European Journal of Physical Education and Sport Science
ISSN: 2501 - 1235
ISSN-L: 2501 - 1235
Available on-line at: www.oapub.org/edu

DOI: 10.46827/ejpe.v6i6.3200 Volume 6 | Issue 6 | 2020

EFFECT OF REGULAR PRACTICING GREEK TRADITIONAL DANCES ON BODY COMPOSITION PARAMETERS IN ADULT PEOPLE

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Abstract:
The aim of the present study was to examine the effects of a Greek traditional dances program on adult individuals' body composition parameters. For this purpose, 73 sedentary healthy adults, 42 women and 31 men, aged 38-58 years, were randomly chosen and separated into an experimental and a control group. The subjects of the experimental group (n=37, 22 women and 15 men) engaged in a 24-week Greek traditional dance program with moderate intensity, and at a frequency of three training sessions per week, each lasting 60 minutes. The control group (n=36, 20 women and 16 men) did not engage in any physical activity. Body mass, waist circumference (WC) and hip circumference (HC) were measured, and BMI, body fat percentage and waist to hip ratio (WHR) were assessed pre- and post-24-week Greek traditional dances program. For the statistical analysis the Statistical Package for Social Sciences ver. 23.0 for windows was used. No significant difference was found in the baseline measurements between the two groups. After the participation in the 24-week Greek traditional dances intervention program the experimental group presented significant decreases in body mass from 77,71±16,8 kg to 75,57±15,7 kg ($t=5,121$, $p<0,001$), in BMI from 25,75±4 kg/m^2 to 25,05±3,8 kg/m^2 ($t=5,289$ $p<0,001$), in BF percentage from 28,3±6,4% to 26,33±5,6% ($t=5.279$ $p<0,001$) and in WC from 89,81±12,9 cm to 87,46±12 cm ($t=5.703$, $p<0,001$). No significant difference was found after the 24-week period for the control group. Regarding the WHR, no significant change was observed, although the experimental group showed a tendency

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for reduction while the control group showed a slight increase. The results of this study indicate that Greek traditional dances are a very beneficial alternative exercise form that brings favorable changes in body mass and body composition parameters. In general, among its multiple utilities and benefits, dancing can contribute to weight loss programs.

Keywords: folk dance, BMI, waist circumference, WHR, body fat

1. Introduction

Evidently, regular exercise presents numerous great benefits; among other things it can improve musculoskeletal health, control body weight and reduce symptoms of depression (World Health Organization, 2009). However, most people in the western world do not engage enough in physical activity in order to draw these health benefits. As a result, it is well documented that nowadays adult people live a sedentary life that may result either immediately or long term in many health problems mainly related to the increased body weight, such as obesity, poor metabolic health, hyperlipidemia, coronary heart disease, various types of cancer, and mortality (Healy et al., 2011; Hu et al., 2003; Katzmarzyk et al., 2009).

However, one popular and alternative form of exercise is dancing (Argiriadou, 2018). Dancing can increase people's motivation to participate in physical activity and maintain this participation, mainly because they perceive dance as a fun, expressive, non-competitive and social activity (Keogh et al., 2009; Malkogeorgos et al., 2011b; Malkogeorgos et al., 2012). Dancing is a great way to improve physical fitness and develop social skills, resulting in better mental health. Moreover, previous research supports that dancing presents similar cardiorespiratory fitness benefits and calories output levels with other uncompetitive physical activities such as walking and running, as well as with sports such as football or tennis in a non-competitive level (Allen, & Wyon, 2008; Hui et al., 2009; Ribeiro-Nunes et al., 2007; Shimamoto et al., 1998).

