable numbers in two groups Two Way Repeated Measure ANOVA has been applied. Based on the applied analysis such as repeated measures TWO way ANOVA Box's Test of Equality of Covariance Matrices there is no detected violence of the assumptions (>0.05): X_DA – deviation average (X cm), (=.372), Y_DA – deviation average (Y, cm) (=.525), X_VA – velocity average (X cm/s) (=.770), Y_VA – velocity average (Y cm/s) (=.286), LA – length of area (=.402), SA – the size of the area (=.127). The Greenhousegeiseer value has been determined as 1.000, so the interpretation of the results has been based on these values.

Ethics of Research

The study meets the Helsinki Declaration criteria and it is approved by the ethics committee of Istanbul Gelisim University.

Results

Table 2

The Differences on the Body Composition Between Pre and Post-Tests

V	Groups	N	Pre-test	Post-test	Differences between pre and post-tests		
						Sig.	Eta
			X̄±SD	X̄±SD	F	p	η2
W	Control group	10	80.600 ± 12.5224	81.630 ± 12.3860	1.120	.304	.059
	Experimental group	10	74.870 ± 10.854	73.190 ± 11.2041			

	Interaction				19.465	.000	.520
	Between groups				1.820	.194	.092
BMI	Control group	10	30.750 ± 4.7785	30.820 ± 4.9562	9.717	.006	.351
	Experimental group	10	29.290 ± 2.9835	28.390 ± 3.3772			
	Interaction				13.271	.002	.424
	Between groups				1.123	.303	.059
F%	Control group	10	42.386 ± 6.4819	43.990 ± 6.5468	.814	.379	.043
	Experimental group	10	36.940 ± 6.1149	36.110 ± 6.3583			
	Interaction				8.046	.011	.309
	Between groups				5.584	.030	.237
MM	Control group	10	33.070 ± 1.8845	32.700 ± 2.0033	6.792	.018	.274
	Experimental group	10	31.700 ± 1.2737	33.720 ± 2.6811			
	Interaction				14.250	.001	.442
	Between groups				.043	.839	.002
WA	Control group	10	43.570 ± 2.5250	42.600 ± 2.6221	.419	.525	.023
	Experimental group	10	47.130 ± 2.9447	48.780 ± 3.8961			
	Interaction				6.226	.023	.257
	Between groups				15.016	.001	.455

V – Variables, Δ%: development %. η2: partial eta square, X̄±SD: average and standart deviation, W- body weight, MBI – body mass index, F% – fat percentage, MM – muscle mass, WA – water amount

When table 1 was analyzed there was carried out a statistically significant effect of dance-based aerobic training on body composition features ($p<0.05$). The effect size has been detected as W: F(19.465), and interaction: =.000 ve η2=.520, BMI: F(13.271), interaction: =.002 ve η2=.424, F%: F(8.046), interaction: =.011 and η2=.309, MM: F(14.250), interaction: =.001 ve η2=.442, and WA: F(6.226), interaction: =.023 ve η2=.257. So, as shown in the results section, the 8-week dance-based aerobic training effects on the body composition features vary between 25-52%.

Table 3

The Differences on the Static Balance Between Pre and Post-Tests

V	Groups	N	Pre-test	Post-test	Differences between pre and post-tests		
						Sig.	Eta
			X̄±SD	X̄±SD	F	p	η2
X_DA	Control group	10	.049 ± .0484	.028 ± .045	2.168	.159	.113
	Experimental group	10	.014 ± .0500	-.010 ± .073			
	Interaction				.012	.912	.001
	Between groups				3.285	.088	.162
Y_DA	Control group	10	-.034 ± .037	-.011 ± .041	.056	.816	.003
	Experimental group	10	-.010 ± .062	-.025 ± .053			
	Interaction				1.392	.255	.080
	Between groups				.090	.769	.006
X_VA	Control group	10	.117 ± .053	.084 ± .032	2.121	.163	.111
	Experimental group	10	.068 ± .040	.063 ± .043			
	Interaction				1.075	.314	.059
	Between groups				5.392	.033	.241
Y_VA	Control group	10	.111 ± .043	.087 ± .037	2.211	.155	.115
	Experimental group	10	.071 ± .034	.058 ± .028			
	Interaction				.234	.635	.014
	Between groups				8.874	.008	.343
LA	Control group	10	5.310 ± 2.180	4.183 ± 1.43	3.652	.073	.177
	Experimental group	10	3.360 ± 1.641	2.386 ± 1.199			
	Interaction				.020	.890	.001
	Between groups				12.356	.003	.421
SA	Control group	10	.259 ± .256	.115 ± .068	3.519	.078	.171
	Experimental group	10	.104 ± .120	.063 ± .040			

