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The Influence of a Greek Traditional Dance Program on Body Composition and Lipidemic Profile in Postmenopausal Women

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Abstract: The present study aims at the examination of the influence of a Greek Traditional Dance program on body composition parameters and lipidemic profile in postmenopausal women. In the research participated voluntarily twenty-three postmenopausal women, who were randomly, divided into a dance group (DG; n=13) and a control group (CG; n=10). The DG participated in sessions of Greek traditional dances (GTD), three times a week, for 50 minutes, for 12 weeks, while the CG did not engage in any physical activity. Body weight, waist circumference (WC), hip circumference (HC), and body skinfolds were measured, and body mass index (BMI), body fat percentage (BF%), and waist-to-hip ratio (WHR) were assessed. In addition, total cholesterol (TC), High-Density Lipoproteins (HDL-C), Low-Density Lipoproteins (LDL-C), and triglycerides (TG) were measured in collected venous blood by enzymatic procedures, while Risk Index Factor was calculated. All measurements were taken pre and post the 12-week period. The statistical package SPSS/PC version 29.0 for windows was used for statistical analysis. Regarding DG, the data analysis showed significant improvements in body weight ($p<0.05$), BMI ($p<0.05$), BF% ($p<0.01$), skinfold sum ($p<0.01$), WC ($p<0.01$), HC ($p<0.01$), and TG ($p<0.05$), a 2.11% decrease in TC and 1.06% in LDL-C, while HDL-C and Risk Index Factor remained at the same levels. Conversely, in the CG, either no alteration or deterioration of the studied variables was observed. The results showed beneficial effects on body composition and lipidemic profile parameters highlighting the value of a GTD program for postmenopausal women's health.
Keywords: aerobic physical activity, lipids, triglycerides, body weight, body mass index, body fat percentage.

1. Introduction

Menopause is a very important threshold in women's lives and signals not only the end of their reproductive years but also many pathophysiological changes. During the period of transition to menopause, biological, endocrinological, clinical, and psychological changes, occur, some of which are the result of the significant decline in estrogen levels, while others are the result of the aging process (Diakoumakou, & Diakoumakos, 2010; Edwards, & Li, 2000; Palacios, 2010; The North American Menopause Society, 2010).

The decrease in estrogen during menopause leads to a predisposition to the appearance of atherogenic dyslipidemia, one of the most important risk factors for the development of cardiovascular diseases (CVD) in the female population (Elisaf et al., 2014; Knopp, 2002; Mosca et al., 2011). During the peri- and postmenopausal period of life, women are characterized by increased LDL-C, or/and combined hyperlipidemia with increased LDL-C, elevated TG, and low HDL-C, which is a pathological lipidemic profile. Additionally, menopause and the aging process contribute to the decrease of large arteries elasticity, an independent cardiovascular risk factor. In postmenopausal women atherogenic dyslipidemia contributes by 25-30% to increased cardiovascular risk. Moreover, hypo-estrogenemia is characterized by increased body weight, BMI, intra-abdominal fat, waist circumference, and overall effects on body composition (Edwards, &Li, 2000; Mavroudi et al., 2010; Mosca et al., 2011; Zapantis, &Santoro, 2003; World Health Organization, 2022).

Until menopause, women have an advantage over men regarding CVD, that is, diseases of the heart and circulatory system. This fact leads many women to think of heart disease as a man's disease. However, this advantage progressively vanishes with the significant decline in estrogen levels after menopause, affecting cardiovascular risk (The North American Menopause Society, 2023; World Health Organization, 2022). So, in women older than 55 years more than half of the deaths are caused by CVD. In Europe, 42% of all deaths in women under 75 years of age are due to heart disease, while in North America the number one cause of death of women is CVD (Perk et al., 2012; The North American Menopause Society, 2023).

Given that among the factors influencing the prevalence of heart disease in women are weight gain and physical inactivity, the contribution of non-pharmaceutical interventions that potentially can help in this direction should be examined (Perk et al., 2012; The North American Menopause Society, 2023; World Health Organization, 2022). One such is aerobic exercise interventions which for postmenopausal women have positive effects on the risk factors of developing CVD, such as lipidemic profile improvement that is associated with an increase in cardiorespiratory resistance (American Heart Association, 2011; Green et al., 2004; Haddock et al., 1998; Hagner et al., 2009; Karolkiewizc et al., 2009; Kelley et al., 2004; Mensink, 1996; Mora et al., 2007), as well as body composition (Donnelly et al., 2009; Jensen et al., 2014; Yumuk et al., 2015). Besides, there is an inverse association between higher levels of physical activity and lower CVD rates, which is mediated particularly by inflammatory/hemostatic biomarkers, followed by blood pressure, lipids, and BMI (Mora et al., 2007).