As for Greek traditional dances, it is an alternative type of moderate aerobic exercise, which addresses all ages; and in most cases it doesn't require any money, or any special equipment (Mavrovouniotis et al., 2010). It is worth mentioning that training with Greek traditional dances presented similar functional and cardiovascular benefits with formal exercise training (Kaltsatou et al., 2014). Furthermore, dancing in general, as well as Greek traditional dances in particular, is considered a safe form of exercise, since it appears to have lower chances of injuries compared to other types of exercise (Anagnostopoulou et al., 2017; Malkogeorgos et al., 2010; Malkogeorgos et al., 2011a).

Moreover, dancing consists an excellent way to promote physical, psychological and social benefits for children, adolescents, as well as young, middle-aged and elderly people (Burkhardt, & Brennan, 2012; Flores, 1995; Malkogeorgos et al., 2011b; Malkogeorgos et al., 2013; Mavrovouniotis, & Argiriadou, 2008; Mavrovouniotis et al., 2001; Mavrovouniotis et al., 2013; Papaioannou et al., 2009). In addition, it has been

established that dancing consists an effective therapeutic tool for the treatment of Parkinson's disease (Earhart, 2009; Hackney & Earhart, 2010), dementia (Hokkanen et al., 2008; Karkou & Meekums, 2017), overweight (Murrock & Gary, 2010), and reduced risk for cardiovascular disease mortality (Merom et al., 2016).

Moreover, the participation in a dance program improved cardio-respiratory endurance, balance, agility and flexibility of the body, and reduced body fat of the elderly sedentary female participants (Hopkins et al., 1990). In addition, previous research has shown that the participation in cultural dance programs reduced body weight (Murrock, & Gary, 2010; Cruz-Ferreira et al., 2015; Jeon & Choe, 1996), body fat (Arslan, 2011; Jeon & Choe, 1996; Jaywant, 2013; Kostic et al., 2006), WHR and WC (Arslan, 2011; Cruz-Ferreira et al, 2015; Dewhurst et al., 2014), as well as BMI (Shimamoto et al., 1998; Dewhurst et al., 2014; Mejia-Downs et al., 2011; Murrock, & Gary, 2010). Thus, dancing can help address many current societal issues related to obesity, inactivity, and aging (Hui et al., 2009; Keogh et al., 2009; Murcia et al., 2010).

However, although the effects of dance on people's psychosomatic state have been studied adequately the effects of Greek traditional dances on body composition parameters in adult people have not been studied yet. Therefore, the purpose of the present study is to examine the effects of a 24-week Greek traditional dances exercise program on the body parameters of healthy sedentary adult men and women.

2. Materials and Methods

2.1 Sample

The sample consisted of 80 sedentary individuals, 46 women and 34 men aged 38 to 58 years old. All of them fulfilled the required criteria. More specifically, the participants had to be healthy, not undergoing any medication or any form of diets, as well as not participating in any physical activity or exercise individually or in group for the past six months. A written informed consent for the participation in the research was obtained from each subject. All the subjects had to agree that they will not participate in any other group or individual exercise, physical activity or dancing program for the duration of the experiment, that is a 24-week period.

The subjects were separated randomly into two groups, 40 in the experimental group and 40 in the control group. After the 24-week period, 73 subjects completed the experimental procedure, that is 37 subjects from the experimental group (22 women and 15 men) with mean age 42,22±5,32 years, and 36 subjects from the control group (20 women and 16 men) with mean age 42,50±6,20 years.

2.2 Procedure

Procedures were consistent with the ethical standards of the Declaration of Helsinki of the World Medical Association (2000). The participants were informed for the study's

aim and general requirements. In addition, all the subjects were asked to continue their daily habits without any alterations through the 24-week period.

The subjects of the experimental group took part in a 24-week group program of Greek traditional dances performance of moderate intensity, at a frequency of three training sessions per week, for 60 minutes each. Each Greek traditional dancing session included 8-12 minutes warm up with low intensity dances, the main part that was 40-45 minutes of moderate to high intensity dances, and a 5-7 minutes of cool-down with low intensity dances for recovery. Regarding the main part, the intensity of the dances varied from 60% to 70% of the maximum HR, which corresponds to 40-60% of VO_2max (moderate intensity) (Swain et al., 1994; Tanaka et al., 2001; Uth et al., 2004). In order for subjects to keep dancing continuously throughout each dance session there were frequent alterations to the rhythm. The Greek traditional dances used for the sessions were from different areas of Greece. The 24-week program contained a variety of dances that varied in rhythm, kinetic repertoire and style. Individuals from the experimental group that concluded the program attended at least 80% of the sessions.