Interaction	1.087	.312	.060
Between groups	4.607	.047	.213

V – variables, X_DA – deviation average (X cm), Y_DA – deviation average (Y, cm), X_VA – Velocity average (X cm/s), Y_VA – Velocity average (Y cm/s), LA – length of area, SA – size of area, Δ%: development %. η2: partial eta square, X̄±SD: average and standart deviation

Analysis of the effects of 8-week dance-based aerobic training effects on balance ability on the sagittal and frontal plane deviation average has been determined as; X_DA: F(.012), interaction: =.912 ve η2=.001, Y_DA: F(1.392), and interaction: =.225 ve η2=.080. Similarly average speed of deviation has been determined as; X_VA F(1.075), interaction: =.314 ve η2=.059, and Y_VA F(.234), interaction: =.635, η2=.014. Area length of deviation (LA) results have been determined as; X_SO: F(.020), interaction: =.890 ve η2=.001, and size of the area (SA) resulted to be as; F(1.087), interaction: =.312ve η2=.060.

Discussion and Conclusion, Suggestions

You Based on the current literature there is a lack of scientific knowledge about dance-based aerobic exercise training. So, the study aims to enlighten the effect of dance-based aerobic exercise on body composition features and balance as the ability with priority on the well being of older people. The results of the study have shown a significant effect of dance-based aerobic exercise training on weight loss (η2=%52). There are many studies that have shown the significant effect of aero-dance, Latin dance (Kaplan, 2016; Özdemir, 2014), and oriental dance body mass index (Magno, 2012). Besides this, the study carried out significant losses on the most important feature of weight loss which is a fat percentage (η2=%30). Based on the experimental study made by Serin (2020) there was a significant difference between pre and post-tests such as fat percentage, and waist-hip ratio caused by aerobic training as well as has been detected significant effects of Zumba training (Oktay, 2018), step-aerobic (Pınar, 2018) on the body weight, fat percentage, etc. Similarly, the sudy has shown significant effect of the dance-based aerobic training on the muscle mass (η2=%44) and water percentage (η2=%25). As the current literature proves the positive effect of dance-based aerobic training on the body composition the results of our study are in line with the current literature and expexted as they are. For this reason, in order to go farer and see deeper in the effect of this kind of training we examined the effect on the balance of middle age becasue the risk of falls on this age is very common and closely related to the balance ability. However, in contrast with the previous results about the body composition, the static balance assessments made by using the SIGMA balance platform resulted in not being significantly affected by the dance-based aerobic training. However, when X (sagittal) and Y (frontal) axis average deviation was analyzed, it has been detected that the average speed of deviation, length of deviation area, and size of deviation area were near zero, which means positive results (“Sigma Balance Platform”, 2022). So, dance-based aerobic exercises are effective in balance improvements and there is evidence that proves that. A 12-week experimental

study carried out significant effect effects of Cha-Cha dance on the balance ability (Li, 2022). As it is known the risk of falls in older people (Benjamin and Daves, 2015) dance-based aerobic training may be considered useful in health improvement in older people. However, the lack of effect of dance-based aerobic training on the balance ability is caused because the SIGMA balance platform measures the static balance. So, in future studies analyzing the effects on the dynamic balance would be beneficial and the results may be more significant (Hazımoğlu, 2021). Based on the Hui et al., (2009), and Kolayiş and Arol., (2020) the effects of tempo aerobic dance are significant on the dynamic balance but not the same results has been detected on static balance ability. Static balance development is more affected by the exercises that provides static force, control o mass of gravity etc., rather than dance-based training (Benjamin and Daves, 2015; Atılgan et al., 2017). As can be predicted dance-based aerobic training resulted to be significantly effective on body composition features. However, the effect of the same training on balance ability seems to be a lack of explanatory studies in the current literature. So, the results of our study carried out not significantly high effects of dance-based aerobic training on balance ability. As balance ability in older people is a more specific ability, it is believed that extending the training program which is 8 weeks would result in significant effects.

At the end of analyzing the results based on the decreases in fat percentage, increases in muscle mass, etc. can be considered proof of the benefits of applying dance-based aerobic training in order to improve body composition features in older people. Based on the fact that there were not carried out expected effects of dance-based aerobic training on static balance, we suggest similar studies in order to analyze the same effects on the dynamic balance rather than static balance.

Ethics Committee Permission Information

Ethics review board: İstanbul Gelişim University Ethics Committee

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Authors' contributions

The study was conducted by the first authour. As a supervisor, the second author controlled, revised and checked all sections of the paper.

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