International Journal of Physical Education, Sports and Health 2019; 6(5): 136-141

P-ISSN: 2394-1685
E-ISSN: 2394-1693
Impact Factor (ISRA): 5.38
IJPESH 2019; 6(5): 136-141

www.kheljournal.com
Received: 04-07-2019
Accepted: 06-08-2019

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Effects of aerobic gymnastics practice and endurance race on body composition, cardiovascular and lipid profile among sub-saharan African menopausal women

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Abstract
Menopause occurs earlier in African women than European or American women. Although biological factors contribute largely to such as abdominal fat and metabolic dysfunction, little is known of the role of behavioral factors such as physical activity. The aim of this study was to investigate the effect of aerobic gymnastics practice and endurance race on body composition, cardiovascular and lipid profile. In a case–control and follow-up study, 32 postmenopausal women compared with 31 premenopausal women had experimental physical exercises (aerobic gymnastics, fast walking, jogging) for 16 weeks at Brazzaville (Congo) between March and June 2019. Anthropometric, cardiovascular and lipid parameters were evaluated before and after the 4 month-period. Our results showed that a significant decrease was noted in postmenauposal women for weight (-6.8%), waist (-2.5 cm), total fat (-12.5%), abdominal fat (-21.3%, SBP (-3.0%), DBP (-16.1%), HR (-4.0%) and LDL-c (2.75 ± 0.21 vs 2.58 ± 0.08 mmol/L). in contrast, lean body mass and HDL-c increased significantly (+20.4% and +10.5% respectively). In conclusion, physical exercise based on aerobic gymnastics, fast walking and endurance race play a role in the management of aggressive form of the menopause in African countries, particularly in Congo.

Keywords: Menopause, aerobic gymnastics, physical exercise, body composition, cardiovascular and lipid profile

Introduction
The menopause appears naturally at 50 years (Utian, 1990) [25] with a median age between 49 and 52 years, according to the developed and developing countries. However, this variability does not relate to the menopause as such, but the age of the first menses is that of the first alive birth. Moreover, the cultural attitudes are supposed to explain the differences observed between the ethnic groups, as brings it back an Israeli study (Neri and *et al*, 1982) [18]. In Africa, the age of appearance of the menopause was estimated at 50.7 years in the higher socio-economic environments, and 48.4 years when it is low (Sidibe, 2005) [21], (Aina, 1992) [1]. Nearer to us, in Democratic Republic of Congo, Lepira *et al*., 2012 bring back 53 ± 5 years a median age among Congolese women [15]. According to a study of Smith and Mensah, 2003 [22], the number of menopausal women in the African countries should reach into 2030, 1.2 x 10 9.

Menopause is associated with an enhanced intra-abdominal fat (IAF) accumulation. Cross-sectional and longitudinal studies tend to support that. In addition, it is known that at the time of the menopause, one observes a progressive loss of the muscular mass, due to a decrease of the basal metabolism. This one, person in charge for the positivism of the energy balance, involves an increase in the fatty mass. It is in this context that one notes a stressing of the muscular slit among menopausal women, and thus an increase in the ratio fatty mass / lean body mass (LBM), when one is interested in the body composition. Also, it is recommended the practice of the physical activity among menopausal women lately in order to maintain the weight, to increase the force and muscular coordination, therefore to decrease the falls (Cheng and *et al.*, 2009) [6]. Moreover, the physical activity makes it possible to reduce the cardiovascular (CV) risks, partly independently of the variations of the weight, thus contributing to an increase in the quality of life.

In Republic of Congo, a sole and recent study was undertaken by Congolese researchers who analyzed the beneficial effects of the practice of the gymnastics aerobic in the assumption of responsibility of the menopausal woman (Mabassa and *et al.*, 2019) [16]. However, this study was focused only on the parameters related to the body composition. No work was concerned the menopausal woman on the effects of physical activity on cardiovascular and lipid profile. Knowing that the physical activity located below a threshold bringing a deterioration of the capital health, with particularly an increase in the insulin resistance of diabetes mellitus, cardiovascular diseases (CVD) (Mastorakos and *et al.*, 2010) [17], it is to fill this gap that this work was undertaken parallel to the study of Mabassa and *et al.*, 2019 [16]. The goal assigned with this study is to evaluate the beneficial effects of the physical exercises based on the practice of the aerobics gymnastics and endurance race on the body composition, hemodynamic and lipid profile among post-menopausal women in Brazzaville. The interest of this work resides on the checking of the direct effects of the physical activity on the quality of life is still debated (Jamin, 2011) [12].

