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Outcomes of aerobic exercise on lipid profile and body composition in obese post menupausal women

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ABSTRACT

Back ground: following menopause there are changes in values of lipid profile parameters has also associated with a tendency to gain weight. Several alterations in fat deposits occur, leading to changes in the distribution of body fat. **Objective:** the purpose of study was to determine the effect of aerobic training on lipid profile constituents, including total cholesterol (TC) ,high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL) cholesterol , and triglycerides (TGs) and body composition (fat mass, fat free mass, percent body fat ,and fat distribution trend(android gynoid ratio) on obese postmenopausal women.**Methods:** thirty obese postmenopausal women with age of 50-60 years were included in the present study. Their body mass index (BMI from > 30 kg/m2.They were randomly divided into two groups, each group consisted of 15 patient, the (group A) received low-calorie diet without any program of exercise ,(group B) received a program of aerobic exercise training (25 min. aerobic exercises 3 times/week) with low-calorie diet . The biochemical changes in total cholesterol (TC) ,high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL) cholesterol , and triglycerides (TGs) and body composition (fat mass, fat free mass, percentage body fat ,and fat distribution trend (android gynoid ratio) were measured at the beginning of the study and after twelve weeks. **Results:** Showed that aerobic exercise group had statistically significant increase in high-density lipoprotein (HDL) cholesterol (+6.34mg/dL; P<0.05) vs. (+0.40mg/dL; P>0.05) but changes in the diet group was not statistically significant (P>0.05).also had significant decrease in android gynoid ratio P=0.001) but was not statistically significant in group (A) moreover, after the intervention, a reduction in Body weight, BMI, Fat mass, Percentage body fat, TC, LDL and TGs were observed in both groups. Also fat free mass were remain unchanged in group (B), whereas significant decrease in group (A). **Conclusion:** It was concluded that the result of the present study indicate that significant increase in high-density lipoprotein (HDL),and preserve of fat free mass in obese postmenopausal women after a addition of short term of aerobic exercise to low caloric diet regimen (up to twelve weeks).

Key words:*Aerobic exercise, Lipid profile, Body composition, Obesity and Postmenopausal women.*

INTRODUCTION

Exercise is most important for every living being; in other words, we can also say that physical inactivity results in several types of diseases in the body. It mostly causes Cardio-vascular diseases. So, if we maintain and keep balance between our diets and regular exercise, it will result the best [1].

Postmenopausal women have an increased tendency for gaining weight. The decline of endogenous oestrogen, together with physical inactivity is probably the major cause of this phenomenon [2]. Following menopause, adverse changes in lipid profile occur and the levels of several coagulation factors increase [3].

Obesity is the biggest challenge of the present century posed to the public health; in most countries, healthcare has to deal with issues and complications arising from the increasing incidence of obesity [4]. Excess fat located in the central abdominal area of the body is called android, 'apple-shaped' or upper body obesity and is associated with a greater risk for hypertension, insulin resistance, diabetes, dyslipidaemia and coronary heart disease. Android fat distribution is defined by waist to hip ratio (WHR) more than 0.8 for women and more than 1 for men [5].

Excess body fat produces severe adverse consequences on health, such as high blood pressure and changes in lipid profile constituents, including total cholesterol (TC) [6], high-density lipoprotein (HDL) cholesterol [7], low-density lipoprotein (LDL) cholesterol [8], and triglycerides (TGs) [9]. When combined, these factors predispose to chronic non communicable diseases such as type 2 diabetes mellitus and cardiovascular disease [10].

High-density lipoprotein makes up HDL cholesterol levels and is also known as the good cholesterol. HDL fights against plaque buildup in arteries, so promoting the increase of HDL and can help improve blood circulation [11]. HDL cholesterol restricts the growth of LDL cholesterol and moves the LDL from the arteries to the livers. This reduces the chances of blockage of arteries, which causes strokes or heart diseases. The recommended level of HDL cholesterol is 40mg/dl, which should be present in the body, but it should not exceed 60gm/dl, as it would give boost to the chances of heart attacks [12].

High level of blood cholesterol is a contributory factor of atherosclerosis and many lipid associated ailments like obesity, heart attacks and stroke and kidney failure. Recent studies have shown that lipid associated disorders are not only attributed to the total serum cholesterol, but also to its distribution among different lipoproteins. The low-density lipoproteins (LDLs) are the major carriers of cholesterol towards tissue having atherogenic potential, while the high density lipoproteins (HDLs) carry cholesterol from peripheral tissues to the liver. The HDLs thus give protection against many cardiac problems and obesity. Although genetic factor recline behind these lipid disorder, in most cases it is allied with diets high in saturated fats or Trans fats [13].

Muscle mass decreases by 1-2% each year in middle-aged adults [14]. The loss of muscle strength amounts to approximately 1.5% each year between 50 and 60 years of age, and increases to 3% per year thereafter. Thus, marked declines in muscle mass and strength have already occurred by middle age, and persons in any age group must protect themselves against the loss of muscle associated with weight loss [15].

Energy restriction-induced weight loss, which is the most common method of treating obesity and visceral adiposity, can be successful in achieving moderate weight loss. However, energy restriction not only results in the loss of body fat mass but also causes a significant loss of fat-free mass (FFM) [15,16]. This suggests that energy restriction-induced weight loss actually accelerates the loss of muscle mass with age, also known as sarcopenia, which induces physical frailty and increases the risk of cardiovascular diseases [17]. This may result in the decline of both activities of daily living and health-related quality of life. Therefore, it is essential to carefully consider the clinical approach used to treat obesity and visceral adiposity.

Purpose of this study is to investigate the effect of aerobic exercise on lipid profile and body composition (fat mass, fat free mass, percent body fat and fat distribution trend (android gynoid ratio) in obese postmenopausal women.

