EFFECT OF 15 WEEKS COMBINATION EXERCISE TRAINING ON LIPID PROFILE AND FATTY LIVER INDICES IN POSTMENOPAUSAL WOMEN WITH BREAST CANCER

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Submitted for publication: May 2012
Accepted for publication: Dec 2012

ABSTRACT
NURI, R.; MAHMUDIEH, B.; AKOCHAKIAN, M.; MOGHADDASI, M. Effect of 15 weeks combination exercise training on lipid profile and fatty liver indices in postmenopausal women with breast cancer. Brazilian Journal of Biomotricity. v. 6, n. 4, p. 297-303, 2012. The aim of present study was to clarify the effect of 15 weeks combination exercise training on lipid profile and fatty liver indices in postmenopausal women with breast cancer. Twenty nine postmenopausal women (58.27 ± 6.31 years) with breast cancer divided into two groups randomly; experimental group (n=14) and control group (n=15). Participants of experimental group performed 15 weeks combination exercise training including walking (2 sessions per week) and resistance training (2 sessions per week that different from walking days). For the description of data, mean and standard deviation were used and mean values of two groups in pre and post test were compared by independent and paired t-test for all measurements (p≤0.05). Significant differences were observed for body weight (BW), BMI, WHR, HDL-C, LDL, VLDL, TC, TG, aspartate aminotransaminase (AST) and alanine aminotransferase (ALT) between experimental and control groups after 15 weeks (p< 0.05). In fact, combination exercise training had positive effects on BW, BMI, WHR, HDL-C, LDL, VLDL, TC, TG, AST and ALT. It can be concluded that 15 weeks combination exercise training in postmenopausal women with breast cancer can improve lipid profile and fatty liver indices resulting in reduction of recurrences of breast cancer and cardiac and hepatic disease.
INTRODUCTION

Breast cancer is the most frequently diagnosed invasive cancer in women, currently accounting for 32% of new diagnoses per year (JEMAL et al., 2005). The increased number of breast cancer diagnoses along with improvements in initial treatments, have led to an increase in the number of breast cancer survivors (AMERICAN CANCER SOCIETY 2005).

Breast cancer hormone therapy has positive effects on lipoprotein metabolism by decreasing plasma total cholesterol and low density lipoprotein (LDL) cholesterol levels in postmenopausal women with breast cancer (GUPTA et al., 2006). It may increase plasma triglyceride (TG) levels (KUSAMA et al., 2004). Increased levels of TG and cholesterol have been positively correlated with an increased risk of coronary heart disease. Also, Serum cholesterol has long been hypothesized to affect some cancer risk such as breast cancer. Cholesterol is the precursor to steroid hormone synthesis and endogenous sex steroid hormones are directly related to breast cancer risk (ENDOGENOUS HORMONES AND BREAST CANCER COLLABORATIVE GROUP 2009). On the other hand, an inverse association was observed between high-density lipoprotein cholesterol (HDL-C) level and breast cancer (FURBERG et al., 2004). It has been suggested that breast cancer and its treatment can reduce HDL-C and increase LDL in survivors (FURBERG et al., 2004). Also, there is inverse relationship between HDL-C and cardiovascular disease (CVD) in this population. Therefore, breast cancer survivors are at increased risk for comorbidities such as recurrent breast cancer and CVD (MCTIERNAN et al., 2005). Yancik et al., (2001) reported that 20% patient with breast cancer survivors die from cardiovascular disease (YANCIK et al., 2001). However, Fairy et al., (2005) found that exercise training may have beneficial effects on CRP and other cardiovascular risk factors in postmenopausal breast cancer survivors (FAIREY et al., 2005). Mefferd et al., (2007) demonstrated that 16 weeks of a cognitive behavioral therapy program for weight management may reduce obesity and CVD risk in overweight breast cancer survivors. They showed that levels of TG and total cholesterol/HDL-C levels were also significantly reduced following the intervention (MEFFERD et al., 2007).

Non-alcoholic fatty liver disease is emerging as an acknowledged component of metabolic syndrome. Marker of this condition such as aspartate aminotransaminase (AST) and alaninaminotransferase (ALT) can be predictors of development of the syndrome (HANLEY et al., 2005). Non-alcoholic fatty liver disease may be associated with the breast cancer malignancy itself, drugs or some other well-known risk factors (BILICI et al., 2007). Fore instance, hormone therapy for breast cancer may cause hepatic changes in some patients. Hamada et al., (2000) found that there is fatty liver more than30 % in patients with breast cancer who received tamoxifen (HAMADA et al., 2000). It proposed that physical activity or exercise training can improve the fatty liver. Sreenivas Baba et al., (2006) indicated that moderate intensity aerobic exercise helps in normalizing ALT levels in patients with nonalcoholic steatohepatitis (SREENIVASA BABA et al., 2006). Therefore, the purpose of present study is to determine the effect of 15 weeks combination exercise training on lipid profile and fatty liver indices in postmenopausal women with breast cancer.