Since postmenopausal women are at increased risk of CVD (Kuo et al., 1999; Mpalaris et al., 2015; The North American Menopause Society, 2023), and aerobic exercise training effects positively risk factors such as body composition and lipidemic profile (Goldberg et al., 1984; Haskell et al., 2007; Kostka et al., 2001; Rankovic et al., 2012; Volaklis et al., 2007), the aim of the present study is to examine the effects of exercise training, in the form of a program of GTD, on body composition, and lipidemic profile of postmenopausal women.

2. Method

2.1 Experimental design

The present research was a 12-week randomized controlled trial, with two groups of postmenopausal women: a dance group participating in the GTD program (DG; n=13) and a control group (CG; n=10). The study was conveyed with a pretest-posttest design.

2.2 Participants

A sample of 28 sedentary postmenopausal women was recruited from the Adult Club located in Limassol city in Cyprus. Participant women were selected according to the following criteria: (1) age 55 years and older, (2) no menstruation the past 12 months, (3) no cardiovascular or other disease obstructing participation in exercise programs, (4) no medication, (5) no participation in dancing, physical activity or/and exercise program the past six months (6) written medical clearance from a health care provider for the participation in the dance program, and (7) a signed, written informed consent form. Women were randomly divided into DG (n=14) and CG (n=14). However, during the 12-week intervention period, one participant in DG dropped out of the program due to a musculoskeletal injury, while four participants in CG didn't participate in the follow-up measurements. Finally, 13 postmenopausal women, aged 60.08±4.35 years, participated in DG and 10 postmenopausal women, aged 60.1±3.96 years, participated in CG.

2.3 Procedure

Each participant who signed the informed-consent form was individually interviewed regarding demographic and exercise information and diet behavior. After that, anthropometric characteristics measurements were taken. Subsequently, a blood sample from each participant woman was collected. Samples were collected at the Club and brought to the laboratory on ice and processed within 1 hour of the collection. The blood analyses were obtained at two-time points, pretest-posttest, and were processed by the same laboratory. After the pretest, the GTD program was applied to the participants in DG for a period of 12 weeks, while at the same period, participants in CG continued their usual daily lives without any changes concerning participation in dance, physical activity, or exercise program, diet or/and medication. To assess the effects of the GTD program, anthropometric characteristics measurements and blood analyses were repeated at the completion of the program. Interviews, measurements of anthropometric characteristics, and the GTD program were conducted at the Club by a single, female, trained investigator, who is a teacher of physical education with extensive practical experience. To conduct the research approval was given by the committee of the Adult Club. Research procedures were in accordance with the Declaration of Helsinki.

2.4 Greek traditional dance program

The 12-week GTD program consisted of 3 sessions per week, for 50 min each session, which is considered ideal in terms of duration and frequency (Adiputra et al., 1996; Blackman et al., 1988). Each session included a) the warming up for 5 min which contained dances of low to moderate intensity such as Berati of Thessaly and Syrtos, (b) the main part for 40 min which contained dances of moderate to high intensity such as Tsamikos, Tasia, Fyssouni, Chromatista Tsourapia, Trechatos, Raiko, Zonaradikos, Sfarlis, Baidouska, Xesyrtos, Bogdanos, Syrtos Sygathistos, Tremouliastos, Tik, Syrtos Chaniotis, Balos, and (c) the cool-down for 5 min which contained dances of low intensity such as Syrto sta tria and Pogonisio. The dances were from different areas of Greece and were performed with musical accompaniment. Participant women held each other using a variety of handholds, creating a hemicycle, and danced continuously in each session, as the dances had frequent changes in tempo and intensity. The intensity of dance sessions was moderate and ranged from 60% to 75% of the maximum HR, which corresponds to 40-60% of VO_2max (Swain et al., 1994; Tanaka et al., 2001; Uth et al., 2004).

