Effect Of Aerobic Exercise Training Combined With Isoflavone Supplementation On Lipids In Postmenopausal Women

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Abstract

Background: Menopause is defined as the permanent cessation of menstrual periods that occurs naturally or is induced by surgery, chemotherapy, or radiation. **Purpose**: This current study was designed to investigate and compare the effect of aerobic exercise training, isoflavone supplementation and aerobic exercise training with isoflavone supplementation on lipids in post-menopausal women. **Subjects and Methods**: This study was conducted in Mashtoul Hospital Central Market, El Sharkeya. And outpatient clinics from Mansoura Hospital. Sixty post-menopausal women participated in the study. Patients were randomly divided into three equal groups, for 12 weeks, post 1 after 8 weeks, post 2 after 4 weeks from post: Group (A) (aerobic exercises group), Group (B) (isoflavone supplementation group) and Group (C) (combination group). Results: The mean age of group A, B and C were 52.15 ± 4.17, 49.8 ± 5.25 and 50.9 ± 4.08 respectively, all groups showed significant improvement in low density lipoprotein, Height density lipoprotein, triglycerides and total cholesterol regarding pre-values, post 1 value and post 2 values ($P< 0.05$), also there is statistically significant difference between the three groups in post 1 value and post 2 values ($P< 0.05$) in all groups favouring group C over the others, Conclusion: we could conclude that there is statistically significant effect of exercise training, isoflavone supplementation and exercise training combined with isoflavone supplementation on lipids in postmenopausal women but combined technique express better results.

Keywords: Aerobic Exercise, Training Combined,Isoflavone Supplementation, Postmenopausal Women.

Introduction

Menopause is defined by the World Health Organization as the permanent cessation of menstrual periods that occurs naturally or is induced by surgery, chemotherapy, or radiation. The characteristic symptoms in the postmenopausal period are hot flashes, sweats, dyspareunia, urogenital atrophies, and depression. After menopause, the incidence of cardiovascular disease increases in women, a fact possibly related to the decrease in estrogen levels after menopause **(Greer, 2018;Hofnie et al., 2009;Morris et al., 2011;Palacios et al., 2010).**

Aerobic exercises, aquatic exercises and relaxation are non-pharmacological methods used to control hypertension in overweight hypertensive postmenopausal women. Petriz et al. reported that low intensity exercises reduced systolic blood pressure in rats. Moderate-intensity aerobic exercise (40-70% maximal oxygen consumption) is

associated with a significant reduction of blood pressure in hypertensive, normotensive, overweight and normal weight participants **(Eslamian et al., 2015;Heijden et al., 2010;Kindermann et al., 1982;Nassis et al., 2005).**

In both short-term and long-term studies, the introduction of lean beef, lean fish, and skinless poultry have also been shown to result in reductions of between 5 and 9% in LDL-cholesterol. Thus, it appears from the available in-formation that the hypocholesterolaemia effects of soy are comparable with those achieved by dietary reductions in saturated fat and cholesterol or by switching to lean animal proteins. Exercise exerted an effect on HDL-Cmaturation and composition, cholesterol efflux, and cholesterol delivery to receptors (reverse cholesterol transport). Positive effects of exercise were also seen with blood TG, but little specific effect was seen on LDL-C and total cholesterol. Also, results of this study came in consistency with Ghahramanloo et al. who reported that aerobic exercises improved the serum lipid profile and body composition of sedentary healthy young men **(Mercer et al., 2018;Messina, 2010;Miller et al., 2017;Nagata, 2010).**

so this study was conducted to demonstrate the effect of aerobic exercise training combined with isoflavone supplementation on postmenopausal women.

Subjects and Methods

This current study was designed to investigate and compare the effect of aerobic exercise training, isoflavone supplementation and aerobic exercise training with isoflavone supplementation on lipids in post-menopausal women. This study was conducted in Mashtoul Hospital Central Market, El Sharkeya. And outpatient clinics from Mansoura Hospital.

Inclusive Criteria:

The patients were chosen under the following criteria:

- All patients were post-menopausal women.
- Their ages ranged from 45 to 60 years.
- Their BMI ranged from 24 to 33 kg/m².