Material and methods

Topics

The experimental, case-control and follow-up study was conducted from February to July 2019 at High Institute of Physical Education and Sports, Marien Ngouabi University of Brazzaville (Congo).

Subjects

The sample for our analyses consisted of 72 Congolese women (37 postmenopausal and 35 premenopausal), adult apparently healthy (40 years and old) who took part in this study. The clinical characteristics of all the subjects are presented in table 1. All 72 pre and postmenopausal women had an obesity of the type I. A convenience sampling procedure was followed to select the subjects. Available lifestyle data included self-reported physical activity, alcohol and smoking habits. Data were also available for the menses characteristics, duration of menopause, familial and personal history of diabetes, CVD, hypertension and current antihypertensive medication. However, the women presenting has diabetes and/or year arterial hypertension with use of antihypertensive drugs were no included. Thus, the sample consisted of 63 women [32 postmenopausal (case group) and 31 premenopausal (control group)]. They all were not subjected to a dietary lifestyle.

Table 1: Clinical characteristics of the study population as a whole and according to menstrual bleeding status

Characteristic	Whole group (n = 72)	Postmenopause (n = 37)	Premenopause (n = 35)
Age (yrs)	47.3 ± 5.2	54.1 ± 4.5	40.5 ± 3.8
FH-DM (%)	3.5	5	2
FH-HT (%)	6	7	5
DM (n; %)	8 (15.2)	5 (18.5)	3 (12.0)
HT (n; %)	7 (9.7)	4 (10.8)	3 (8.6)
LPA (%)	50.5	49	52
M. duration (yrs)	-----	6 ± 4	-------
BMI (kg/m^2)	27.1 ± 1.8	28.1 ± 2.3	26.2 ± 1.5
Waist (cm)	87.8 ± 3.1	90.3 ± 0.8	85.4 ± 6.2
SBP (mmHg)	124.9 ± 10	128.5 ± 7.3	121.4 ± 5.5
DBP (mmHg)	76.5 ± 9	84.3 ± 4.1	79.0 ± 7.4
PP (mmHg)	48.4 ± 8	44.2 ± 5.7	42.4 ± 6.3
HR (b/min)	81.3 ± 5.4	80.6 ± 5.2	82.1 ± 5.8

Abbreviations: yrs, years; FH-DM, familial history of diabetes mellitus; FH-HT, familial history of hypertension; DM, diabetes mellitus; HT, hypertension; LPA, level of physical activity; M. duration, menopause duration; BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; PP, pulse pressure; HR, heart rate

Data utilized

The following anthropometric parameters were measured: height (in centimeters) to the nearest 0.1 cm using portable anthropometer Seca; body mass using a digital electronic beam balance. Measures of adiposity included body mass index (BMI) estimated as weight (kilograms) over height squared (meters^2), waist circumference, total fat and visceral (or abdominal) fat using impedance meter Omeron BF-511, and lean body mass (LBM). Hemodynamical measures consisted for each subject, after 5 minutes rest, to blood pressure (BP) [systolic blood pressure (SBP), diastolic blood pressure (DBP), pulse pressure (PP), heart rate (HR)], measured at the left arm with the help of an Omron M1 digital electronic blood pressure/pulse monitor (Omron Corporation, Tokyo); three BP measurements were taken and averaged for analysis.

In addition, all patients had the following measurements after 12 h fasting before each lesson of training: total cholesterol (TC), high density lipoprotein-cholesterol (HDL-c), triglycerides (TG) and glucose. Cholesterol (Cholesterol Test Kit, Wykenga & Pillegi-One Step Method, Spain Diagnostics Ltd) and triglycerides (Triglycerides Test, enzymatic GPO-PAP method, Spain Diagnostics Ltd) were measured using enzymatic methods. Low density lipoprotein-cholesterol (LDL-c) was calculated according to Friedewald equation (Friedewald and *et al.*, 1972) [10].

All the blood examinations were carried out at the Biochemistry Laboratory of the Pasteur Institute of Brazzaville. The physical level of daily activity of each woman was estimated using the questionnaire of Barbosa *et et al.*, 2007 [3].