2.5 Measurements

2.5.1 AnthropometricCharacteristics

Height: was measured once at baseline, in meters, with a Seca 216 mechanical measuring rod, with an accuracy of 0.5 cm.
Body weight: was measured in kg, with a Microlife WS80 electronic scale withan accuracy of 0.1 kg.
BMI: was calculated in kg/m^2 using body mass (body weight) and height, according to the equation:

$$body\ mass/height^2$$

WC: was measured in cm, at the narrowest point below the lateral arch at navel height.
HC: was measured in cm, at the height of the hip joints and above the pubis with a plastic measuring tape.
To measure WC and HC, each participant woman was standing in a relaxed position with legs together and arms crossed at chest height. Measurements were performed twice and the average of the two was calculated.
WHR: was calculated using WC and HC data, according to the equation *WC/HC*.
Body Skinfolds: were measured at five sites, suprailiac, triceps, biceps, subscapular, and front thigh, using standardized Lafayette skinfold calipers (model 01127, Indiana), according to guidelines of International Society for the Advancement of Kinanthropometry (Stewart et al., 2011), and their sum was calculated.
BF%: was calculated using the equation of Siri (1956)

$$BF\% = \left(\frac{4.95}{density} - 4.50\right) \times 100$$

for female populations of similar age. The density of the body was predicted using a formula developed by Durnin and Womersley (1974).
All measurements and calculations of anthropometric variables, except height, were performed twice, before and after the 12-week period.

2.5.2 Biochemical Measurements

For biochemical measurements, a blood sample was collected in 7-ml vacutainers by trained phlebotomists from an antecubital vein of each subject and was mixed with 1.5 mg of EDTA per milliliter. Plasma levels of TC, HDL-C, LDL-C, and TG were measured by enzymatic procedures with the analyst BECKMAN CX-LX Series. Venous blood was collected pretest and posttest at two-morning visits, after postmenopausal women had abstained from all food and drink, except water, for at least 12 hours. Posttest venous blood for DG was collected at least 48 hours after the last dance session. The Risk Index Factor was calculated using TC and HDL-C data, according to the equation *TC/HDL-C*.

2.6 Statistical Analysis

The statistical package SPSS/PC version 29.0 forwindows was used for the statistical analysis of the data. A descriptive analysis of the data was implemented. Wilcoxon tests for the studied variables for each group between the pretest and posttest measurements were carried out. The level of significance was set at $p<0.05$.

3. Results

Descriptive statistics for body composition variables, measured before the beginning and after the 12-week GTD program for DG or the 12-week period for CG, and the significance of any demonstrated changes are presented in Table 1.

There were observed significant decreases in body weight, BMI, BF%, WC, HC, and in skinfold sum for the postmenopausal women in the DG after the 12-week GTD program. On the contrary, the body composition variables increased in postmenopausal women in the CG after the 12-week period, although the increases were non-significant (Table 1).

Table 1 Body composition variables of DG and CG

Variables	**Group**	**Pretest M±SD**	**Posttest M±SD**	**z& p**	**Change**
Body weight (kg)	DG	66.63±12.06	65.71±12.06	z=-2.243 p<0.05	↓
	CG	71.37±8.06	71.65±8.60	p=0.541 NS	↑
BMI (kg/m^2)	DG	26.56±4.90	26.20±4.89	z=-2.132 p<0.05	↓
	CG	29.50±4.13	29.66±4.45	p=0.445 NS	↑
BF%	DG	36.20±3.49	35.65±3.63	z=-2.411 p<0.01	↓
	CG	38.81±2.29	38.93±2.47	p=0.980 NS	↑
WC (cm)	DG	94.15±9.81	92.84±9.66	z=-2.828 p<0.01	↓
	CG	96.90±7.85	98.15±9.09	p=0.09 NS	↑
HC (cm)	DG	103.34±11.09	101.88±10.81	z=-2.824 p<0.01	↓
	CG	106.10±6.93	106.65±7.54	p=0.223NS	↑
WHR	DG	0.91±0.07	0.91±0.07	p=1.00 NS	-
	CG	0.91±0.06	0.91±0.05	p=0.157 NS	-
Skinfold Sum	DG	99.80±21.82	95.26±21.34	z=-2.831 p<0.01	↓
	CG	116.75±16.80	117.55±18.63	p=0.507 NS	↑

NS: non-significant

In Table 2, descriptive statistics for lipids, measured before the beginning and after the 12-week GTD program for DG or the 12-week period for CG, and the significance of any demonstrated changes are presented.