Exclusive Criteria:

The current study excluded the following criteria:

- Any peripheral circulatory abnormality e.g. peripheral arterial diseases or deep venous thrombosis.
- Malignancy.
- Patients who suffering from anemia.
- Patients who suffering from hypertension.
- Patients who suffering from dyslipidemias
- Patient with life threatening disorders as renal failure, myocardial infarction.
- Patients who suffering from myasthenia gravis, hyperthyroidism, Hemorrhage, acute viral disease, acute tuberculosis, mental disorders or those with pacemakers was excluded from the study.

- Patients who suffering from cerebral microangiopathy observed in magnetic resonance imaging and ophthalmoscopic findings .

Design of the Study

3 group pre-test post-test and Randomized controlled design was conducted in this study

- **Group (A) (aerobic exercises group):** It composed of 20 patients who received aerobic exercises program.
- **Group (B) (isoflavone supplementation group):** It composed of 20 patients who received isoflavone supplementation.
- **Group (C) (combination group):** It composed of 20 patients who received aerobic exercises and isoflavone supplementation.

II: Materials

Evaluating materials and methods:

Weight and height scale:

Blood samples:

Blood samples were analysed to determine the levels of HDL-cholesterol, LDL-cholesterol, TAG, and TC.

Blood samples were obtained on 2 consecutive days for the measurement of lipid and lipoprotein lipid concentrations, and for lipid enzyme activity levels. blood were drawn for analysis 1 day before exercise (Pre) and then immediately (IPE) and after 24 h (24 HR) after the intervention.

Total cholesterol (TC) and triglycerides (TG) in the serum were determined with commercially available kits (cholesterol C-test and triglyceride G-test; Wako Pure Chemical, Osaka, Japan).

HDL-cholesterol level in the serum was measured by an enzymatic method (HDL-cholesterol-test; Wako Pure Chemical, Osaka, Japan). Serum leptin and adiponectin levels were measured with commercially available rat ELISA kits according to the manufacturer's instructions (leptin: rat leptin ELISA kit; B-Bridge International, CA, USA and adiponectin: mouse/rat adiponectin; ELISA kit from Otsuka Pharmaceuticals, Tokyo, Japan).

Treatment equipment:

Treadmill apparatus

It was used as a method of aerobic exercise for group (A) and (C) Cybex 750T (fig. (00)) was used in this study with its specification as follows:

- Length: 80 inch (204 cm).
- Width: 34 inch (86 cm).
- Running area: 22 inch x 62 inch (56 cm x 157 cm).
- Weight of product: 410 pounds (lbs.) (186 kg).
- Speed range: 0.5 to 15.6 mile per hour (mph)

- Default max speed: 12.4 mph (20.0 kilo per hour (kph)).
- Incline range: -3 to 15% grade.
- Motor: 3.0 hourse power (hp) Continuous, 6.0 hp Peak, Alternative current (AC), Brushless.
- Emergency stop: Pull the emergency stop key (e-stop).

The parameters of treadmill was used as follow:

- Intensity:65 – 80% of predicted maximum heart rate
- Total treatment time: 30 - 40 min
- Warm up: 5 min
- Training at session: 30 min
- Cool down: 5 min
- Frequency: 3 days\week for 8 weeks
- Inclination: 0^0

Isoflavone supplementation:

Isoflavone tablets was used as a method of isoflavone supplementation for group (B) and (C). Patients took 120 mg/dayfor 8 weeks.

Data collection and Statistical Procedures:

In this study, data collection was conducted via data collection sheet and then the data will be collected in large table to form raw data that was used as base for statistical analysis

SPSS version 24 was used to conduct the analysis of concurrent study. the descriptive statistics (the mean, the standard deviation, maximum, minimum and range) were calculated for all subjects in the study including height weight, BMI.

ANOVA was used to compare the before and after treatment results between the study groups for all variable and post hoc test was used to determine which group is different.

Results

Among groups:

Considering the effect of the tested group (first independent variable) on LDL level, Multiple pairwise comparison tests (Post hoc tests) revealed that the mean values of the "pre" test among (group A versus B), (group A versus C), and (group B versus C) showed no significant differences with (p=0.98, p=0.98, and p=0.98) respectively. While, Multiple pairwise comparison tests (Post hoc tests) revealed that there was significant difference of the mean values of the "post 1" test among (group A versus B), (group A versus C) and (group B versus C) with (p=0.001*, p= 0.025* and p=0.0001*) respectively and this significant reduction in favor of group (A and C) in compared to group B and in favour to group C in compared to group A. Additionally, Multiple pairwise comparison tests (Post hoc tests) revealed that there was significant difference of the mean values of the "post 2" test among (group A versus B) and (group B versus

C) with (p=0.0001* and p=0.0001*) respectively and this significant reduction in favor of group (A and C) in compared to group B. while there was no significant difference between (group A versus C) with (P=0.092). In spite of there was no statistical significant difference between group A and group C, there was clinical difference and high percent of improvement in favor to group C.