The subjects of the control group were asked to continue their daily habits without any changes, at the 24-week period, as it was recorded at the beginning of the research. Measurements and each session of Greek traditional dances were conducted by a single, male investigator, teacher of physical education with extensive practical experience in Greek traditional dances.

2.3 Measurements

Body height was measured once at the baseline of the 24-week Greek traditional dances program with a precision of 0.5 cm, using a Seca 216 mechanical measuring rod. Body mass was measured using a Microlife WS80 electronic scale with a precision of 0.1 kg. The data from body mass and height were used to calculate the BMI (kg/cm^2). The waist circumference and the hip circumference were measured in cm and the data were used to calculate the waist to hip ratio (WHR). BF-907 Body Fat Analyser from Maltron was used to assess the participants' body fat percentage. Body mass, waist circumference, hip circumference, WHR, BMI and body fat percentage, for both groups (experimental & control), were measured before and after the 24-week Greek traditional dances program.

2.4 Statistical Analysis

For the statistical analysis the statistic packet SPSS/PC Version 23.0 was used. The collected data were analyzed by computing mean and standard deviation. All dependent variables, namely Body mass (weight,), WC (waist circumference), HC (hip circumference), WHR, BMI and BF (body fat percentage) were tested if they were normally distributed by using the Kolmogorov-Smirnov tests of normality; parametric tests were used for the normally distributed variables. Independent samples t-tests were used to determine if the individuals from the two groups presented significant mean differences in the baseline measurements. Paired t-tests and ANOVA with repeated

measures were used to determine if significant pre- to post-test differences existed (before and after the Greek traditional dances program for experimental group, and before and after the 24-week period for control group). Regarding the non-normally distributed variables a further test was conducted with non-parametric tests, such as Mann-Whitney U test for independent samples, and Wilcoxon test for related samples. The level of significance was set to $p<0,05$.

3. Results

The results from the anthropometric measurements of the experimental group that attended the Greek traditional dances program, and the control group are presented in Table 1. Independent samples t-tests showed that there was no significant difference between the two groups, concerning the anthropometric characteristics.

Table 1: Anthropometric characteristics of experimental and control group

Parameters	Group	Mean	Std. Deviation
Age (years)	Experimental	42,22	5,324
	Control	42,50	6,199
Height (m)	Experimental	1,731	,094
	Control	1,726	,088
Body mass (kg)	Experimental	77,711	16,771
	Control	81,764	16,330

Descriptive statistics for the body mass variable of both groups (experimental & control), which were measured before the beginning and at the end of the 24-week intervention program, and the significance of any demonstrated changes are shown in Figure 1 and Table 2.

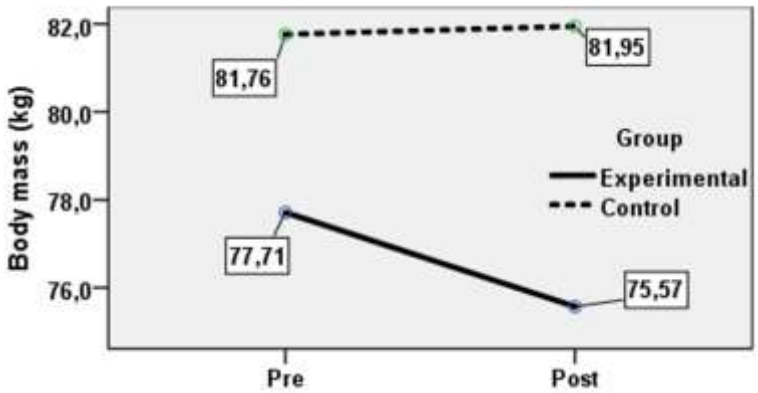

Figure 1: Body mass for Greek traditional dances group and control group before and after the 24-week period

It is observed that there was a significant decrease in body mass (-2,76%) for the subjects of the experimental group after their participation in the 24-week Greek

traditional dances program, while no changes were observed for the subjects of the control group (Figure 1, Table 2).