METHODS

Thirty obese postmenopausal women aged ranged 50 to 60 years were included in the present study. Were classified into two groups: group (A) 20 subject received a low-calorie diet only without any exercise program and the second group (B) 20 subject received a program of aerobic exercise (25 min, aerobic exercises, 3 times/week) with a low-calorie diet. Selected from the Out Patient Clinic of the National Nutrition Institute; for this study, their body mass index (BMI) were ≥30 kgs/m² according to WHO's classification [18].Any patient had history of cardiovascular disorders, cancer, renal failure, or any other type of chronic disease, hyper-or hypothyroidism, weight loss medication and endocrinal disorders, was excluded from the study.

Instrumentation

Weight and Height scale (Healthy scale 200 kg) used to measure the weight, height and BMI of each participant, Bicycle ergometer was used for warming up exercise (HinzKettler-co.kg.postfach 1020, Germany), Dual-Energy X-ray Absorptiometry (DEXA): (GE Medical System LUNAR Prodigy Machine) used to evaluate the body composition (fat mass, fat free mass, percent of body fat, and fat distribution trend (android gynoid ratio).

A)Procedure for evaluation

After selection of the patients an informed consent was taken from all patients that participated in the study, before starting the study all patients were informed about the nature, benefits and procedure of the study. Dual-Energy X-ray Absorptiometry (DEXA) used to evaluate changes in the body composition (fat mass, fat free mass, percentage body fat, and fat distribution (android gynoid ratio), and serum samples 10 ml of blood were taken after 12 hours of fasting from the brachial vein of each women in groups (A &B) for measuring total fasting CH, HDL, LDL and TG levels.

B) Procedure for therapy

The steps of training were explained for each patient. Group (A) received low calorie diet alone without any exercise program monitored by a diet questionnaire. Dietary intake data were obtained using 24-hour dietary recalls to determine the approximate amount of nutrients received. Participants were asked to list every food and drink they had consumed over the last 24 hours. This questionnaire was filled out by all participants on three non-consecutive occasions once a month over a 12-week period.

Group (B) received low calorie diet in addition to the program of aerobic exercise (25min, aerobic exercises 3 times/week).The exercise program during each session consisted of three phases which are:

A warm up period: for 3 minutes to enhance the numerous adjustments that must take place before physical activity.

An aerobic exercise period: for 20 minutes which is the conditioning part of the exercise program, with the intensity of 50-60% of maximal heart rate.

A cool down period: for 2 minutes to prevent pooling of the blood in the extremities by continuing to use muscles to maintain venous return.

The prescribed intensity of exercise training was calculated for the main period using the Karvonen heart rate reserve formula which used to determine the exercise intensity: Indicator heart rate = (maximum heart rate) - (resting heart rate)*(intensity training) + (resting heart rate) [19].

At the end of the study program (after 12 weeks), another blood sample were obtained and all measures were obtained and the pre and post samples for the two groups were compared.

Statistical Analysis

Descriptive statistics was done in the form of mean and standard deviation. Inferential statistics assessed Changes in total cholesterol (TC) ,high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL) cholesterol , and triglycerides (TGs)using independent t-test between the two groups and dependent t-test was used to assess changes within group, analysis was done using SPSS version 17 and Relatives changes percentage was calculated according to:

$$\text{Relatives changes percentage} = \frac{\text{post} - \text{pre}}{\text{pre}} \times 100.$$

RESULTS

As observed in Table (1), there was no significant difference between both groups in their ages, weights, heights and BMI respectively.

As shown in Table (2) and presented by Fig. (1), the statistical analysis of the mean differences of body weight was statistically significant decrease in group A and group B .The percentage of change of body weight for group (A) was -5.74%; whereas, in group (B) was -8.70%, while statistically it was no significant difference between the two group post treatment p=0.0704.

Table 1: Demographic and clinical characteristics of patients in both groups (A&B)

Items		Age (year)	Height (cm)	Weight (kg)	BMI (Kg/m2)
Group A N=15	Mean	54.00	158	95.67	**38.23**
	S.D.	±2.20	±0.06	±4.61	**±2.71**
	Minimum	51	153	91	**30.7**
	Maximum	57	173	101	**42.72**
Group B N=15	Mean	54.40	158	95.87	**38.55**
	S.D.	±1.77	±0.04	±4.42	**±2.44**
	Minimum	52	151	91	**32.5**
	Maximum	57	158	104	**42.5**
t-value		0.549	0.355	0.1240	**0.335**
P-value		0.588	0.626	0.9029	**0.741**

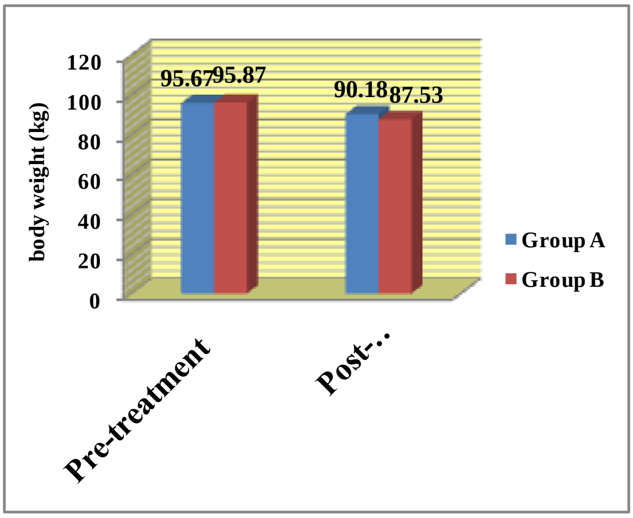
Kg/m2: Kilogram per meter square, SD: Standard Deviation, BMI: Body Mass Index, NS: Non-significant, P: Probability