Table ( ). Descriptive statistics and 3×3 mixed design MANOVA for LDL level at different measuring periods at three groups.

LDL level	**Group A** (Mean ±SD)	**Group B** (Mean ±SD)	**Group C** (Mean ±SD)
Pre	130.35 ±4	131.35 ±2.6	130.85±3.46
Post 1	121.7 ±2.88	126.6 ±4.45	118.35±4.08
Post 2	114.7 ±5.69	122.45 ±5.3	111.1±4.29
Multiple pairwise comparisons (Post hoc tests) among different measuring periods for* LDL level *among three groups			
p-value	**Pre Vs. Post one of treatment**	**Pre Vs. post two of treatment**	**Post one of treatment Vs. post two of treatment**
Group A	0.0001*	0.0001*	0.0001*
Group B	0.0001*	0.0001*	0.0001*
Group C	0.0001*	0.0001*	0.0001*

Multiple pairwise comparison tests (Post hoc tests) for the LDL level among different groupsat different measuring periods			
	Group A Vs. group B	**Group A Vs. group C**	**Group B Vs. group C**
Pre treatment	0.98	0.98	0.98
Post one	0. 001*	0.025*	0.0001*
Post two	0.0001*	0.092*	0.0001*

Table ( ): Percent of improvement of LDL level at different measuring periods at three groups.

% of change of LDL level	**Group A**	**Group B**	**Group C**
Pre/post 1	6.63	3.61	9.55
Pre/post 2	12	6.7	15.09
Post 1/post 2	5.7	3.2	6.12

- ***HDL*:**

1-Within groups:

As presented in table () and illustrated in figure (), within group's comparison the mean ± SD values of HDL in the "Pre-treatment", "Post 1 of treatment", and "Post 2 of treatment" tests were 28.1±3.3, 30.65 ±3.34 and 36.25 ±3.64 respectively in the group (A). Multiple pairwise comparison tests (Post hoc tests) revealed that there was no significant difference of HDL between (pre Vs. post 1) with (p=0.104). while there was significant difference among (pre Vs. post 2) and (post 1 Vs. post 2) with (p=0.0001* and p=0.0001*) respectively. This significant increase in favor to post 2 of treatment in

compared to Pre and post 1 of treatment. As well, the mean ± SD values of HDL in the "Pre-treatment", "Post 1 of treatment", and "Post 2 of treatment" tests 28.6 ±4.05, 28 ±2.86 and 35.05±2.85 respectively in the group (B). Multiple pairwise comparison tests (Post hoc tests) revealed that there was no significant difference of HDL between (pre Vs. post 1) with (p=0.98). while there was significant difference among (pre Vs. post 2) and (post 1 Vs. post 2) with (p=0.0001* and p=0.0001*) respectively. This significant increase in favor to post 2 of treatment in compared to Pre and post 1 of treatment. Additionally, the mean ± SD values of HDL in the "Pre-treatment", "Post 1 of treatment", and "Post 2 of treatment" tests 28.85±6.7, 32.45 ±3.31 and 38.2 ±4.67

respectively in the group (C). Multiple pairwise comparison tests (Post hoc tests) revealed that there was significant difference of HDL among (pre Vs. post 1), (pre Vs. post 2) and (post 1 Vs. post 2) with (p=0.01*, p=0.0001* and p=0.0001*) respectively. This significant increase in favor to Post 1 and post 2 of treatment in compared to Pre treatment and in favor to post 2 in compared to post 1.

Among groups:

Considering the effect of the tested group (first independent variable) on HDL level, Multiple pairwise comparison tests (Post hoc tests) revealed that the mean values of the "pre" test among (group A versus B), (group A versus C), and (group B versus C) showed no significant differences with (p=0.98, p=0.98, and p=0.98) respectively. While, Multiple pairwise comparison tests (Post hoc tests) revealed that there was significant difference of the mean values of the "post 1" test among (group A versus B) and (group B versus C) with (p=0.033* and p=0.0001*) respectively and this significant increase in favor of group (A and C) in compared to group B. while there was no significant difference between (group A versus C) with (P=0.237). In spite of there was no statistical significant difference between group A and group C, there was clinical difference and high percent of improvement in favor to group C.