Experimental procedure

- Exercise training program was supervised, occurred three times per week (90 min / day) for a four-month period (March
- June 2019). The training schedule was composed of: exercises of aerobic gymnastics (duration: 25 min), on carpet in the gymnasium (gymnic choreography on funds of Congolese dances);
- Physical exercises of easing and reinforcement of the belt scapular and the abdominal muscles (duration: 20 min);

- Fast walk on the track of athletics (duration: 20 min)
- Stretching (duration: 10 min).

One observed 5 min of active recovery between two physical activities.
Practice of jogging was conducted each Sunday on the boulevard of the Cornice; all women runned 12 km.
One observed 10 min of relaxation after each meeting.
The intensity of each exercise was fixed at a participant's HR, controlled by monitoring the HR with a Sport- Tester device (Vantage NV, Polar Electro, Kempele, Finland) and corresponding to the maximum rate of fat oxidation (Lipox $_{max}$) value assessed at the first meeting.
Hypertension was defined as BP ≥ 140/10 mmHg or current use of antihypertensive drugs. Women was defined as postmenopausal if they had reported their last menses to be at least 12 months previously, and premenopausal if they had unchanged and regular menstrual pattern (WHO, 1996) [26]. Intolerance with glucose was retained for a higher glycemia with jeun 6.11 mmol/L. Abdominal obesity was defined for a waist measurement higher than the 90th percentile according to standards of WHO (WHO, 2007) [27]**.** The obesity of the type I was retained for BMI ranging between 30 and 34.5 kg/m2. The hypertriglyceridemy was defined for plasmatic triglycerides higher than 1.69 mmol/L. All patients gave informed consent and National Committee of Health Sciences Research of Congo approved data collection.

Statistical analysis
Data were expressed as mean ± standard deviation (SD) or relative frequency in percent. The distribution of triglycerides being positively skewed, non-parametric test (MannWhitney) was used for comparing two values [before and after training program]. Chi square and Student's t tests were used for comparing categorical and continuous variables normally distributed, respectively. p value ≤ 0.05 defined statistical significance. All statistical analyses were performed with SPSS for Windows, version 23.0 at the Laboratory of Numerical Analysis, Computer Engineering and Applications, Faculty of Sciences and Technology, Marien Ngouabi University.

Results
Anthropometric and body composition data
Table 2 indicates the results of the anthropometric parameters and the body composition according to the status of the menopause.

Table 2: Anthropometric parameters and body composition before the physical work program according to the status of the menopause

Variable	Postmenopausal (n = 32)	Premenopausal (n = 31)
Weight (kg)	92.0 ± 4.3**	83.7 ± 3.0
BMI (kg/m^2)	28.1 ± 2.3*	26.2 ± 1.5
Waist (cm)	90.3 ± 0.8**	85.4 ± 6.2
Total fat (%)	52.1 ± 1.9*	49.6 ± 2.5
Abdominal fat (%)	14.2 ± 2.4*	11.5 ± 0.9
Lean body mass (%)	24.5 ± 1.6*	23.1 ± 1.1

Abbreviations: *, p<0.05; **, p<0.01; BMI, body mass index

Before the physical work program, one found significant differences between postmenopausal and premenopausal women; the higher values were noted at the first on the postmenopausal women: weight (92.4 ± 4.3 kg against 83.7 ± 3.0 kg; Δ = 10.4% and p<0.01); BMI (28.1 ± 2.3 kg/m2 *versus* 26.2 ± 1.5 kg/m2 ; Δ= 7.2% and p<0.05) and of the waist measurement (90.3 ± 0.8 cm *versus* 85.4 ± 6.2 cm; Δ = 5.7% and p<0.05). In the same direction, the rates of total fat, abdominal fat and LBM of the postmenopausal women were higher, the variations being respectively of: 5.0%, 23.4% and 6.1%.
After 16 weeks of physical activities, the data of the anthropometric parameters and body composition are indicated in table 3.