Table 2: Mean Weight (Kg) values between pre- and post-treatment within each group

Items	Pre-	Post-	t-value	P-value	% of changes	Sig.
Group A N=15 Mean + SD	95.67 ±4.61	90.18±3.73	13.46	0.0001	-5.74%	S
Group B N=15 Mean + SD	95.87±4.42	87.53±4.39	11.32	0.0001	-8.70%	S
t-value	0.1242	1.958				
P-value	0.9029	0.0704				
Sig.	NS	NS				

As shown in Table (4) and presented by Fig. (3), the statistical analysis of the mean differences of total cholesterol was statistically significant Decrease (P<0.05) in group A and group B .The percentage of change of total cholesterol for group (A) was -2.75%; whereas, in group (B) was -4.66%, while statistically it was no significant difference between the two group post treatment (p=0.495).

Fig. 1: Mean weight values between pre- and post-treatment within each group



SD: Standard deviation, S: Significant, P: probability, NS: Non-significant

Table 3: BMI (Kg/m2) values between pre- and post-treatment within each group

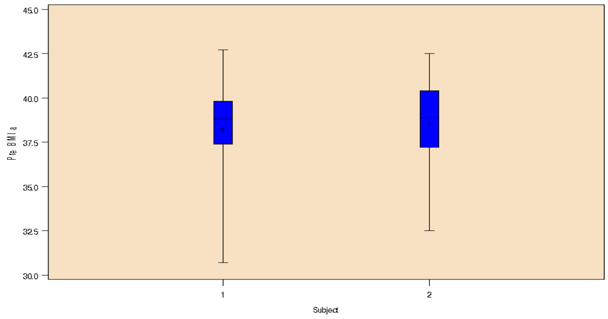
Items	Pre-	Post-	z-value	P-value	% of changes	Sig.
Group A **N=15** **Median**	38.80 (37.40,39.80)	36.13 (35.37,37.91)	16.52	0.0001	-6.88%	S
Group B **N=15** **Median**	38.90 (37.22,40.40)	35,59 (33.10,37.50)	12.48	0.0001	-8.51%	S
z-value	0.435	0.846				
P-value	0.852	0.281				
Sig.	**NS**	**NS**				

P: probability, S: Significant, NS: Non-significant

As shown in Table (4) and presented by Fig. (4), the statistical analysis of the mean differences of TG was statistically significant Decrease (P<0.05) in group A and group B .The percentage of change of TG for group (A) was --2.11%; whereas, in group (B) was -3.47%, while statistically it was no significant difference between the two group post treatment (p=0.581).

As shown in Table (6) and presented by Fig. (5), the statistical analysis of the mean differences of LDL was statistically significant decrease in group A and group B .The percentage of change of LDL for group (A) was -3.43%; whereas, in group (B) was -4.08 %, while statistically it was no significant difference between the two group post treatment (P=0.304).

Fig. 2: BMI box plot values between pre- and post-treatment within each group (Pretreatment)



(Post-treatment)

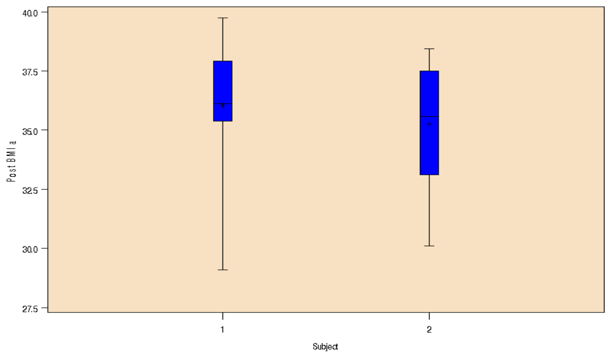


Table 4: Mean Total CH (mg/dL) and TG (mg/dL) values between pre- and post-treatment within each group

	Items	Group A N=15 Mean + SD	Group B N=15 Mean + SD	t-value	P-value	Sig
CH(mg/dL)	**Pre-**	220.80±17.48	218.60±40.54	0.227	0.823	**NS**
	Post-	214.73±18.07	208.4 ±38.28	0.699	0.495	**NS**
t-value		10.16	10.339			
P-value		0.0001	0.0001			
% of changes		-2.75%	-4.66			
Sig.		S	S			
TG(mg/dL)	**Pre-**	148.53±49.00	164.93 ±83.65	0.643	0.530	**NS**
	Post-	145.40±48.71	159.20±82.47	0.564	0.581	**NS**
t-value		9.81	9.87			
P-value		0.0001	0.0001			
% of changes		-2.11%	-3.47%			
Sig.		S	S			

SD: Standard deviation, S: Significant, P: probability, NS: Non-significant

As shown in Table (6) and presented by Fig. (6), the statistical analysis of the mean differences of HDL wasstatistically significant decrease in group (B) p=0.014, but statistically it was not significant in group (A).The percentage of change of HDL for group (B) was +13.11% when compared with recipients of group(A).

Fig. 3: Mean total cholesterol values between pre- and post-treatment within each group.