Additionally, Multiple pairwise comparison tests (Post hoc tests) revealed that there was no significant difference of the mean values of the "post 2" test among (group A versus B) and (group A versus C) with (p=0.966 and p=0.33) respectively. In spite of there was no statistical significant difference between group (A and B) and between (group (A and C) there was clinical difference and high percent of improvement in favor to group (C) in compared to group A and in favor to group (A) in compared to group B.While there was significant difference between (group B versus C) with (P=0.033*) and this significant increase in favor of group C in compared to group B.

Table ( ). Descriptive statistics and 3×3 mixed design MANOVA for HDL level at different measuring periods at three groups.

HDL level	**Group A** (Mean ±SD)	**Group B** (Mean ±SD)	**Group C** (Mean ±SD)
Pre	28.1±3.3	28.6 ±4.05	28.85±6.7
Post 1	30.65 ±3.34	28 ±2.86	32.45 ±3.31
Post 2	36.25 ±3.64	35.05±2.85	38.2 ±4.67
Multiple pairwise comparisons (Post hoc tests) among different measuring periods for* HDL level *among three groups			
p-value	**Pre Vs. Post one of treatment**	**Pre Vs. post two of treatment**	**Post one of treatment Vs.**

			post two of treatment
Group A	0.104	0.0001*	0.0001*
Group B	0.98	0.0001*	0.0001*
Group B	0.01*	0.0001*	0.0001*

Multiple pairwise comparison tests (Post hoc tests) for the HDL level among different groupsat different measuring periods

	Group A Vs. group B	**Group A Vs. group C**	**Group B Vs. group C**
Pre treatment	0.98	0.98	0.98
Post one	0.033*	0.237	0.0001*
Post two	0.966	0.33	0.033*

Table ( ): Percent of improvement of HDL level at different measuring periods at three groups.

% of change of HDL level	**Group A**	**Group B**	**Group C**
Pre/post 1	9.07	2.09	12.47
Pre/post 2	29.04	22.55	32.4
Post 1/post 2	18.27	25.17	17.72

- ***Triglyceride level*:**

1-Within groups:

As presented in table () and illustrated in figure (), within group's comparison the mean ± SD values of Triglyceride level in the "Pre-treatment", "Post 1 of treatment", and "Post 2 of treatment" tests were 178.6 ±8.37, 164.6 ±7.16 and 151.15 ±8.66 respectively in the group (A). Multiple pairwise comparison tests (Post hoc tests) revealed that there was significant difference of Triglyceride level among (pre Vs. post 1), (pre Vs. post 2) and (post 1 Vs. post 2) with (p=0.0001*, p=0.0001* and p=0.0001*) respectively. This significant reduction in favor to Post 1 and post 2 of treatment in compared to Pre treatment and in favor to post 2 in compared to post 1. As well, the mean ± SD values of Triglyceride level in the "Pre-treatment", "Post 1 of treatment", and "Post 2 of treatment" tests 177.2 ±7.5, 169.55 ±10.86 and 156.3 ±8.89 respectively in the group (B). Multiple pairwise comparison tests (Post hoc tests) revealed that there was significant difference of Triglyceride level among (pre Vs. post 1), (pre Vs. post 2) and (post 1 Vs. post 2) with (p=0.02*, p=0.0001* and p=0.0001*) respectively. This significant reduction in favor to Post 1 and post 2 of treatment in compared to Pre treatment and in favor to post 2 in compared to post 1.

Additionally, the mean ± SD values of Triglyceride level in the "Pre-treatment", "Post 1 of treatment", and "Post 2 of treatment" tests 176.35±5.89, 160.75±9.08 and 144.3±5.35 respectively in the group (C). Multiple pairwise comparison tests (Post hoc tests) revealed that there was significant difference of Triglyceride level among (pre Vs. post 1), (pre Vs. post 2) and (post 1 Vs. post 2) with (p=0.0001*, p=0.0001* and p=0.0001*) respectively. This significant reduction in favor to Post 1 and post 2 of treatment in compared to Pre treatment and in favor to post 2 in compared to post 1.