Descriptive statistics for the WC variable of both groups (experimental & control), measured before the beginning and at the end of the 24-week intervention program, and the significance of any demonstrated changes are shown in Figure 2 and Table 2.

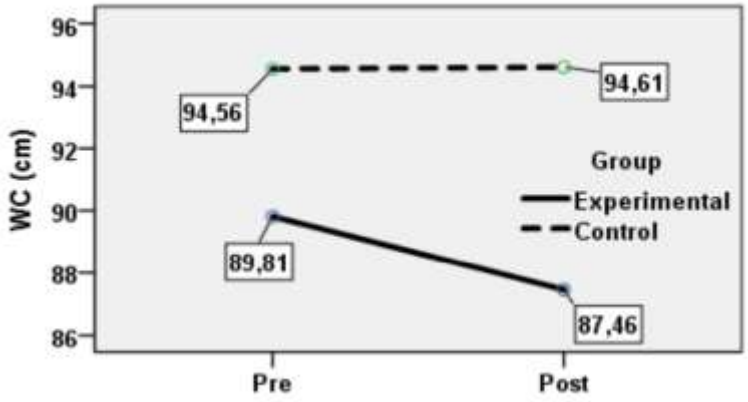

Figure 2: WC for Greek traditional dances group and control group before and after the 24-week period

There were no changes in WC for the control group after 24 weeks. On the contrary, the experimental group presented significant changes in the WC (-2,62%) after the 24-week period (Figure 2, Table 2).

Descriptive statistics for the BMI variable of both groups (experimental & control), assessed before the beginning and at the end of the 24-week intervention program, and the significance of any demonstrated changes are shown in Figure 3 and Table 2.

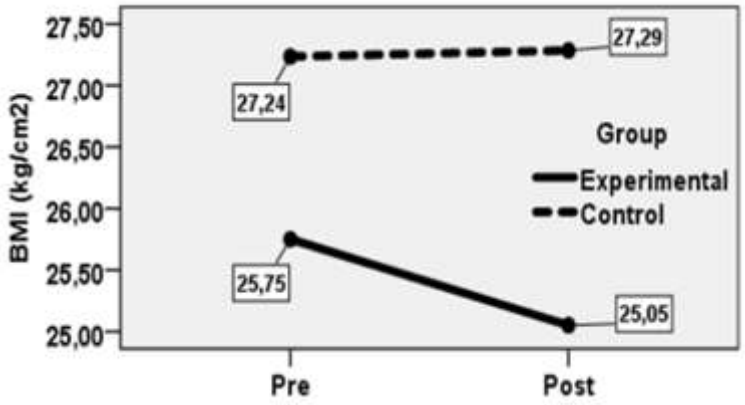

Figure 3: BMI for Greek traditional dances group and control group before and after the 24-week period

After their participation in the 24-week intervention program the experimental group showed a significant decrease in the BMI (-2,72%). On the other hand, the control group did not present any changes (Figure 3, Table 2).

Descriptive statistics for the body fat percentage of both groups (experimental & control), assessed before the beginning and at the end of the 24-week intervention program, and the significance of any demonstrated changes are shown in Figure 4 and Table 2.