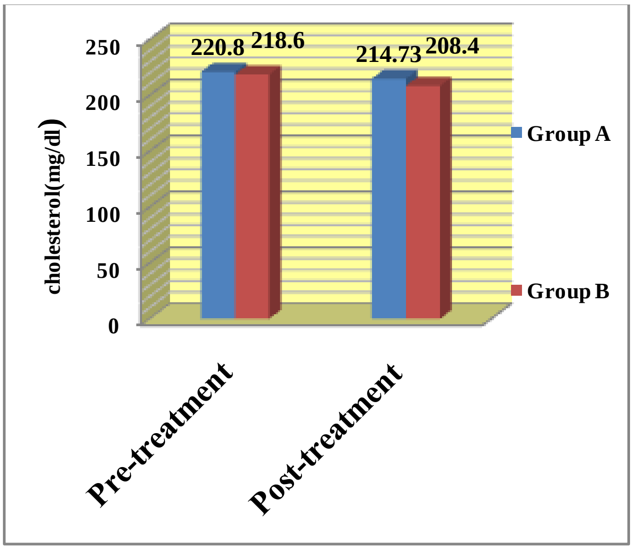


Fig. 4: Mean TG values between pre- and post-treatment

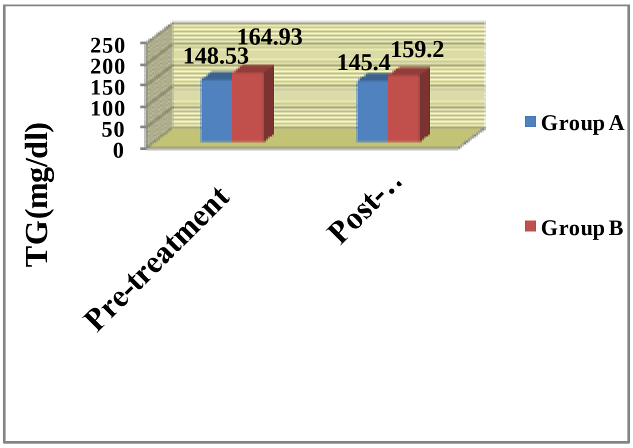


Fig. 5: Mean LDL values between pre- and post-treatment within each group

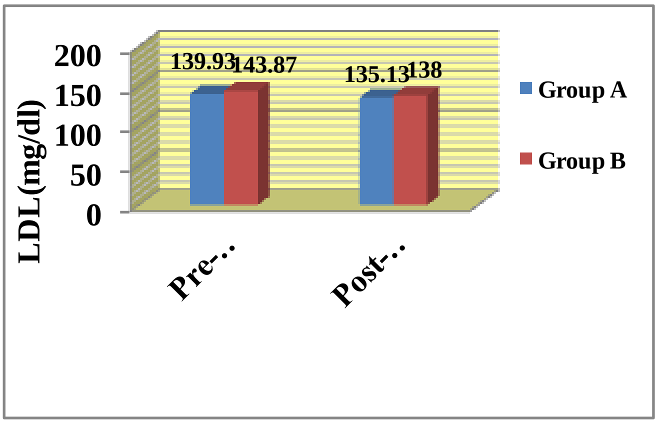


Table 6: Mean LDL (mg/dL) and HDL (mg/dL) values between pre- and post-treatment within each group

	Items	Group A N=15 Mean+ SD	Group B N=15 Mean+ SD	t-value	P-value	Sig.
LDL (mg/dL)	Pre-	139.93 ±27.18	143.87 ±27.70	0.427	0.682	NS
	Post-	135.13 ±26.74	138.00 ±27.53	0.764	0.304	NS
t-value		11.86	**10.49**			
P-value		0.0001	**0.0001**			
% of changes		-3.43%	**-4.08%**			
Sig.		S	S			
HDL (mg/dL)	Pre-	49.40 ±6.13	48.33±11.01	0.265	0.794	NS
	Post-	49.80±6.34	54.67±4. 50	2.158	0.048	S
t-value		1.38	2.81			
P-value		0.189	0.014			
% of changes		------	+13.11%			
Sig.		NS	S			

SD: Standard deviation, S: Significant, P: probability, NS: Non-significant

Fig. 6: Mean values HDL between group (A) and group (B) pre- and post-program.

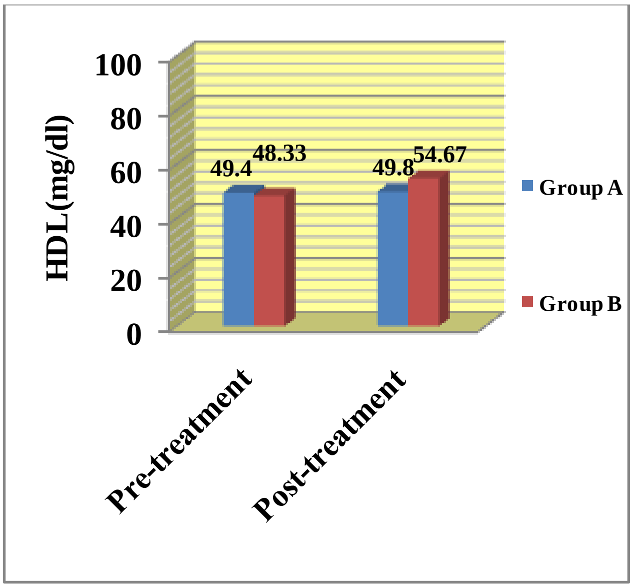


Table 7: Mean fat mass (kg) and fat free mass (kg) values between pre- and post-treatment within each group

	Items	Group A N=15 Mean + SD	Group B N=15 Mean + SD	t-value	P-value	Sig.
fat mass (kg)	Pre-	46.88 ±2.56	46.95 ±2.59	0.1004	0.9214	NS
	Post-	43.52 ±2.80	38.50 ±3.12	5.575	0.0001	S
t-value		9.94	11.35			
P-value		0.0001	0.0001			
% of changes		-7.17%	-18.00%			
Sig.		S	S			
fat free mass (g)	Pre-	48.71 ±4.84	49.05 ±4.72	0.2106	0.8362	NS
	Post-	46.61 ±4.28	49.04 ±4.87	1.553	0.142	NS
t-value		6.70	0.121			
P-value		0.0001	0.905			
% of changes		- 4.31%	------			
Sig.		S	NS			