Among groups:

Considering the effect of the tested group (first independent variable) on Triglyceride level, Multiple pairwise comparison tests (Post hoc tests) revealed that the mean values of the "pre" test among (group A versus B), (group A versus C), and (group B versus C) showed no significant differences with (p=0.98, p=0.98, and p=0.98) respectively. While, Multiple pairwise comparison tests (Post hoc tests) revealed that there was significant difference of the mean values of the "post 1" test among (group A versus B) and (group A versus C) with (p=0.279 and p=0.568) respectively. In spite of there was no statistical significant difference between (group A and group B) and (group A and group C), there was clinical difference and high percent of improvement in favor to group A in compared to group B and high percent of improvement in favor to group C in compared to group A. while there was significant difference between (group B versus C) with (P=0.0001*) and this significant reduction in favor of group C in compared to group B. Additionally, Multiple pairwise comparison tests (Post hoc tests) revealed that there was significant difference of the mean values of the "post 2" test among (group A versus C) and (group B versus C) with (p=0.022* and p=0.0001*) respectively and this significant reduction in favor of group C in compared to group A and B. while there was no significant difference between (group A versus B) with (P=0.124). In spite of there was no statistical significant difference between group A and group B, there was clinical difference and high percent of improvement in favor to group A.

Table ( ). Descriptive statistics and 3×3 mixed design MANOVA for Triglyceride level at different measuring periods at three groups.

***Triglyceride* level**	**Group A (Mean ±SD)**	**Group B (Mean ±SD)**	**Group C (Mean ±SD)**
Pre	178.6 ±8.37	177.2 ±7.5	176.35±5.89
Post 1	164.6 ±7.16	169.55 ±10.86	160.75±9.08
Post 2	151.15 ±8.66	156.3 ±8.89	144.3±5.35
Multiple pairwise comparisons (Post hoc tests) among different measuring periods for Triglyceride* level *among three groups			
p-value	**PreVs. Post one of treatment**	**Pre Vs. post two of treatment**	**Post one of treatment Vs. post two of treatment**
Group A	0.0001*	0.0001*	0.0001*
Group B	0.02*	0.0001*	0.0001*
Group B	0.0001*	0.0001*	0.0001*
Multiple pairwise comparison tests (Post hoc tests) for the Triglyceride level among different groupsat different measuring periods			
	Group A Vs. group B	**Group A Vs. group C**	**Group B Vs. group C**
Pre treatment	0.98	0.98	0.98
Post one	0.279	0.568	0.011*

Post two	0.124	0.022*	0.0001*

Table ( ): Percent of improvement of Triglyceride level at different measuring periods at three groups.

% of change of *Triglyceride* level	Group A	Group B	Group C
Pre/post 1	7.83	4.31	8.84
Pre/post 2	15.36	11.79	18.17
Post 1/post 2	8.17	7.81	10.23

- ***Total cholesterol level*:**

1-Within groups:

As presented in table () and illustrated in figure (), within group's comparison the mean ± SD values of Total cholesterol level in the "Pre-treatment", "Post 1 of treatment", and "Post 2 of treatment" tests were 186.25 ±10.8, 163.25 ±8.74 and 160.15 ±9.37 respectively in the group (A). Multiple pairwise comparison tests (Post hoc tests) revealed that there was significant difference of Total cholesterol level among (pre Vs. post 1), (pre Vs. post 2) and (post 1 Vs. post 2) with (p=0.0001*, p=0.0001* and p=0.0001*) respectively. This significant reduction in favor to Post 1 and post 2 of treatment in compared to Pre treatment and in favor to post 2 in compared to post 1. As well, the mean ± SD values of Total cholesterol level in the "Pre-treatment", "Post 1 of treatment", and "Post 2 of treatment" tests 182.95 ±8.62,

170.45±7.71 and 168.85±7.7respectively in the group (B). Multiple pairwise comparison tests (Post hoc tests) revealed that there was significant difference of Total cholesterol level among (pre Vs. post 1), (pre Vs. post 2) and (post 1 Vs. post 2) with (p=0.0001*, p=0.0001* and p=0.003*) respectively. This significant reduction in favor to Post 1 and post 2 of treatment in compared to Pre treatment and in favor to post 2 in compared to post 1.