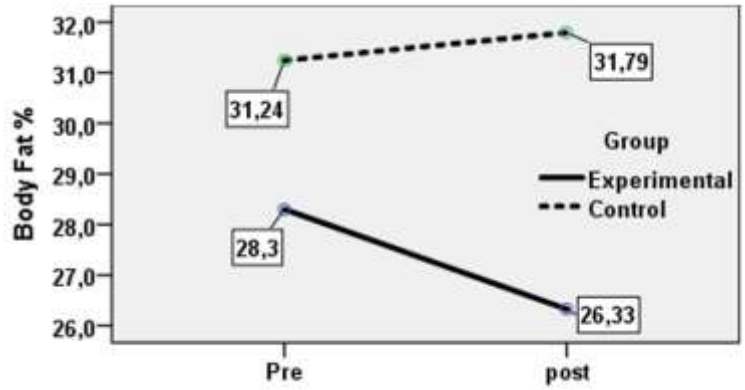

Figure 4: Body fat % for Greek traditional dances group and control group before and after the 24-week period

Similarly, the results showed significant changes in the Body fat % of the experimental group (-6,96%), following the 24-week Greek traditional dances program; while the control group presented a slight increase in the Body fat% (Figure 4, Table 2).
Descriptive statistics for the HC variable of both groups (experimental & control), measured before the beginning and at the end of the 24-week intervention program, and the significance of any demonstrated changes are shown in in Figure 5 and Table 2.

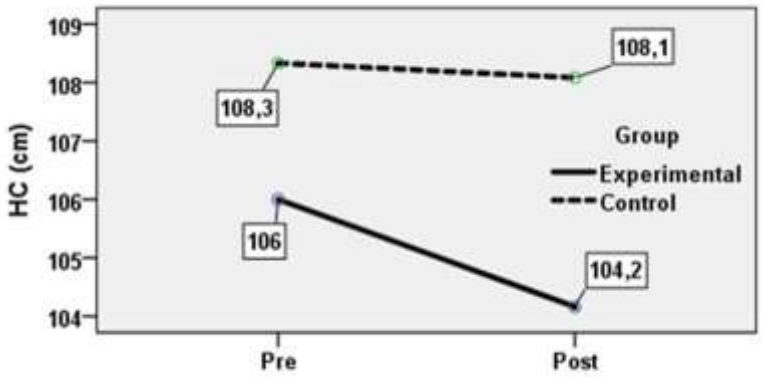

Figure 5: HC for Greek traditional dances group and control group before and after the 24-week period

According to the results from the paired samples t-tests, after their participation in the 24-week intervention program the experimental group showed a significant decrease in the HC (-1,74%). On the other hand, the control group did not present any changes (Figure 5, Table 2).

Descriptive statistics for the WHR variable of both groups (experimental & control), assessed before the beginning and at the end of the 24-week intervention program, and the significance of any demonstrated changes are shown in Figure 6 and Table 2.

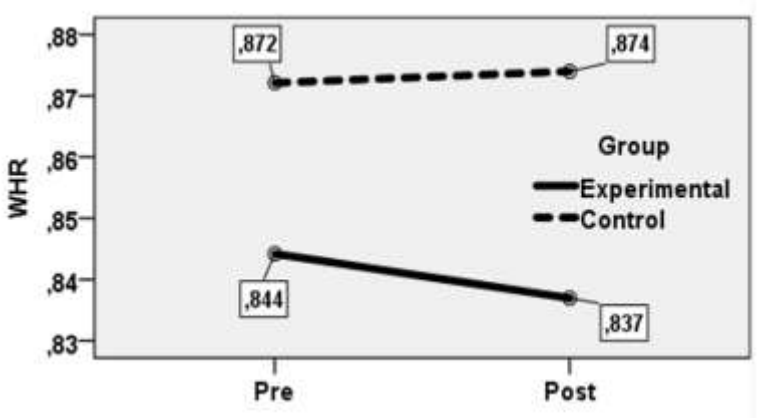

Figure 6: WHR for Greek traditional dances group and control group before and after the 24-week period

According to the results from the paired samples t-tests, the two groups (experimental & control) did not present any significant differences in the WHR after the 24-week period. However, the experimental group showed a tendency for reduction in WHR from 0.844 to 0.837 (0,83%), while the control group presented a slight increase in the WHR (Figure 5, Table 2).

