How dose walking exercise affect serum lipids in underweight female adults?

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ABSTRACT

Introduction: Fat profile is an extremely important substrate for muscle contraction, both at rest and during exercise as yet, there is still no clear consequence of exercise on lipid profile regulation in underweight subjects and thus the purpose of this study was to compare lipids serums in underweight young women (BMI≤ 20) before and after walking intervention.

Materials and methods: 20 underweight young non-athlete women volunteered to participate in this study and then they were randomly assigned into two exercise (E: n=10, BMI=17.8±1.2, age: 21.1±1.7yr) and control (C: n=10, BMI=17.5 ±1.1, age: 21.9 ± 1.2) groups. Pre and post assessment were contained somatic (age, height, weight, BMI) and lipids profile (FBS, LDL, HDL, triglycerides and total cholesterol) measurements. Exercise programme was consisted of 30-minute supervised walking exercise at 60 % HR max at intensity equal with 40% VO_2max 3 days per week for 2 months.

Results: Data analysis showed post-BMI as well as body weight did not altered in comparison with pre - exercise programme ($p>0.05$). Subsequently all post - lipids variables included FBS, LDL, HDL, triglycerides and total cholesterol were elevated compared with pre- intervention walking exercise ($p< 0.05$.)

Conclusions: This study outlined that walking programme can be a stimuli toward ideal weight in slim individual because an increased lipids profile as indicators of an increased body mass in underwent individual who are at risk of diseases such as anorexia nervosa shows this notion. However, more investigation with longer duration is needed to justify this conclusion.

Key words: walking exercise, serum lipids, underweight women

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INTRODUCTION

Regular exercise decreases energy balance through an increase in energy expenditure or an increase in fat oxidation through favorable changes in plasma lipid profile [1]. Fat is an extremely important substrate for muscle contraction, both at rest and during exercise [2]. Evidence suggests that when measured at the same absolute workload after training, lipid oxidation is increased in exercised population for example in men [3]. Chronic exercise that referred to as "training" does not also induce a sustained reduction in TG levels, because discontinuation of regular exercise in well-trained individuals for 2-3 days leads to a robust increase in plasma TG concentrations [4].

Moreover, fat oxidation rates increase from low to moderate intensities and then decrease when the intensity becomes high. Maximal rates of fat oxidation have been shown to be reached at intensities between 59% and 64% of maximum oxygen consumption (VO_2max) in trained individuals and between 47% and 52% VO_2max in a large sample of the general population [5] .Various levels of walking are linked to metabolic effect, for instance, we recently have shown that 30 min walking exercise a few time in a week elevates basal metabolic rate in slim women with Anorexia Nervosa [6]. However, despite of several research into the effects of exercise on lipid metabolism in obese people or male individual, there is still no clear consequence of exercise on lipid serums regulation in underweight subjects. Hence, this study is aim to investigate the lipids serums responses in underweight young women (BMI≤ 20) due to a designed -walking intervention to achieve to a learning outcome.

MATERIALS AND METHODS

Participants

20 underweight young women volunteered to participate in this study and then they were randomly assigned into two exercise (E: n=10, BMI=17.8±1.2, age: 21.1±1.7yr) and control (C: n=10, BMI=17.5 ±1.1, age: 21.9 ± 1.2) groups. The participants were sedentary and were not familiar with physical activity term before this investigation. They had poor appetite but otherwise healthy .They were not using any medication that could affect the study variables and they had not any history of muscular injury or cardiovascular diseases also. Initially, subject provided written informed consent that was approved by local committee of ethics.

Procedures

Anthropometric Measurements

In pre- intervention measurements the age was recorded by years (± yr) and the height was measured in centimeter (±cm) using a standard vertical height board. A digital weighing scales was used to assess body weight in kilogram (±kg) and the body mass index (±BMI) as an indicator of body fatness was determined by dividing the body weight (in kilograms) by the height (in meters) squared (BMI $=kg/m^2$).The participants had a regular menstrual cycle and did not take oral contraceptive during the study period.

Blood Sampling

Blood samples (10 ml of blood) were taken for lipid profiles including FBS, LDL, HDL, triglycerides and total cholesterol between 8 to 11 am after an overnight fasting. Serum obtained after clotting and centrifuged at 1500 rpm for 30 min at $4^{0\ C}$ within 2h. FBS (fasting blood sugar), total cholesterol, and triglycerides were assayed using standard enzymatic procedures. Cholesterol components (HDL-C and LDL-C) were estimated by a homogeneous assay (HDL& LDL, Plus, and Roche Diagnostics, Japan) on the Hitachi 911 analyzer.The same technician performed blood cholesterol (HDL-C & LDL-C) test before and after exercise programme.