Additionally, the mean ± SD values of Total cholesterol level in the "Pre-treatment", "Post 1 of treatment", and "Post 2 of treatment" tests 180.95±8.23, 155.4 ±5.03 and

152.2 ±4.23 respectively in the group (C). Multiple pairwise comparison tests (Post hoc tests) revealed that there was significant difference of Total cholesterol level among (pre Vs. post 1), (pre Vs. post 2) and (post 1 Vs. post 2) with (p=0.0001*, p=0.0001* and p=0.0001*) respectively. This significant reduction in favor to Post 1 and post 2 of treatment in compared to Pre treatment and in favor to post 2 in compared to post 1.

Among groups:

Considering the effect of the tested group (first independent variable) on Total cholesterol level, Multiple pairwise comparison tests (Post hoc tests) revealed that the mean values of the "pre" test among (group A versus B), (group A versus C), and (group B versus C) showed no significant differences with (p=0.798, p=0.23, and p=0.98) respectively. While, Multiple pairwise comparison tests (Post hoc tests) revealed that there was significant difference of the mean values of the "post 1" test among (group A versus B), (group A versus C) and (group B versus C) with (p=0.009*, p= 0.004* and p=0.0001*) respectively and this significant reduction in favor of group (A and C) in compared to group B and in favour to group C in compared to group A.

Additionally, Multiple pairwise comparison tests (Post hoc tests) revealed that there was significant difference of the mean values of the "post 2" test among (group A versus B), (group A versus C) and (group B versus C) with (p=0.001*, p= 0.004* and p=0.0001*) respectively and this significant reduction in favor of group (A and C) in compared to group B and in favour to group C in compared to group A.

Table ( ). Descriptive statistics and 3×3 mixed design MANOVA for Total cholesterol level at different measuring periods at three groups.

***Total cholesterol* level**	**Group A (Mean ±SD)**	**Group B (Mean ±SD)**	**Group C (Mean ±SD)**
Pre	186.25 ±10.8	182.95 ±8.62	180.95±8.23
Post 1	163.25 ±8.74	170.45±7.71	155.4 ±5.03
Post 2	160.15 ±9.37	168.85±7.7	152.2 ±4.23
Multiple pairwise comparisons (Post hoc tests) among different measuring periods for Total cholesterol* level *among three groups			
p-value	**Pre Vs. Post one of treatment**	**Pre Vs. post two of treatment**	**Post one of treatment Vs. post two of treatment**
Group A	0.0001*	0.0001*	0.0001*
Group B	0.0001*	0.0001*	0.003*
Group B	0.0001*	0.0001*	0.0001*
Multiple pairwise comparison tests (Post hoc tests) for the Total cholesterol level among different groupsat different measuring periods			
	Group A Vs. group B	**Group A Vs. group C**	**Group B Vs. group C**
Pre treatment	0.798	0.23	0.98
Post one	0.009*	0.004*	0.0001*
Post two	0.001*	0.004*	0.0001*

Table ( ): Percent of improvement of Total cholesterol level at different measuring periods at three groups.

% of change of *Total cholesterol* level	**Group A**	**Group B**	**Group C**
Pre/post 1	12.34	6.83	14.11
Pre/post 2	14.013	7.7	15.88
Post 1/post 2	1.89	0.9	2.05

Discussion

This current study was designed to investigate and compare the effect of aerobic exercise training, isoflavone supplementation and aerobic exercise training with isoflavone supplementation on lipids in post-menopausal women. This study was conducted in Mashtoul Hospital Central Market, El Sharkeya. And outpatient clinics

from Mansoura Hospital. Sixty post-menopausal women will have participated in the study and each participant signed the consent form. Subjects will be recruited from gynecology department of Mashtoul Hospital Central Market, El Sharkeya. And outpatient clinics from Mansoura Hospital. Patients were randomly divided into three equal groups using coin toss method: Group (A) (aerobic exercises group), Group (B) (isoflavone supplementation group) and Group (C) (combination group).

The mean age of group A, B and C were 52.15 ± 4.17, 49.8 ± 5.25 and 50.9 ± 4.08 respectively, all groups showed significant improvement in LDL, HDL, TG and TC regarding pre-values, post 1 value and post 2 values ($P< 0.05$), also there is statistically significant difference between the three groups in post 1 value and post 2 values ($P< 0.05$) in all groups favouring group C over the others.