Table 3: Anthropometric parameters and body composition of the postmenopausal and premenopausal women after physical work program

Variable	Postmenopause (n = 32)	Premenopause (n = 31)
Weight (kg)	86.1 ± 2.8*	79.3 ± 1.6
BMI (kg/m^2)	26.3 ± 1.9	25.9 ± 0.7
Waist (cm)	87.8 ± 2.0*	83.5 ± 1.3
Total fat (%)	46.3 ± 4.6*	44.3 ± 1.9
Abdominal fat(%)	11.7 ± 2.0***	9.5 ± 0.7
Lean body mass (%)	29.5 ± 3.2*	26.8 ± 2.5

Abbreviations: *, p<0.05; **, p<0.01; ***, p<0.001; BMI, body mass index

The anthropometric values and those of the body composition obtained in J160 (4th month of the physical work program) showed a significant fall in the two groups of women, except for the BMI. However, the highest values were noted among postmenopausal women: weight, 86.1 ± 2.8 kg against 79.3 ± 1.6 kg (Δ = 8.6%; p<0.05); waist measurement, 87.8 ± 2.0 cm against 83.5 ± 1.3 cm (Δ = 5.1%; p<0.05); total fat, 46.3% ± 4.6% *versus* 44.3% ± 1.9% (Δ = 5.0%; p<0.05); abdominal fat, 11.7% ± 2.0% *versus* 9.5% ± 0.7% (Δ = 23.5%; p<0.001); Lean body mass, 29.5% ± 3.2% against 26.8% ± 2.5% (Δ = 6.1%; p<0.05).
The anthropometric data and body composition before and after the physical work program at postmenopausal (table 4) indicated a significant reduction for the following studied parameters: weight, Δ = -6.8%; BMI, Δ = -6.8%; waist, Δ = -2.5 cm; total fat, Δ = -12.5%; visceral fat, Δ = -21.3%. On the other hand, the lean body mass increased significantly, the rate of decrease being of +20.4%.

Table 4: Comparison of the anthropometric data and body composition among women postmenopausal before and after the physical work program

Variable	Before program (n = 32)	After program (n = 31)	P
Weigth (kg)	92.0 ± 4.3	86.1 ± 2.8	0.047
BMI (kg/m^2)	28.1 ± 2.3	26.3 ± 1.9	0.045
Waist (cm)	90.3 ± 0.8	87.8 ± 2.0	0.021
Total fat (%)	52.1 ± 1.9	46.3 ± 4.6	0.013
Abdominal fat (%)	14.2 ± 2.4	11.7 ± 2.0	0.007
LBM (%)	24.5 ± 1.6	29.5 ± 3.2	0.010

Abbreviations: BMI, body mass index; LBM, lean body mass

Cardiovascular data
Cardiovascular characteristics of postmenopausal and premenopausal women before and after physical activities program are reported in table 5.

Table 5: Cardiovascular characteristics of postmenopausal and premenopausal women, before and after the four-month period

Parameter	Postmenopausal women		Premenopausal women	
	Before	After	Before	After
SBP (mmHg)	133.4 ± 4.0	127.2 ± 3.1**	121.5 ± 2.4	118.5 ± 3.4*
DBP (mmHg)	84.6 ± 3.3	72.5 ± 2.4**	80.8 ± 15	79.2 ± 2.2
PP (mmHg)	48.8 ± 3.5	47.7 ± 2.6	44.4 ± 1.9	39.3 ± 2.7*
HR (b/min)	86.3 ± 4.2	83.1 ± 2.5*	81.5 ± 0.8	78.4 ± 1.2**

Abbreviations: *, $p<0.05$; **, $p<0.01$; SBP, systolic blood pressure ; DBP, diastolic blood pressure; PP, pulse pressure; HR, heart rate

Significant differences were found before the program between the postmenopausal and premenopausal women. The higher values were noted among women postmenopausal of all the studied parameters: SBP, Δ = +12.2 mmHg; DBP, Δ = 3.8 mmHg; PP, Δ = 4.4 mmHg; HR, Δ = 4.8 b/min. After four-months of training program, all data decreased in two groups of women. Among postmenopausal women, any significant change was observed for PP; in contrast, any change was noted for DBP in premenopausal women.

Biological characteristics

Lipid profile of the study population before and after the four-months training program is summarized in table 6.