MATERIAL AND METHODS

Participants

Participants of present study were selected from the Center of Oncology and Radiation therapy of Hazrate Seyodoshohada Hospital in Isfahan. Selections of participants have been previously reported (NURI et al., 2009, RAHNAMA et al., 2010). In brief, 29 postmenopausal women with breast cancer who received surgery, chemotherapy and radiation therapy with current hormone therapy divided to two groups; Experimental (n=14) and Control groups (n=15). Inform consent was completed by all participants. Also, Physical activity readiness questionnaire (PAR-Q) was completed by all participants.
Measurements of Height, Body Weight (BW), Body Mass Index (BMI), waist-to-hip ratio (WHR)

Height was assessed by stadiometer (Seca model, made by German). BW was measured without shoes by a digital scale (Pand Electronic model, made by Iran). BMI was assessed by following formula: BMI= weight (kg) / height² (m). WHR was calculated as follows: waist-to-hip ratio= waist (cm) / hip (cm).

Blood samples and Laboratory Analyses

Blood samples were collected after a 10-min recumbence between 07.00 and 9.00 hours after 12 hours fasting. In addition, the participants were told to abstain from vigorous exercise 48 hours before blood sampling. Two 10-mL redtop tubes were collected for serum. Then, the samples were centrifuged at 10,000 rpm for 10 minutes at 4°C. Serum was separated and stored at -80°C until all samples were collected.

HDL-C, LDL, VLDL, total cholesterol (TC) and TG were measured enzymatically (Diagnostic, Pars Kits). ALT and AST were assessed by Pars Diagnostic Kit. Duplicate measurements were made for each sample, and the mean of the duplicate measurements was assigned as the sample value. Blind duplicates were used for determining coefficients of variation (CV).

Combination exercise training protocol

Exercise training protocol was described previously (NURI et al., 2009, RAHNAMA et al., 2010). Briefly, Experimental group were participated in supervised walking and standard resistance training program for four times per week. Walking program started at 45% of target heart rate (THR) for 25 minutes in first 5 weeks. Duration of walking in second 5 weeks was 35 minutes and intensity was 55% THR. In last 5 weeks, duration of walking was 45 minutes and intensity was 65% THR. Walking program was held 2 times per week for 15 weeks.

A sixty-minute standard resistance training that held twice weekly for 15 weeks, differentiated from walking days. Participants were lifted as much weight as they could for 10 repetitions per set in first 5 weeks, 12 repetitions per set in weeks 6-10 and 14 repetitions per set in last weeks 11-15. Participants built up to three sets per each exercise. The nine resistance training exercises included exercises performed on Cybex strength training equipment (Smith press squats, leg press, leg extension, seated leg curl, lat pulldowns) and with free weights (bench press, overhead press, biceps curls, and triceps kickbacks). The control group was participated in measurements only, did not train and was asked not to begin a structured exercise program. All participants were asked to avoid changes in dietary habits for weight loss purposes for the duration of the study.

Statistical analysis

Results were expressed as the mean ± SD and distributions of all variables were assessed by K-S test. Independent t-test and paired t-test were used to evaluate changes in variables. The level of significance in all statistical analyses was set at P≤0.05. Data analysis was performed using SPSS software for windows (version 13, SPSS, Inc., Chicago, IL).

RESULTS

Table 1 indicates clinical characteristics of the study participants. The mean age of participants was approximately 58 years at baseline, and there was a mean of 2.4 years since diagnosis of breast cancer.

Table 1 - Clinical characteristics of the sample (n = 29)
Results show that BW, BMI and WHR were decreased significantly (P<0.05) after 15 weeks combination exercise training in the experimental group compared with the control group. TG, LDL, VLDL and total Cholesterol (TC) was decreased significantly in the experimental group (P<0.05, -5.0%) and was increased significantly in the control group (P<0.05, 24%) after 15 weeks. However, HDL-C was increased significantly in the experimental group (P<0.05, 4.5%) and was decreased significantly in the control group (P<0.05, 7.8%) after 15 weeks (Table 2).