SD: Standard deviation, S: Significant, P: probability, NS: Non-significant

Fig.7: Mean fat mass (Kg) values between pre- and post-treatment within each group

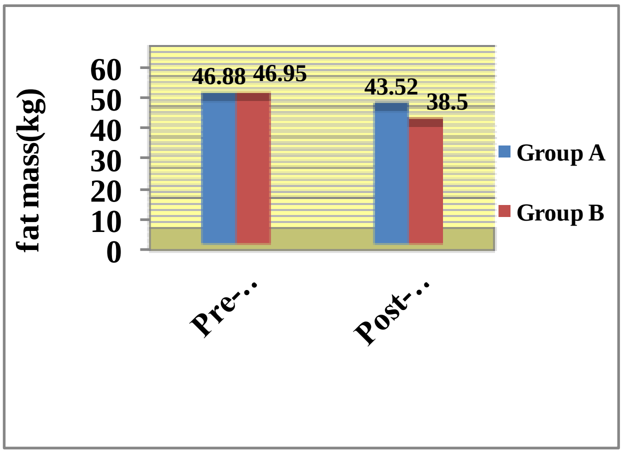


Fig. 8: Mean fat free (g) values between pre- and post-treatment within each group

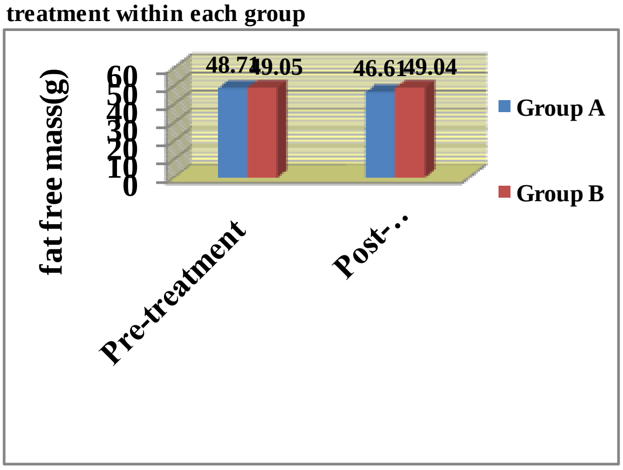


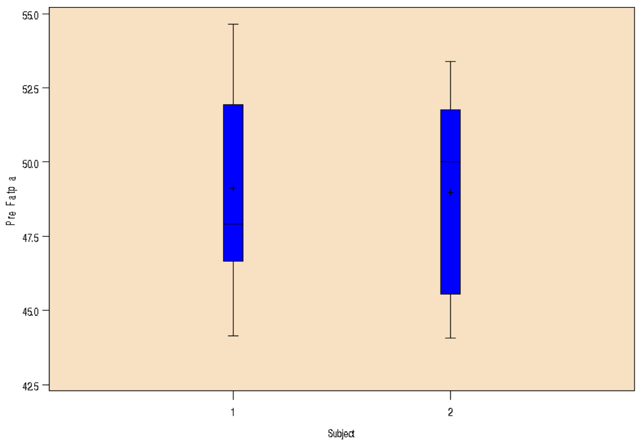
Table 8: values of Fat Percentage (%) and Android/Gynoid ratio between pre- and post-treatment within each group

	Items	Group A N=15 median	Group B N=15 median	z-value	P-value	Sig.
Fat percentage (%)	Pre-	47.91 (46.65, 51.93)	50.00 (45.56, 51.77)	0.236	0.942	NS
	Post-	48.26 (45.25, 51.63)	44.76 (40.84, 47.62)	1.79	0.021	S
z-value		3.42	**9.024**			
P-value		0.02	**0.0001**			
% of changes		-0.73%	**-10.4%**			
Sig.		S	S			
Android /Gynoid ratio	Pre-	1.11 (1.05, 1.13)	1.07 (1.02, 1.12)	0.258	0.923	NS
	Post-	1.07 (1.01, 1.11)	1.00 (0.95, 1.02)	4.53	0.031	S
z-value		1.52	5.87			
P-value		0.084	0.001			
% of changes		-----	- 6.54%			
Sig.		NS	S			

S: Significant, P: probability, NS: Non-significant

Fig. 9: fat percentage box plot values between pre- and post-treatment within each group