Table 6: Lipid characteristics of postmenopausal and premenopausal women, before and after the four-month period

Parameter	Postmenopausal women		Premenopausal women	
	Before	After	Before	After
TC (mmol/L)	4.59 ± 0.11*	4.12 ± 0.07	4.27 ± 0.03*	4.05 ± 0.08
LDL-c (mmol/L)	2.75 ± 0.21*	2.50 ± 0.10	2.58 ± 0.08*	2.34 ± 0.12
HDL-c (mmol/L)	1.52 ± 0.13	1.68 ± 0.05*	1.41 ± 0.12	1.82 ± 0.04
TG (mmol/L)	1.49 ± 0.08**	1.37 ± 0.03	1.42 ± 0.10*	1.12 ± 0.07
Glucose (mmol/L)	6.07 ± 0.04*	5.81 ± 0.06	5.93 ± 0.04	5.63 ± 0.11

Abbreviations: TC, total cholesterol; LDL-c, low density lipoprotein-cholesterol; HDL-c, high density lipoprotein cholesterol; TG, triglycerides; *, $p<0.05$; **, $p<0.01$

Compared to premenopausal women, postmenopausal ones had in average, before the four-months training program higher levels of TC (4.59 ± 0.11 mmol/L vs 4.27 ± 0.03 mmol/L; $p<0.05$), LDL-c (2,75 ± 0,21 mmol/L vs 2.58 ± 0.08 mmol/L), HDL-c (1.52 ± 0.13 mmol/L vs 1.41 ± 0.12 mmol/L; $p<0.01$) and TG (1.49 ± 0.08 mmol/L vs 1.42 ± 0.10 mmol/L; $p<0.001$). No significant difference was found between the two groups regarding LDL-c and glucose. At the end of the program, levels of TC, TG, levels of LDL-c levels and glucose were significantly decreased in postmenopausal women. In contrast, HDL-c were increased in the two groups; however, values observed in postmenopausal women were significantly higher.

Discussion

This work showed, at the end 4 months of training program, the beneficial effects of the practice of the aerobic gymnastics and the race of endurance on the body composition, the hemodynamic and lipid profile in a population of Congolese postmenopausal women. The impact of these physical activities on the body weight, waist, total fat and abdominal fat was particularly observed. In addition, the values of SBP, DBP and HR also decreased significantly. With regard to the lipid profile, the decrease related to TC, TG and the glycemia was observed; on the other hand, the values of LDL-c decrease, in contrast, values of HDL-c increased significantly. To our knowledge, the studies of follow-up on the practice of the aerobic gymnastics and the activities of race of endurance among menopausal women do not exist yet to date in the African black population from where the difficulty of comparing them with present.

The majority of the postmenopausal women had at least an occupation (civil servant of the State departments, servant of the company or tradesman), had universitary level, and was married and old on average 54.1 years. They are there the reasons which could have prevented them to practice the physical activities that we retained. What indicates a certain will to practice the physical activity in spite of the current propensity of the factors of sedentariness such as the industrial revolutions (car, portable phone, television with remote control, computer, etc.), the urbanization and progress in automatic technologies?

The reduction of the weight among postmenopausal women was 6.8% (5.9kg of loss) after 4 months of training to the aerobic gymnastics and physical exercises of endurance. On the other hand, Mabassa and *et al.*, [16] bring back among 58 women Congolese postmenopausal a decrease of weight of 28.6% after 24 weeks of physical reconditioning, based on exercises of gymnastics aerobic and rhythmic follow-ups of 90 minutes an active walk to moderate intensity. These authors also note a reduction of 33.3% for waist vs 8.0% in our study, 77.7% for total conceited person vs 12.5% and 45% for abdominal conceited person vs 21.3%. These differences in percentage are related mainly to the duration of the programs, nature of the exercises suggested and with the methodological protocols (for example the regrouping of the obese women and in overweight in the same group in the study of Mabassa and *et al.*, 2019). In this respect, a review of literature indicates that the loss of the weight at the woman is 1.4 kg around when this one was subjected to various methods of training (Jamin, 2011) [12]. With regard to the premenopausal women, the study of Pines and Berry, 2007 [20] brings back among old women of 42.2 ± 1.9 years a significant loss of body weight from approximately 5.2% years after a physical reconditioning program of 28 weeks including/understanding walk, the race and the muscular stretching at a rate of two meetings per week. Thus, the weight reduction ratios vary according to studies'. The critical review of Duclos, 2001 [9] makes it possible to specify the impact of the regular exercise on the corticotrope axis at the woman. Indeed, according to these authors, the activation of the corticotrope axis represents a physiological response to

the energy, metabolic and vascular "constraint" of the muscular exercise. The temporal dynamics of the activation of the corticotrope axis during the exercise associates stimulation of the co-secretion of hypothalamic corticophin releasing hormone (CRH) and AVP (with a dominating role of the AVP on the CRH) (Smoak and *et al.*, 1991) [23], production of hypophyseal adrenocorticotropic hormone (ACTH) by the corticotrope hypophysar cells preceding the increase by plasmatic cortisol. What confirms in an indirect way work of Galbo and Gollnick, 1984 [11] which showed that the variations of the cortisolemia during the exercise was related to the variations of the cortisol secretion. The factors implied in stimulation of the neurons with CRH and the neurons with AVP are multiple: lower glycemia at the time of prolonged exercises (case of the jogging practiced by our subjects in this study), variation of volume and plasmatic osmolarity at the time of intense exercises, interaction with central catecholamines, etc….