Table 2: Descriptive data, and degree of change of body mass and body composition parameters of experimental and control group

Parameters	Group	Pre 24 weeks M±SD	Post 24 weeks M±SD	t & p	Change
Body mass (kg)	Experimental	77,71±16,8	75,57±15,7	T=5,121 p<0,001	↓
	Control	81,76±16,3	81,95±16,4	NS	↑
WC (cm)	Experimental	89,81±12,9	87,46±12	T=5,703 p<0,001	↓
	Control	94,56±12,5	94,61±12,6	NS	↑
HP (cm)	Experimental	106±6,86	104,16±6,95	t=6,254 p<0,001	↓
	Control	108,33±7,88	108,08± ,88	NS	↓
BMI (kg/m²)	Experimental	25,75±4	25,05±3,8	T=5,289 p<0,001	↓
	Control	27,23±3,8	27,28±3,7	NS	↑
Body Fat (%)	Experimental	28,3±6,4	26,33±5,6	T=5,279 p<0,001	↓
	Control	31,24±6,4	31,79±6,1	NS	↑
WHR	Experimental	0,844±0,08	0,837±0,07	NS	↓
	Control	0,872±0,09	0,874±0,09	NS	↑

The results of the independent samples t-tests showed that at the baseline that is before the 24-week period, there were no significant differences between the two groups for all dependent variables; suggesting that the two groups were similar in all the measured variables. In addition, for the variables of the body mass, WC and BMI, Mann-Whitney U tests were conducted and showed similar results.

According to the results of the paired t-tests and repeated measures ANOVA, all the body parameters of the experimental group demonstrated significant differences between the two measures, pre- and post-participation in the 24-week intervention program with Greek traditional dances. On the contrary, the control group did not demonstrate any significant changes in the duration of the same 24-weeks period (Table 2). Additionally, for the body mass, WC and BMI variables, Wilcoxon tests were performed and showed similar results. It is worth mentioning, that gender did not have any significant effect on the results.

4. Discussion

The results of the present study support our hypothesis by clearly showing that the individuals of the experimental group, after their participation in the Greek traditional dances program, exhibited significant changes on body parameters. More specifically, the body mass of the participants in the 24-week Greek traditional dances program was significantly decreased from 77,71±16,8 kg to 75,57±15,7 kg, which corresponds to a 2,76% decrease. This finding is in agreement with previous findings in studies focusing to determine the utility of dance in an intervention program and its effects on body mass, BMI and body fat percentage. Cruz-Ferreira et al. (2015) by using a creative dance program for 24 weeks in older women, found a significant reduction in body mass (3,68%). Similarly, another study found a significant difference in body mass after eight weeks of dance exercise program in 49 healthy sedentary obese women (Arslan, 2011).

Regarding traditional dances, it has been observed that they positively affect body weight and body composition. More specifically, Hidayah and Syahrul Bariah (2011) found significant difference in body weight (4,9%) between a group of Malaysian female dancers and their control group of inactive subjects. Jeon and Choe (1996) designed a study using a Korean traditional dance program for 12 weeks, 3 times a week and approximately 50 minutes duration. They found that the people who participated in the program presented a significant effect on their body weight and body fat ($p<0,001$) compared to the people who didn't participate in the program.

In the present study the BMI of the participants in the 24-week Greek traditional dances program was significantly decreased, from 25,75±4 kg/m^2 to 25,05±3,8 kg/m^2, which corresponds to a 2,72% decrease. Similarly, Mejia-Downs et al. (2011) found a significant decrease in the BMI of 20 adults (from 26,96 kg/m^2 to 26,21 kg/m^2; -2,87%), following their participation in a 6-week interactive video dance exercise program.