Fat percentage (%) Pre treatment



Fat percentage (%)Post treatment

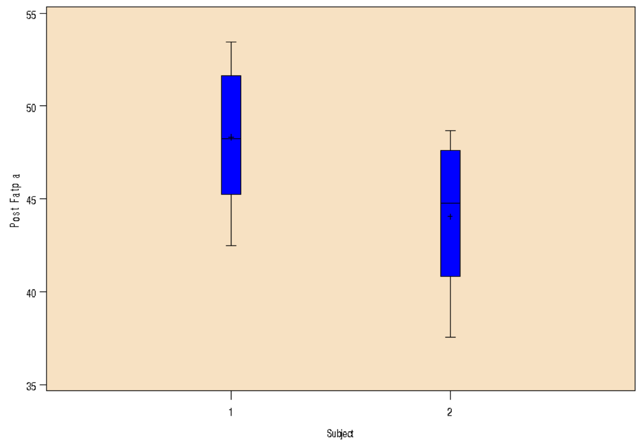
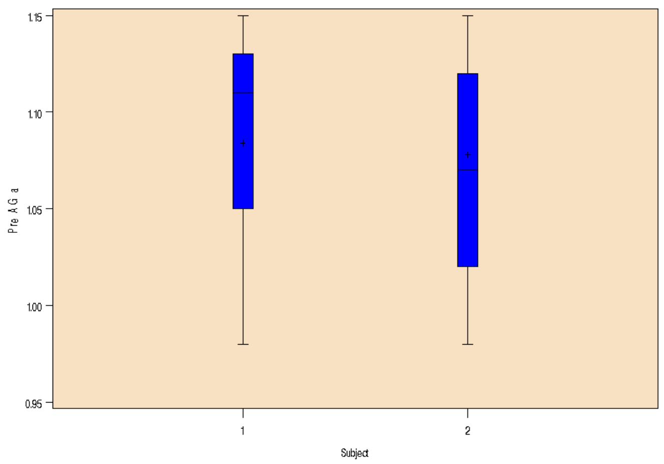
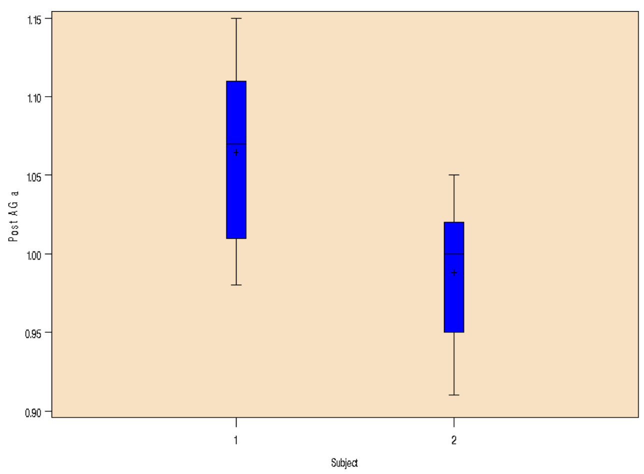


Fig. 10: A / G ratio box plot values between pre- and post-treatment within each group

A/G (%) Pre treatment



A/G (%) Post treatment



As shown in Table (7) and presented by Fig. (8), the statistical analysis of the mean differences of fat free mass (g) was statistically significant decrease in group (A) p=0.0001, but statistically it was not significant decrease in group (B).The percentage of change of fat free (g) for group (A) was - 4.31% when Compared with group (B).

As shown in Table (8) and presented by Fig. (9), the statistical analysis of the percent body fat was statistically significant decrease in group A and group B .The percentage of change of percent body fat for group (A) was –0.73% whereas, in group (B) was -10.4%, while statistically it was significant difference between the two group post treatment (p=0.021).

As shown in Table (8) and presented by Figure (10), the statistical analysis of the Android / Gynoid ratio was statistically significant decrease in group (B)p=0.001,while statistically it was not significant decrease in group (A).The percentage of change of A/ G ratio for group (B) was - 6.54% when Compared with group (A).

DISCUSSION

The present study was designed to investigate the effect of aerobic exercise on lipid profile (total cholesterol (TC) ,high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL) cholesterol , and triglycerides (TGs)) and body composition (fat mass, fat free mass, percentage body fat ,and fat distribution trend (android gynoid ratio).

Results showed statistical significant improvement (P<0.05) in total cholesterol (TC), low-density lipoprotein (LDL) cholesterol, and triglycerides (TGs)) of base line was in group (B) than group (A) (-4.66% vs,-2.75% & -3.47% vs ,-2.11% & -4.08% vs -3.43%) respectively. and High-density lipoprotein (HDL) cholesterol was statistically significant increase in group B (+13.11%; P=0.014), but it was not in group A (P>0.05), moreover; body weight, BMI, fat mass, percent of body fat showed statistically significant decrease in group B than group A (P<0.05) .The results revealed statistically significant decrease in fat distribution trend(android gynoid ratio) in group B (P<0.05; P=0.001),while statistically it was not in group (A) moreover; fat free mass statistically significant decrease in group A(P<0.05), but statistically it was not significant decrease in group B. These results go in hand with the following reviews:

Similarly Arazi et al. [20] also studied the impact of morning three months aerobic training on lipid profile, and body composition in sedentary overweight females, This study examined the effects of morning aerobic training on lipid profile, body composition, Subjects in the training group were performed slow running (10 minutes), stretching muscles and loosening joints (10 minutes), aerobic training program (30 minutes) and cool down (10 minutes). The intensity of training was 60-70% of target pulse rate calculated by Karvonen protocol [19]. These training were completed six days in a week during 8 week.20 overweight subjects with mean age of 40.2 ± 6.2 years, mean height of 158.70 ± 5.96 cm and mean body weight (BW) of 65.81 ± 7.89 kg, assigned to training group (n=10) and control group (n=10) randomly. Aerobic Training consisted of 8 weekly period and6 days per week was applied to subjects. Before and after the training period, the body fat percentage (BF), body mass index (BMI), the waist to hip ratio (WHR), blood lipid parameters (TG, CH, LDL, HDL), were measured. They concluded that 8-weeks morning aerobic training had significant effect on LDL, HDL, BMI, and weight .That study approved similar results that exercise training for 12 weeks was significant differences ($p<0.05$) between pre and posttest values of LDL, HDL, BMI, WHR, and weight .But it differs with our study in number of the participant (20), time of the intervention (8 weeks. and methods of the assessment of body composition).

Banz et al. [21] matches with present study results who reported a 13% increase in HDL cholesterol (from 29.8 to 33.7 mg/dL, p\0.05) following a relatively short 10-week protocol of training three times weekly at 85 % of the maximal heart rate (HRmax) [from the second week onwards] for 40 min on ski style exercise equipment. The authors reported that HDL cholesterol was the only component of the lipid profile that improved.

Dunn et al. [22] investigated the effects of a 6-month aerobic exercise training program, which progressed from 50 to 85 % of maximum aerobic power for 20–60 min three times weekly, and reported significant decreases in total cholesterol (-0.3 mmol/L, p\0.001) and in the total HDL cholesterol ratio (-0.3, p\0.001). In this case, the intervention period was relatively long and the intensity was relatively high.