Table 2 Lipids of DG and CG

Variables	**Group**	**Pretest M±SD**	**Posttest M±SD**	**z& p**	**Change**
TC (mg/dL)	DG	221.38±39.06	216.69±30.19	p=0.529 NS	↓
	CG	223.50±40.63	220.60±36.96	p=1.00 NS	↓
HDL-C (mg/dL)	DG	55.46±8.22	55.30±10.57	p=0.157 NS	↓
	CG	61.00±5.79	57.60±10.18	p=0.113NS	↓
LDL-C (mg/dL)	DG	145.00±35.47	143.46±30.12	p=0.844 NS	↓
	CG	145.60±34.95	140.60±32.11	p=0.575 NS	↓
TG (mg/dL)	DG	104.92±38.59	89.46±19.59	z=-2.028 p<0.05	↓
	CG	84.20±31.06	111.20±43.20	p=0.066NS	↑
Risk Index Factor	DG	4.03±0.75	4.04±0.80	p=0.624 NS	-
	CG	3.66±0.56	3.90±0.66	z=2.325 p<0.05	↑

NS: non-significant

Concerning lipids there were observed significant decreases in TG (-14.73%) and non-significant decreases in TC (-2.11%), and LDL-C (-1.06%) for the postmenopausal women in DG after the 12-week GTD program, while HDL-C and Risk Index Factor remained almost unchanged. As for postmenopausal women in

CG, there were observed significant increases in TG (32.07%) and Risk Index Factor (6.56%) and non-significant decreases in HDL-C, TC, and LDL-C after the 12-week period (Table 2).

4. Discussion - Conclusions

The results of the present study demonstrate that the 12-week GTD program had significant positive health effects on participant postmenopausal women. Specifically, there were observed significant improvements in body weight, BMI, BF%, skinfold sum, WC, HC, and TG. There was observed a 2.11% decrease in TC and 1.06% in LDL-C, while HDL-C remained at the same levels, after the participation in the GTD training program. Conversely, in the CG, either no alteration or deterioration of the studied variables was observed.

Concerning body composition parameters, the present results are consistent with the results of previous studies focusing on dance's usefulness in an intervention program and its effectiveness on body weight, BMI, BF%, and WC. More specifically, Malkogeorgos et al. (2020), also implemented a 24-week GTD program with 3x60 min sessions a week, in 22 women and 15 men, from Greece, aged 38-58 years. After the 24-week GTD program, intervention group (IG) presented significant decreases in body weight, BMI, BF%, and WC, while no significant change was observed in WHR. The results of Malkogeorgos et al. (2020), that also implemented a GTD program in their study, are similar to the present results showing the effectiveness of GTD on body composition parameters.

Similarly, Jeon, and Choe (1996) implemented a 12-week Korean traditional dance movement training with 3x50 min sessions a week, in sedentary postmenopausal women aged 68.76±3.4 years, and Murrock, and Gary (2010), implemented an 8-week specific cultural dance intervention with African dances with 2x50 min sessions a week in African American women aged 36 to 82 years, and found decreases in body weight, BF%, and BMI.

Additionally, studies with other dance forms, such as step-aerobic dance and creative dance, reported decreased body weight, BF%, WC, and BMI in sedentary middle-aged and elderly women who danced for 50 to 60 min three times per week for 8 weeks (Arslan, 2011) and for 24 weeks (Cruz-Ferreira et al., 2015). It is worth mentioning that Shimamoto et al. (1998) argued that a dance exercise program is as effective as jogging and/or cycling in improving body composition parameters.

Concerning lipidemic profile, the present study confirms the results of a Kim et al. (2003) study also with traditional dance. More specifically, they implemented a 12-week program with 4x45 min sessions of Korean traditional dance movements with traditional Korean folk songs as background music, combined with six education classes on various health subjects and individualized counseling sessions, in 21 postmenopausal women, aged 67-89 years. The researchers found that the studied variables were significantly decreased, and more specifically TG from 164.2±42.0 to 150.4±44.1 mg/dL, TC from 200.2±29.1 to 189.6±25.3 mg/dL, BMI from 22.7±3.0 to 22.1±3.0 kg/m^2. The researchers concluded that the program using Korean traditional dance movements was safely applicable and beneficial to participant women, just as the program with GTD in the present study.