A very powerful study conducted to observe if prior aerobic exercise improves lipid and lipoprotein concentrations following a meal high in CHO in post-menopausal women. Twenty-two post-menopausal women completed 2 trials, one with exercise (EX) and the other without exercise (NE), in a randomized cross-over design, with a washout period of 7 days. The EX trial required the completion of 60 min of treadmill walking at a target heart rate of 75% of each subject's age-predicted max, 13-16 h prior to the consumption of the test meal. In the NE trial, the subjects remained at rest during the period corresponding to the exercise. In both conditions, the subjects fasted for 12 h prior to consuming the test meal, which had a caloric content that met 33% of the subject's energy needs, with 73.09% energy from CHO, 23.4% energy from fats, and 3.49% energy from protein. Blood samples were collected before the meal, and at 60, 120, and 180 min of the post-prandial period. Blood samples were analyzed for lipid and lipoprotein concentrations. There were no significant differences between EX and NE in the lipid or lipoprotein concentrations; however, there were some tendencies for an exercise effect when analyzing area under the curve (AUC). Median, and percentile AUC responses are shown below (median (25th, 75th)). So, we could conclude that prior aerobic exercise did not affect blood lipid or lipoprotein concentrations after consuming a high-carbohydrate meal in postmenopausal women; however, prior exercise may improve postprandial triglyceride and VLDL responses **(Gloeckner et al., 2018)**.

A strongly agreed article with my findings was conducted to examine the effects of an aerobic exercise intervention on adiposity outcomes that may be involved in the association between physical activity and breast cancer risk. That study was a two-centre, two-armed, randomized controlled trial. The 1-year-long exercise intervention included 45 min of moderate-to-vigorous aerobic exercise five times per week, with at least three of the sessions being facility based. The control group was asked not to change their activity and both groups were asked not to change their diet. The study examined the effects of an aerobic exercise intervention on adiposity outcomes that may be involved in the association between physical activity and breast cancer risk. A total of 320 postmenopausal, sedentary, normal weight-to-obese women aged 50–74 years who were cancer-free, nondiabetic and nonhormone replacement therapy users were included in this study. Anthropometric measurements of height, weight and waist and hip circumferences; dual energy X-ray absorptiometry measurements of total body fat; and computerized tomography measurements of abdominal adiposity were carried out. Women in the exercise group exercised a mean of 3.6 days (s.d.=1.3) per week and

178.5 min (s.d.=76.1) per week. Changes in all measures of adiposity favored exercisers relative to controls (P<0.001). The mean difference between groups was: −1.8 kg for body weight; −2.0 kg for total body fat; −14.9 cm^2 for intra-abdominal fat area; and −24.1 cm^2 for subcutaneous abdominal fat area. A linear trend of greater body fat loss with increasing volume of exercise was also observed. And finally we could conclude that A 1-year aerobic exercise program consistent with current public health guidelines resulted in reduced adiposity levels in previously sedentary postmenopausal women at higher risk of breast cancer **(Friedenreich et al., 2011)**.

A magnificent study aimed to evaluate whether soy isoflavones had an effect on CVR markers.The expected 10-year risk of cardiovascular disease and mortality were calculated as a secondary endpoint from a double blind randomised parallel study involving 200 women (mean age 55 years, Caucasian, Hull, UK, 2012) in the early menopause who were randomised to 15 g soy protein with 66 mg isoflavone (SPI) or 15 g soy protein alone (depleted of all isoflavones; SP) given as a snack bar between meals daily for 6 months. Age, diabetes, smoking, blood pressure and lipid profiles were used to calculate CVR using the Framingham CVR engine. SPI treatment resulted in a significant reduction in the metabolic parameters and systolic blood pressure compared to SP ($p < 0.01$). There were no changes in fasting lipid profile and diastolic blood pressure with either treatment. At 6 months, changes in these parameters with SPI treatment were reflected in a calculated 27% ($p < 0.01$) reduction in 10 year coronary heart disease risk, a 37% ($p < 0.01$) reduction in myocardial infarction risk, a 24% ($p < 0.04$) reduction in cardiovascular disease and 42% ($p < 0.02$) reduction in cardiovascular disease death risk. And finally it concluded that Supplementation with soy protein with isoflavones for 6 months significantly improved CVR markers and calculated CVR at 6 months during early menopause compared to soy protein without isoflavones**(Sathyapalan et al., 2018)**.