Taghian and Zolfaghari [23] matches with present study results, were tested the effect of a 12 week aerobic exercise program on body composition(body mass index Kg/m2, fat percent % and waist-hip ratio) weight, fat percentage, BMI, waist to hip ratio which assessment by (using In Body model 3 by BIOSPACE made in Korea), the study include twenty obese volunteer women (age 35±6.81y, body mass index 35.8±3.67 Kg/m2, fat percent 43.98±4.02% and waist-hip ratio 1.03±0.05 (means±SD) were randomly divided into two equal groups, experience (n=10) and control (n=10). Aerobic training program was performed three sessions per week during 12 weeks using treadmill (start with 60-65% heart rate max/15-20 min, final with 80-85% heart rate max/ 45-50 min).. They showed that after a 12-week treatment of aerobic exercises, weight, fat percentage, WHR, and BMI in the experimental group were significantly decreased ($P<0.05$).But they differed with our study in the assessment methods (In Body), Participants number (20)

The work of Kelley et al. [24] on the effects of exercise on lipoprotein concentrations seen with changes in body mass has reported that reductions in lipoprotein lipid concentrations occurred more frequently when exercise was combined with body fat loss but could occur without change in body mass. Therefore, in agreement with our results, studies prove that a combined exercise with diet program demonstrated higher efficacy on LDL levels Janssen et al. [25].

Five-year follow-up of a subsequent study by Aadahl et al. [26] reported significant associations between physical activity and improvements in total cholesterol ($p = 0.006$), LDL cholesterol ($p = 0.007$), triglycerides ($p = 0.02$) and HDL cholesterol ($p = 0.01$) among 4,039 participants aged 30–60 years, although significant improvements in HDL cholesterol levels were found only in men. While the mechanisms underlying the effect of exercise on the lipid profile are unclear, exercise appears to enhance the ability of skeletal muscles to utilize lipids as opposed to glycogen, thus reducing plasma lipid levels by Earnest et al. [27].

Chomentowski et al. [16] reported that the addition of moderate aerobic exercise to intentional diet-induced weight loss attenuated the loss of muscle mass in older, overweight to obese adults. Twenty-nine overweight to obese (body mass index = 31.8 ± 3.3 kg/m2) older (67.2 ± 4.2 years) men (n = 13) and women (n = 16) completed a 4-month intervention consisting of diet-induced weight loss alone (WL; n = 11) or with exercise (WL/EX; n = 18). The WL intervention consisted of a low-fat, 500–1,000 kcal/d caloric restriction. The WL/EX intervention included the WL intervention with the addition of aerobic exercise, moderate-intensity walking, three to five times per week for 35–45 minutes per session, Approved that both groups had similar decreases in bodyweight (WL, −9.2% ± 1.0%; WL/EX, −9.1% ± 1.0%) and whole-body fat mass (WL, −16.5%, WL/EX, −20.7%). However, whole-body fat-free mass decreased significantly ($p < .05$) in WL (−4.3% ± 1.2%) but not in WL/EX (−1.1% ± 1.0%). Similar results are found in the present study which showed improvement in body weight (group A -5.74% vs. group B -8.70%) and whole-body fat mass (group A -7.17% vs. group B -18.0%). However, whole-body fat-free mass decreased significantly ($p < .05$) in group A (−4.31%) but not in group B.

In agreement with present study results, Silva et al.[28] approved that reduction in percent body fat and fat mass and an increase in fat-free mass and lipid profile (HDL-c) were observed in the experimental group ($p<0.05$). These findings indicate a possible reduction in the risk of cardiovascular diseases in overweight adolescents who regularly exercise. Similar results are found in the present study which showed improvement in (HDL-c) and reduction in percent body fat, fat mass and maintenance of the fat free mass from reduction with aerobic exercise combined with diet induced weight loss. But they differed with our study in the assessment methods (BIA) device and examined effect of physical activity without diet program on small participant's (9) overweight adolescent.

On the contrary, a randomized, controlled trial was done by Bopp et al. [29] to investigate the association between dietary protein intake and loss of lean mass during weight loss in postmenopausal women through a retrospective analysis of a 20-week randomized, controlled diet and exercise intervention in women aged 50 to 70 years. Weight loss was achieved by differing levels of caloric restriction and exercise. The diet-only group reduced caloric intake by 2,800 kcal/week and the exercise group's reduced caloric intake by 2,400 kcal/week and expended ~400 kcal/week through aerobic exercise. Total and appendicular lean mass was measured using dual energy x-ray absorptiometry. Linear regression analysis was used to examine the association between changes in lean mass and appendicular lean mass and dietary protein intake. Average weight loss was 10.8±4.0 kg, with an average of 32% of total weight lost as lean mass. Protein intake averaged 0.62 g/kg body weight/day (range=0.47 to 0.8 g/kg body weight/day). Participants who consumed higher amounts of dietary protein lost less lean mass and appendicular lean mass (=0.3, P=0.01 and r=0.41, P<0.001, respectively).This different result due to the composition of the FFM lost (i.e. water, protein, and mineral masses), inadequate protein intake during caloric restriction may be associated with adverse body-composition changes in postmenopausal women, may be potential explanations.