Moreover, the results of the present study confirm the results of Ready et al. (1996), who, also, didn't find any significant change in serum lipids of postmenopausal women, aged 61.3±5.8 years, in response to either walking 3 d·wk^{-1} or walking 5 d·wk^{-1}, both at an intensity of 60% peak oxygen uptake (VO_2peak) for 60 min, for 24 weeks. Moreover, similarly to the present study, Ready et al. (1996) found a decrease in BF% by 1.1% and 1.3% in those walking 3 and 5 d·wk^{-1}, respectively, while both changes significantly different from the control group.

The present results are in agreement with the results of Hagner et al. (2009), who implemented a 12-week program with 3x90 min sessions of Nordic Walking with the average pulse rate set to be between 100 and 140 beats/min in 53 postmenopausal women, aged 62.5±5.43 years, with instructions not to increase the daily intake of fat as well as not to change their nutrition routine. The results showed significant changes in BMI, total fat mass, LDL-C, TG, and WC. However, the researchers didn't observe any alteration in HDL-C level in participant postmenopausal women.

Similarly, Texeira et al. (2021), recruited 36 postmenopausal women, of mean age 57 years, in a 16-week dance program with 3x90 min sessions. The results showed significant changes, that is decrease in TG from 156.5±17.0 mg/dL to 131.5±12.9 mg/dL and increase in HDL-C from 55.4±15.9 mg/dL to 60.0±15.4 mg/dL, as well as in TC from 199.5±26.8 mg/dL to 211.8±35.7 mg/dL, showing that a 16-week dance intervention was effective in improving the lipid profile of postmenopausal women.

In addition, Wang et al. (2023) examined body composition, and blood lipid levels in 23 obese older women, who were randomly assigned to IG and CG. IG participated in a 12-week program of simplified dance exercises involving pelvic tilt and rotation with basic breathing techniques. The results showed that IG had lower TC, TG, and LDL-C levels, but higher HDL-C, while no significant difference was observed for body composition after the completion of the program.

In addition, body weight and fat mass losses and decreased waist girth, blood pressure, TG, TC, and LDL-C, and increased HDL-C concentrations were observed in overweight to obese postmenopausal women after a 16-week exercise program, with 3x45 min sessions/week at a moderate intensity (Roussel et al., 2009). Similar results were found by Lindheim et al. (1994) after the implementation of a 24-week exercise program concerning postmenopausal women's lipid profiles. It is worth mentioning that the observed significant changes were more after the 16-week and 24-week exercise programs, compared with the changes in the present study, probably due to their longer duration.

Therefore, it seems that aerobic exercise, but also dancing as aerobic exercise mode can contribute to the reduction of TG value in older women. This effect is particularly important since, according to World Health Organization (2004), TG is a more important factor in the occurrence of CVD in women than in men. The percentage of TG reduction from aerobic exercise is related to initial TG values as well as the total training volume as defined by the exercise program (Durstine, & Haskell, 1994). Moreover, it is worth mentioning that TG responds more easily to exercise interventions while TC and LDL-C respond with more difficulty (Durstine et al., 2001). So, in the present study, a tendency to decrease TC and LDL-C in DG was observed. The results agree with those of other studies, with programs of similar duration in postmenopausal women (Asikainen et al., 2003; Blumenthal et al., 1991; Cornelissen et al., 2009; Grandjean et al., 1998; Mohanka et al., 2006).

It is worth mentioning that women with high baseline TC concentrations may respond more favorably to exercise programs (Lokey, & Tran, 1989). In addition, several researchers have shown that aerobic exercise programs of 8- to 16-week may result in TC or/and LDL-C decrease in postmenopausal women (Hagner et al., 2009; Karolкiewich et al., 2009; Palasuwan et al., 2011; Roussel et al., 2009). Thus, aerobic exercise lasting more than 8 weeks may produce a 2% reduction in TC and 3% in LDL-C in the postmenopausal female population, as well as may present an association of TC with fat loss (Kelley et al., 2004). In agreement, the present study has shown a 2.11% reduction in TC and 1.06% in LDL-C of postmenopausal women. Furthermore, Durstine and Haskell (1994) argued that the effects of aerobic exercise on TC and LDL-C levels are not particularly encouraging concerning older individuals.