One of the most prominent articles that disagree with this study is one conducted to examines the effect of soy germ isoflavones on menopausal symptoms and serum lipids. Ninety early postmenopausal Chinese women, aged 45 to 60 years, were randomly assigned to three treatment groups (30 each) receiving daily doses of 0 (placebo), 84, and 126 mg of soy germ isoflavones. Hot flush frequency, Kupperman scores, serum 17β-estradiol, follicle-stimulating hormone, luteinizing hormone, and serum lipids, including triglyceride, total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, apolipoprotein A-I, and apolipoprotein B100, were assessed at baseline and at 12 and 24 weeks after treatment.Both the frequency of hot flushes and the Kupperman index score decreased in all three treatment groups during the intervention period, but the percentage decreases in both were significantly greater in the two isoflavone groups (44.3 ± 19.1 and 57.8 ± 37.4 [84 mg isoflavones]; 48.5 ± 27.2 and 56.7 ± 26.7 [126 mg isoflavones]) than in the placebo group (27.8 ± 15.5 and 34.6 ± 46.2; $p < 0.01$). There was no significant difference in the changes in estradiol, follicle-stimulating hormone, and luteinizing hormone among the three treatment groups during the study, and no significant differences were observed in the lipid components. And all this leads us to conclude that A daily supplement of 84 or 126 mg soy germ isoflavones may improve menopausal symptoms, although neither dose was found to affect lipid profiles in early postmenopausal Chinese women after 24 weeks of

treatment. The favorable effects are unlikely to be associated with female hormones **(Ye et al., 2012)**.

In addition the results of this study disagree with another study that was conducted to examine the effects of 2 years of exercise training and soy isoflavone supplementation on bone mass and lipids in postmenopausal women provided with calcium and vitamin D. Women were randomized to four groups: exercise training (Ex); isoflavone supplementation (Iso: 165 mg/d [105 mg/d aglycone equivalent]); combined Ex and Iso (ExIso); and placebo (control). Exercise included resistance training (2 days/week) and walking (4 days/week). Our primary outcomes were lumbar spine and hip bone mineral density (BMD). Secondary outcomes included hip geometry, tibia and radius speed of sound (SOS), dynamic balance (6 m backward tandem walking), blood lipids, mammography, and endometrial thickness. A total of 351 women (Ex = 86, Iso = 90, ExIso = 87, control = 88) were randomized, with 298 analyzed at 2 years (Ex = 77, Iso = 76, ExIso = 72, control = 73). There was a significant interaction for total hip BMD ($p < 0.001$) such that ExIso had a greater rate of decrease (absolute change [95% confidence interval] = −0.018 [−0.024, −0.012] g/cm2) than either the Ex or Iso groups alone (−0.005 [−0.01, 0.001] and −0.005 [−0.011, 0.001] g/cm2, respectively). There were no differences between groups for changes in lumbar spine BMD and minimal significant changes in hip geometric properties and bone SOS. Exercise groups improved dynamic balance as measured by a decrease in backward tandem walking time over 6 m ($p = 0.017$). Isoflavone groups decreased low density lipoproteins (Iso: −0.20 [−0.37, −0.02] mmol/L; ExIso: −0.23 [−0.40, −0.06] mmol/L; $p = 0.003$) compared to non-isoflavone groups (Ex: 0.01 [−0.16, 0.18] mmol/L; control: −0.09 [−0.27, 0.08] mmol/L) and had lower adverse reports of menopausal symptoms (14% versus 33%; $p = 0.01$) compared to non-isoflavone groups. Isoflavone supplementation did not increase endometrial thickness or abnormal mammograms. We conclude exercise training and isoflavone supplementation maintain hip BMD compared to control, but these two interventions interfere with each other when combined. Isoflavone supplementation decreased LDL and adverse events related to menopausal symptoms. **(Chilibeck et al., 2013)**.

Conclusions

The results obtained from the current study and the discussion that followed it was concluded that:

- Aerobic exercise training have a statistically significant effect on lipids in post-menopausal women
- Isoflavone have a statistically significant effect on lipids in post-menopausal women
- Aerobic exercise training with isoflavone supplementation have a statistically significant effect on lipids in post-menopausal women
- There are statistically significant differences between aerobic exercise training, isoflavone supplementation and aerobic exercise training with isoflavone supplementation on lipids in post-menopausal women

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