In addition, it was observed in this study among women postmenopausal before the training program higher values of BMI, waist, total fat and abdominal fat. An explanatory factor is the decrease of the testosterone rates and the growth hormone (GH), in relation to the rates of reduction in the lipolysis of abdominal fat with the age. GH exerts a lipolytic effect predominantly in the visceral adipose tissue, and to a lesser extent in the sub-cutaneous adipose tissue, resulting in increased free fatty acid (FFA) flux from the adipose tissue. The specific effect of GH in adipose tissue could be explained by the fact that GH increases lipolysis by increasing adipose tissue hormone-sensitive lipase (HSL) activity (Oscaï and *et al.*, 1990) [19]. GH stimulates triglycerides uptake in the skeletal muscle primarily by increasing lipoprotein lipase expression; there by promoting lipid utilization (Kanaley and *et al.*, 1999) [14]. However, among women the reduction in the rates of oestrogen after the menopause constitutes a critical factor. Thus, the regular physical activity of the aerobic gymnastics associated to fast walk and jogging allowed a significant loss of weight among women postmenopausal and premenopausal, result which join the observations of Adams and *et al.*, 1986 [2]. Moreover, the study of Jeffery *et al*., 2003 [13] showed that larger east the energy expenditure caused by the physical practice of activities of endurance, more significant is the loss of weight. This fact is in relation to the increase in LBM recorded in our study among postmenopausal women: 29.5 ± 3.2% after the program against 24.5 ± 1.6%.

With regard to the fall of the hemodynamic values of the parameters (SBP, DBP and HR), the evoked reasons are multiple: loss of weight with increase of LBM and reduction of fatty, in particular visceral mass as objectified in this study. That increases the insulino-sensitivity and, so the thrombotic risk decreases by increasing of fibrinolysis (inhibitor of plasminogene drops) (Tchernof and *et al.*, 1998) [24]. That decreases also the thrombotic risk by an effect on the circulatory kinetics.

We also observed an improvement of the lipid profile (drops by LDL-c and increase in HDL-c). The studies of Daley *et al*., 2009 [8], Jamin, 2011 [12] confirm these benefits on quality on the metabolism of fat among menopausal women, even if these results are discussed by other authors (Coon and *et al.*, 1992) [7], (Cefalu and *et al.*, 1995) [5]. Indeed, the menopausal women store great quantities of fatty mass in the form of TG in fat development just as in muscle fiber. During the exercises of endurance, these reserves of fat are mobilized and oxidized at relatively slow speeds compared to the glucides stored in muscular glycogen. However, the fatty acids coming from fat development are mobilized in the blood and transported by albumin to the muscles to be oxidized there. This oxidation increases as the intensity of the exercise increases by 25 to 65% of the VO_2max because of the oxidation of the intramuscular TG which represent approximately half of the oxidized lipids.

However, the interpretation of our results must take account of some limit. First, it is known that to maintain the loss of weight among women in overweight or obese at the time of the practice of the physical activity, he is advisable to associate there the follow-up of a dietetic mode (Bollon and Poehlman, 1994) [4]. Second, information on the family or personal morbid antecedents, as well as the lifestyle of the women surveyed rested only on the declarations of the participants, without rigorous checking. Nevertheless these limits do not completely affect the power of our observations. The exercises used respected a certain regularity, as for the moment of their realization; moreover, they made as a preliminary the object of test and retest in order to check their reliability.

Conclusion

Our results demonstrated that a four –month training program of aerobic gymnastics, fast walk and endurance race decrease body weight, abdominal fat, total fat and LDL-c. In contrast, lean body mass and HDL-c increases. All things considered, these physical activities are lifestyle factors that play a role in prevention or management of postmenopausal women. Consequently, it is advisable to recommend the physical activity among women menopausal to modify the consequences of menopause.

Conflict of interest

The authors had no conflict of interest to declare concerning this article.

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