**DISCUSSION**
The present study evaluated effect of 15 weeks combination exercise training on lipid profile and fatty liver indices in postmenopausal women with breast cancer. The findings of this study demonstrate that 15 weeks combination exercise training have significant effect on lipid profile and fatty liver indices. However, the current study had some limitation. Limitations of our study were small sample size and short exercise training period with no follow-up.

In this study, combination exercise training had significant effect on lipid profile. HDL-C was increased in experimental group up to 4.5% and was decreased in control group by 7.8% after 15 weeks. Also, TG was decreased in experimental group up to 5.0% and was increased in control group up to 25.5% after 15 weeks. In addition, LDL, VLDL and TC were decreased in experimental group up to 10%, 18% and 7%, respectively. Salpeter et al., believed that there is inverse relationship between HDL and TG (SALPETER et al., 2006). Active individuals have higher levels of HDL-C and lower levels of TG, LDL and VLDL, if compared to inactive individuals. In current study, lipid profile was improved, as there was a reduction in TG, LDL and TC, and an increase in HDL-C following the 15 weeks combination exercise training. A study reported that exercise training improve lipid profile and have positive effect on cardiovascular risk factors in postmenopausal breast cancer survivors (FAIRY et al., 2005). It has been demonstrated that LDL cholesterol and TG can be the most sensitive predictive factor for CVD (CRIQUI and GOLOMB, 1998). Also, it has been previously found that an increase in 1 mg/dl of HDL-C is equivalent to a 2–3% reduction in risk for a cardiovascular event (YOUNG, 2004). Therefore, the experimental group may have reduced their risk up to 6–10%. In general, the experimental group was able to significantly modify their risk factors by reducing body weight, decreasing plasma cholesterol concentration and increasing plasma HDL-C concentration.

Some study revealed that there is inverse relationship between BW and HDL-C (NIEMAN et al., 2002, FAIRAY et al., 2005). Also, there is direct relationship between BW, BMI and WHR, and LDL, TC and TG. In present study, BW, BMI and WHR were significantly decreased in experimental group (P<0.05), thus improvement in HDL-C, LDL, TC and TG can be related to reduction in BW, BMI and WHR. Another mechanism for improvement of TG and HDL-C is that exercise training increase cholesterol absorption resulting in cholesterol metabolism and highlights the complex relationship between exercise training and cholesterol homeostasis (NIEMAN et al., 2005). Also, reduction in concentration of LDL, VLDL, TC and TG might be demonstrated that cholesterol was transported from peripheral tissue to the liver for degradation during exercise. Overall, it seems that combination exercise training can improve lipid profile in postmenopausal women with breast cancer.

Combination exercise training had significant effect on ALT and AST in postmenopausal women with breast cancer (P<0.05). In the control group compared with the experimental group, ALT and AST were two times and three times more, respectively. In fact, combination exercise training can prevent the increasing in ALT and AST due to hormone therapy. Lange (2004) and Feldstein et al., (2003) reported that exercise can prevent and treatment hepatic steatosis and improve lipid profile (LANGE et al., 2004, FELDSTEIN et al., 2003). Some researchers indicated that serum ALT activity was independently associated with BMI and total body fat (CHOI, 2003, KHEDMAT et al., 2007). In addition, Park et al., (1995) found that reduction in BW can improve AST and ALT levels (PARK et al., 1995). It seems that changes in ALT and AST in experimental group can be related to decreased BMI and BW in this group. Also, there are direct relationship between LDL, VLDL, TC and TG, and ALT and AST. Therefore, increased ALT and AST in control group rather than experimental group may be due to increased LDL, VLDL, TC and TG, in this group. On the other hand, previous studies show that liver enzymes such as ALT and AST are high in hypertension. Previously, we found that exercise training can reduce blood pressure in women with breast cancer (RAHNAMA et al., 2010). Thus, reduction in blood pressure can be another mechanism for improvement in AST an ALT in experimental group. In general, AST and ALT is associated with components of metabolic syndrome (KHEDMAT et al., 2007). In this study, some components of metabolic syndrome such as, BMI, WHR, TG and HDL-C in postmenopausal women affect by combination exercise training. Therefore, changes in ALT and AST can be related to improvement of metabolic syndrome after combination exercise training. However, confirming this topic need to more study with large sample size.
PRACTICAL APPLICATION
Because of combination exercise training have positive effect on lipid profile and fatty liver indices, it can be suggest to postmenopausal women with breast cancer that participate in combination exercise training.

REFERENCES