Exercise Intervention

Exercise intervention was consisted of 30-minute supervised walking exercise at 60 % HRmax at an intensity equal with 40% VO_2max 3 days per week for 2 months in an indoor track and field ground. Maximal heart rate was estimated using the formula of (220– age) before the exercise intervention using 10 min intermittent walking by a chest polar belt (Polar Electro Oy, and Finland) and a stopwatch [7]. Heart rate using digital polar belt was monitored during the training sessions. Participants in control group were asked to continue their own former daily routine during the study period.

Statistical Analysis

Descriptive Statistics were used to determine mean and standard division (X ± SD) and paired *t* **–** test with an alpha level set at $p<0.05$ was used to all comparisons.Variables were compared between pre and post assessments using Statistical Package for the Social Sciences (SPSS) (version 18; SPSS Inc., Chicago, IL USA).

RESULTS

From somatic variables can be realized the exercise (E) and control (C) group were not different in average of age (21.1±1.7 vs 21.9 ± 1.2 yr) ($P > 0.05$) while were different in average height

(159.9±7.5 vs. 162.7 ± 6.6 cm) ($p<0.05$) . Further analysis showed post-BMI as well as body weight did not altered in comparison with pre -exercise programme ($p>0.05$) in both exercise and control groups (Table 1). Subsequently all post - lipids variables included FBS, LDL, HDL, triglycerides and total cholesterol were elevated in experimental group compared with pre- intervention exercise programme and in comparison to the control groups ($p<0.05$) (Table 1).

Table1. Changes in variables in slim subjects pre and post assessments (X ± SD)

Variables	Exercise		Control	
	pre	post	pre	post
Age (years)	21.1±1.7		21.9 ± 1.2	
Height (cm)	159.9±7.5		162.7 ± 6.6	
Weight (kg)	46.9± 5.3	46.4±5.2	46.5 ±5.7	46.3 ± 5.2
BMI (kg/m^2)	17.8±1.2	17.8± 0.0	17.5±1.1	17.6±0.1
FBS (mg/dl)	84.9±0.1	90.5±0.00 *	86.4±0.2	88.4±0.1
LDL (mg/dl)	93.3±0.0	102.7±0.3 *	101.1± 0.2	99.4±0.5
HDL (mg/dl)	56.0±0.0	57.6±0.04 *	58.9±0.0	60.1±0.0
Cholesterol Total (mg/dl)	165.5±0.2	177.9±0.01*	174.3±0.3	173.8±0.1
Triglycerides (mg/dl)	81.4±0.0	87.3±0.03 *	73.1±0.1	71.0±0.0

Significantly different from the respective 'Pre' value $p < 0.05$*

DISCUSSION

Exercise increases fat profiles and the metabolic rate increases exercise group while they still had normal range of all lipid serums variables in which blood suture (desirable<200 mg/dl), LDL (desirable<130 mg/dl), HDL(35-60 mg/dl), triglycerides (up to 200 mg/dl) and total cholesterol (desirable < 240 mg/dl) in conventional terms that can be because of stimulated appetite in exercised subjects to use more calories in daily to daily routine after any exercise session [8]. Moreover, the body weight and body mass index (BMI) did not change in experimental group after exercise programme in spite of increased lipids profile that might be due to limited duration of the study period. Nonetheless, slim individual rarely gain any extra weight because of multiple reasons such as not having enough appetite and a simple exercise such as walking can be a good strategy in this line [9]. This means an exercise programme such as walking in a well-designed schedule can easily corporate in all population way of lives including underweight people who may continuously in doubt to engage in any exercise programmes because of losing weight [10]. For this reason American college of sports medicine (ACSM) from long time ago every single year update the famous recommendation that stated to promulgate public health all adults aged 18 to 65 years need engage at cardiorespiratory activity for a minimum of 30 min on five days at each week [11,12] .This is because more activity requires more arm and leg works thereby it can improve the quality of life toward optimal health and ideal weight [13]. Another interesting point can be referred to the control group who did not perform exercise but were acquired to the terms of health promotion with taking part in this study. As even gaining knowledge can be a life-style modification intervention itself. For instance, they did not lose weight which is a risk factor for many illness such as osteoporosis as well as bone loss [14] and they showed elevation in their HDL-C level as a good cholesterol components resulting in optimal health and well-being [15] .Hence, lack of knowledge is a one of major risk factors for many disease and more educational strategy could be a beneficial tool in different population namely in underweight individual. In conclusion this study is done to observe the walking training outcome on lipid serums, although it additionally has educational health benefit consequences for control group. Finally , current study outlined that walking programme can be a stimuli toward ideal weight in slim individual because an increased lipids profile as indicators of an increased body mass in underwent individual who are at risk of diseases such as anorexia nervosa shows this notion. However, more investigation with longer duration is needed to justify this conclusion.

CONCLUSIONS

This study outlined that walking programme can be a stimuli toward ideal weight in slim individual because an increased lipids profile as indicators of an increased body mass in underwent individual who are at risk of diseases such as anorexia nervosa shows this notion. However, more investigation with longer duration is needed to justify this conclusion.

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