As for HDL-C levels, they remained stable after the GTD training program in the present study. The failure to increase HDL-C levels is consistent with other randomized trials in postmenopausal women (Asikainen, 2003; Blumenthal et al., 1991; Grandgean et al., 1998; Green et al., 2004; Lindheim et al., 1994; Mohanka et al., 2006; Ready et al., 1996). It should be noted that in the female population, the desired levels of HDL-C should be greater than 50 mg/dL (Mosca et al., 2011), since for concentrations lower than 55 mg/dL the risk of coronary heart disease appears to be increased (Wilkins et al., 2014). The lower the baseline value of HDL-C, the greater the likelihood of a favorable effect on it, as a result of training (Leon & Sanchez, 2001; Durstine, & Haskell, 1994; Goldberg & Elliot, 1987).

Furthermore, Durstine et al. (2002), argue that there is a dose-dependent relationship between HDL-C and increased energy expenditure from aerobic training. So, moderate-to-high-intensity exercise programs lasting longer than twelve weeks may increase HDL-C levels, although this increase is not always observed. Therefore, an exercise protocol of greater frequency and duration is likely to have more positive effects on HDL-C values (Cornelissen et al., 2009; King et al., 1995; Kraus et al., 2002).

Thus, a possible explanation for the lack of an increase in HDL-C may be the relatively high baseline mean value of the DG, or/and the frequency, and duration of the GTD program. Furthermore, it has been found that HDL-C responds more poorly to the training stimulus in older women (Taylor, & Ward, 1993).

In addition, Risk Index Factor is a powerful tool for the prevention of CVD in the female population, so its observed deterioration, with a statistically significant increase of 6.56%, is considered unfavorable for the CG. In contrast, DG maintained the Risk Index factor stable after the GTD program, a fact particularly favorable for the postmenopausal women in the present study.

However, Serrano-Guzmán et al. (2016) who implemented a dance therapy program didn't observe any significant change in BMI in fifty-two sedentary postmenopausal women, aged 69.27±3.85 years. More specifically, the participant postmenopausal women were randomly assigned to receive either an 8-week dance therapy program, with 3x50 min sessions, based on Spanish folk dance (flamenco and sevillanas) (IG; n=27) or self-care treatment advice (CG; n=25). Although many significant changes in IG were observed (concerning mobility, balance, levels of physical activity, and fitness), no differences were observed in BMI which ranged from 28.63±3.69 to 28.27±3.46kg/m^2.

Moreover, Busby et al. (1985) examined the levels of serum TC, TG, HDL-C, and HDL-2b in fifty healthy women between the ages of 40 and 65 who participated in a 12-week program of exercise, discussion sessions, or both, for 6 and 12 weeks. The researchers didn't observe any statistically significant differences in the levels of serum TG, or HDL-C fractions between non-exercising and exercising groups at either program duration.

Additionally, Asikainen et al. (2003) examined the effects of two programs 15 and 24-week long (1):exercise intensity at 65% of VO_2max and a total of 300 kcal expended in one (Group W1) or two (Group W2) daily walking bouts, and (2):continuous exercise with intensity at 55% of VO_2max and energy expenditure 300 kcal/session (Group W3), at 45% and 300 kcal (Group W4), at 55% and 200 kcal (Group W5) and at 45% and 200 kcal (Group W6), 5 days/week. Serum lipoproteins and systolic blood pressure did not change after the two programs. In addition, the greatest exercise dose, exercise intensity 65% of VO_2max and weekly expenditure of 1500 kcal had a minimal, positive effect on diastolic pressure and blood glucose. The researchers concluded that the implemented exercise dose is probably close to the minimum to affect lipids, and all coronary risk factors, in healthy postmenopausal women.

Furthermore, King et al. (1991) examined the effectiveness of a year-long randomized, controlled trial comparing (1)higher-intensity group-based exercise training and (2)higher-intensity home-based exercise training (3x40-min/week endurance training sessions at 73% to 88% of peak treadmill heart rate); (3)lower-intensity home-based exercise training (5x30-min/week endurance training sessions at 60% to 73% of peak treadmill heart rate); or (4)assessment-only control, on 160 sedentary and free of CVD women, aged 50 to 65 years. They didn’t find any significant training-induced changes in lipid levels, body weight, or blood pressure.