In addition, Cruz-Ferreira et al. (2015), found a significant decrease in the BMI of sedentary elderly women, from 32,43±0,98 to 30,64±0,84 kg/m^2 (-5,52%), after their participation in a six-month dancing program. Likewise, Murrock and Gary (2010), provided evidence of a decrease in obesity, as measured by body fat and BMI, in African American women after taking part in a specific cultural dance intervention. In addition, Tai Chi utilized as an intervention program resulted in significant decreases in BMI and body fat in older adults with hypertension in China, and in patients with schizophrenia in Korea (Kwon, & Kwag, 2011; Sun, & Buys, 2015).

Moreover, after the 24-week intervention program of Greek traditional dances the individuals in the experimental group demonstrated significant improvement in WC from 89,81±12,9 cm to 87,46±12 cm (-2,62%) and in HC from 106±6,86 cm to 104,16± 6,95 cm (-1,74%). Even though, the paired t-test did not present any significant differences in the WHR between the experimental and the control group after the 24-week intervention, the people from the experimental group showed a tendency for reduction in WHR from 0,844±0,08 to 0,837±0,08 (-0,83%), while the control group presented a slight increase in the WHR. In accordance with previous researches, it could be said that participation in a dance-based exercise program could positively affect WC and WHR (Arslan, 2011; Cruz-Ferreira et al, 2015; Kontaxi, 2015; Mavrovouniotis et al., 2018)

Finally, body fat percentage of the experimental group following the 24-week Greek traditional dances program decreased significantly from 28,3±6,4% to 26,33±5,6% (-6,96%), while the control group presented a slight increase. In agreement with this finding, Banerjee et al., (2014), found out significantly lower body weight and body fat percentage in the experimental group dancing Bharatanatyam (a major form of Indian classical dance) than in the control group. Similarly, Arslan (2011) who applied a dance exercise program for three days per week with one-hour duration in 49 healthy sedentary obese women, observed a significant decrease in body fat percentage from 39,32±2,64% to 37,56±2,49% (-4,48%). Moreover, a 12-week low-impact dance program, improved significantly the functional fitness components, including body fat (Hidayah & Syahrul Bariah, 2011).

Another study used sixty Japanese women, aged 50,9±6,7 years and divided them in two groups, a dance group and a jogging and/or cycling group. The results indicated that body mass decreased significantly in both groups, -3,1 kg and -3,3 kg respectively. Concerning the body fat percentage, it was also significantly decreased in the dance group, as well as the jogging and/or cycling group, -6,1% and -5,3% respectively. These findings suggest that a dance exercise program is as effective as jogging and/or cycling in improving body composition parameters (Shimamoto et al., 1998). Additionally, Greek traditional dances, this beneficial alternative exercise form may induce psychological improvements, due to its social and entertaining elements, resulting in better mental health. Therefore, this versatile positive effect of Greek traditional dances outcomes to a better quality of life (Argiriadou et al., 2017; Malkogeorgos, et al., 2011b).

Summing up, the sample of the present study who participated in a 24-week Greek traditional dances program demonstrated beneficial effects concerning their body weight, as well as their body composition. The findings from our research is consistent with previous studies that used various types of dance and demonstrated the beneficial effects of dancing, in terms of body characteristics and body composition. The induced of the Greek traditional dances program changes on body weight and body composition parameters are not just changes in body image, but also have a positive effect on body condition, health status, prevention of related diseases, as well as on the quality of life.

5. Conclusions

Greek traditional dances are an alternative exercise form, that may constitute an exercise program aiming on health promotion, when performed regularly in a frequency of at least 3 times per week for 60 min each session. The participation in Greek traditional dances could lead in body improvements, concerning body mass, BMI, waist and hip circumference, and body composition of adult participants. Consequently, Greek traditional dances may improve body condition inducing favorable changes in body mass status and body composition. In general, among its multiple utilities and benefits, dancing can contribute to weight loss programs.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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