While the mechanisms underlying the effect of exercise on the lipid profile are unclear, exercise appears to enhance the ability of skeletal muscles to utilize lipids as opposed to glycogen, thus reducing plasma lipid levels Earnest et al. [27].The mechanisms may include increases in lecithin-cholesterol acyltrans (LCAT)—the enzyme responsible for ester transfer to HDL cholesterol [30], which has been shown to increase following exercise training [31], and increases in lipoprotein lipase activity, although the data in this instance are inconsistent [32] and may depend upon the energy expenditure that is elicited. Ferguson et al. [33] reported that 1,100 kcal of energy expenditure is required to elicit increases in HDL cholesterol that coincide with significant increases in lipoprotein lipase activity. The process of cholesterol removal is known as ‘reverse cholesterol transport’. This process removes cholesterol from circulation for disposal as a result of increases in LCAT and reductions in cholesterol ester transfer protein (CETP)—the enzyme responsible for transfer of HDL cholesterol to other lipoproteins—following acute and chronic exercise [34]. This increased enzymatic activity increases the ability of muscle fibers to oxidize fatty acids originating from plasma, VLDL cholesterol or triglycerides [35].

CONCLUSION

We concluded that in our study demonstrates that exercise training confers benefits in absolute and relative cardiovascular fitness, muscle strength; and positive body composition outcomes in obese postmenopausal women who are attempting to lose weight by energy restriction. Exercise training promotes greater fat mass loss and assists the preservation of lean mass, compared to energy restriction alone during weight loss interventions. Further, energy restriction without exercise training has a neutral or negative influence on cardio respiratory fitness, muscular strength, and generates greater loss of lean mass. Clinicians should recommend exercise training as part of a lifestyle modification for obese individuals with a focus on improving fitness, function and lean mass rather than merely creating greater energy deficit for weight loss.

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الملخص العربى

مخرجات التمارين الهوائيه علي مستوى الدهون في الدم ومكونات الجسم في السيدات البدينات بعد سن اليأس

هدف البحث: - تحديد تأثير التدريب الهوائية عن مكونات مستوى الدهون في الدم، بما في ذلك الكوليسترول الكلي ، البروتين الدهني العالي الكثافة في الدم، البروتين الدهني منخفض الكثافة ، والدهون الثلاثية ومكونات الجسم بما يشمل (كتلة الدهون وكتلة الجسم خالية من الدهون و النسبه المئويه للدهون في الجسم توزيع الدهون (نسبة الدهون في الجزء العلوي بالنسبه للجزء السفلي)وذلك فى النساء البدينات بعد سن اليأس. **تصميم البحث: -** برنامج علاجى باستخدام التمارين الهوائية على مكونات مستوى الدهون فى الدم. **مقاييس النتائج الرئيسية: -** التغيرات البيوكيميائية في الكوليسترول الكلي و البروتين الدهني العالي الكثافة ، البروتين الدهني منخفض الكثافة والدهون الثلاثية وتكوين الجسم بما يشمل (كتلة الدهون وكتلة الجسم خالية من الدهون و النسبه المئويه للدهون في الجسم توزيع الدهون (نسبة الدهون في الجزء العلوي بالنسبه للجزء السفلي). **طريقة البحث: -** أجرى البحث على ثلاثين سيدة يعانون من السمنة المفرطة بعد انقطاع الدورة الشهريه تم اخيارهم من المعهد القومي للتغذية جامعة القاهره حيث تتراوح أعمارهن ما بين خمسين إلى ستين عاما و مؤشر كتلة الجسم اكثر من 30 وقد تمت هذه الدراسة على مدار اثنى عشرة أسبوع وقسمت عشوائيا إلى مجموعتين، تتألف كل مجموعة من 15 مريض. المجموعة الأولى (المجموعه الضابطه) التى تلقت نظام غذائي قليل السعرات ولكن بدون أى نوع من التمرينات والمجموعة الثانية (مجموعة الدراسه) التى تلقت برنامج التمرينات الهوائية (25 دقيقه 3 مرات أسبوعيا) مع نظام غذائي قليل السعرات وقد تم تسجيل التغيرات البيوكيميائية في الكوليسترول الكلي و البروتين الدهني العالي الكثافة ، البروتين الدهني منخفض الكثافة والدهون الثلاثية وتكوين الجسم بما يشمل (كتلة الدهون وكتلة الجسم خالية من الدهون و النسبه المئويه للدهون في الجسم توزيع الدهون (نسبة الدهون في الجزء العلوي بالنسبه للجزء السفلي) فى النساء البدينات بعد سن اليأس. قيست في بداية الدراسة وبعد اثني عشر أسبوعا. **النتائج: -**أظهرت النتائج ان مجموعة التمارين الرياضية ذادت زيادة ذات دلالة إحصائية في البروتين الدهني عالي الكثافة (+ 6.34مج / ديسيلتر؛ P<0.05) مقابل (+ 0.40مج / دل؛ P >0.05)، وكان انخفاض كبير في نسبة نسبة الدهون في الجزء العلوي بالنسبه للجزء السفلي P=100. وذلك لم يحدث في المجموعة الأولى التى تلقت نظام غذائي قليل السعرات وعلاوة على ذلك، بعد البرنامج العلاجي لوحظ، انخفاض في وزن الجسم، ومؤشر كتلة الجسم و النسبه المئويه للدهون في الجسم ونسبه الكوليسترول الكلي و البروتين الدهني منخفض الكثافة والدهون الثلاثية في كلا المجموعتين كما ايضا وجد ان كتلة الجسم الخالية من الدهون انخفاضت بشكل كبير في مجموعة (ا) بينما بوقيت دون تغيير في المجموعه (ب).

الخلاصة:-تم التوصل إلى ان برنامج التمارين الهوائية أظهرت زيادة كبيرة في البروتين الدهني العالي الكثافة وايضا وجد ان كتلة الجسم الخالية من الدهون بوقيت دون تغيير في في المدى القصير للتمرينات الهوائيه عند اضافتها للنظام الغذائي قليل السعرات (اثني عشر أسبوعا).

مفتاح كلمات البحث:- التمارين الرياضية، مستوى الدهون في الدم، تكوين الجسم، السمنة، السيدات بعد سن اليأس.