In addition, Stefanick et al. (1998) examined 180 postmenopausal women, aged 45-64 years, who had low HDL-C levels (<or =59 mg per deciliter) and moderately elevated levels of LDL-C (>125 mg per deciliter but <210 mg per deciliter), and were randomly assigned to aerobic exercise, the NCEP Step 2 weight-reducing diet, or weight-reducing diet plus exercise, or to a CG, which received no intervention. The results showed that TC and LDL- C decreased in the diet-plus exercise group, but not in the diet-only or the exercise-only group.

It is worth to be mentioned that in the studies of Asikainen et al. (2003), Busby et al. (1985), King et al. (1991), Ready et al. (1996) and Woolf-May et al. (1999), where no improvements in lipids were found, the participants were normolipidemic and their mean BMI varied from 24 to 27 kg/m^2. In addition, the training was quite similar to the studies where effects could be found, that is walking 20-40 min in one to three daily exercise bouts at 60-84% of VO_2max on 3-5 days/week for 12 weeks to 1 year. Such exercise improved not only aerobic fitness (Busby et al., 1985; King et al., 1991; Ready et al., 1996), but also body weight (Ready et al., 1996). Thus, it can be said that in overweight or dyslipidemic participants, who need the improvements most, exercise training more often improves the lipid profile, while in healthy subjects these improvements are not observed. For early postmenopausal women, there are no randomized controlled trials showing lipid profile improvements in normal-weight, normolipidemic individuals (Asikainen et al., 2004). Moreover, lipids appear to respond more poorly to the training stimulus in older women (Durstine, & Haskell, 1994; Taylor, & Ward, 1993).

Concerning, exercise dose, it appears that a greater frequency and duration of the training protocol were needed to alter serum lipids in non-obese, normolipidemic postmenopausal women, as intensity appears to be less important to achieve statistically significant improvements (Cornelissen et al., 2009; King et al., 1995; Kraus et al., 2002; Ready et al., 1996). Thus, to get a more pronounced and clinically relevant effect on lipids in healthy postmenopausal women, a greater exercise dose is needed (Asikainen et al., 2003). Additionally, simultaneous changes in diet may contribute to these effects, as exercise and diet combined seem to have an additive effect on lipids and body composition parameters (Ready et al., 1996; Stefanick et al., 1998).

It is worth mentioning, that although physical activity induces modest changes in individual risk factors, such as 5% for blood lipids, 3-5 mmHg for blood pressure, and 1% for hemoglobin A1c, however, the reductions in CVD risk induced with physical activity are large (30-50%) (Kraus et al., 2002; Leon, & Sanchez, 2001; Mora et al., 2007). Nevertheless, for the sedentary or/and low-active postmenopausal women, as well as all sedentary or/and low-active members of society, any improvement in health may be considered as important (Woolf-May et al., 1999).

Summing up, from the study of the literature, it appeared that the results regarding postmenopausal women are complicated. Thus, other researchers who implemented dance programs or other forms of exercise observed significant changes in lipids and body composition parameters, while others did not observe any changes. However, the present study showed beneficial effects on postmenopausal women after participation in the GTD program. This highlights the value of a GTD program on postmenopausal women’s health.

To our knowledge, this is the first study to contribute scientific evidence on the effectiveness of a GTD program on body composition, and lipidemic profile of sedentary postmenopausal women in Cyprus. The present study’s main limitation is the sample size which may affect the power of the statistical analyses, although it is a representative part of Cypriot postmenopausal women. To generalize the observed effects to the whole Cypriot postmenopausal women population, future research should increase the sample size. Furthermore, recommendations for future research include increasing the implementation period of the program, as previous studies have attested to the effects of exercise programs of a longer period of implementation.

Future research, also, should examine the reasons that some individuals respond to exercise and others do not, regarding lipidemic profile. In conclusion, it can be said that GTD is a safe and enjoyable physical activity that can be adopted by postmenopausal women in their daily lives, as a beneficial alternative physical activity that may offer them health, well-being, and quality of life.

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