EFFECT OF AEROBIC EXERCISE ON SOME OF SELECTED METABOLIC SYNDROME IN YOUNG OBESE WOMEN

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Abstract

There is evidence that obesity in youth is a more powerful predictor of this risk than metabolic syndrome in adulthood. The purpose of the present study is to examine the effect of walking exercise in order to reduce some of selected metabolic syndrome in sedentary obese girls. 20 untrained obese (BMI>30) girls 19-25 years volunteer took place in this research and then they were randomly divided in two groups (Control: n=10 Experimental: n=10). At first and after 2 months all component of body composition, total cholesterol, triglyceride, FBS, were assessed. Then the experimental group started to do exercise program that consisted of 30 mints walking with intensity of %50 - %75 of maximal heart rate, 3 sessions in a week for 2 months. The data by unpaired- t-test at the level of p<0.05 were analyzed. The results of this study showed that walking exercise positively affected all component of body composition (all p=0.000). More ever total cholesterol, triglyceride, FBS significantly decreased (p<0.05). The implications of the results are that obese individual should be encouraged to increase their physical activity levels, which may result in significant improvements in selective markers of the metabolic syndrome.

Key words: *metabolic syndromes, walking exercise, obese girls*

Introduction

Metabolic syndrome is the name for a group of risk factors linked to overweight and obesity (Taubes, 1998). The term "metabolic" refers to the biochemical processes involved in the body's normal functioning. Risk factors are traits, conditions, or habits that increase your chance of getting a disease. Many components of metabolic syndrome are associated with a sedentary lifestyle, including increased adipose tissue (predominantly central); reduced HDL cholesterol; and a trend toward increased triglycerides, blood pressure, and glucose in the genetically susceptible. The metabolic syndrome has become increasingly common in the United States. It's estimated that over 50 million Americans have it (Scott, 2003). Various strategies have been proposed to prevent the development of metabolic syndrome. The best treatment for metabolic syndrome is control it (Eckel, 1998). This condition is more common among *obese women*. Because of all the negative physiologic and psychosocial consequences associated with metabolic syndrome obese people frequently try to control it (Yanai et al., 1997). While various forms of aerobic activity may control of metabolic syndrome, walking as an exercise intervention may be accepted by a board range of patients' .Consequently, there may be a therapeutic role for walking exercise in the prevention and management of obesity. Furthermore it is popular and feasible for the obese population. These include increased this physical activity such as walking 30 minutes every day (Barlow et al., 1995; Eriksson et al.,1997). A recent study found that metabolic syndrome can be reversed in as little as three weeks with healthy diet changes (65-70% complex carbohydrates, 15-20% protein, 12-15% fat and extra fruits, vegetables and whole grains). Also moderate daily exercise (45-60 minutes of walking). Previous studies have found that losing even 10 lbs. makes a significant difference in lowering stabilizing blood sugar levels, and contributing to overall health and wellbeing, even when subjects were still obese (Kong et al., 2004; Lakka et al., 2007).This is a cause for concern because obesity increases all-cause mortality risk and there is evidence that obesity in youth is a more powerful predictor of this risk than obesity in adulthood. The purpose of the present study is to examine the effect of walking exercise in order to reduce some of selected metabolic syndrome in sedentary obese girls.

Material and methods

20 untrained obese (BMI>30) women with age 22.00 ± 1.50 years volunteered to participate in this study. Then they were randomly assigned to exercise and control groups (Experimental n=10, Control n=10). Written informed consent for all procedures was obtained from all participants prior to entering the study. The criteria for the invitation were being willing to participate, clinically healthy (no cardiovascular, musculoskeletal, respiratory, or other chronic diseases that might limit training or testing), no menstrual irregularities, not using medication and no beta-blockers, sedentary life style (no regular sports activities for at least 2 years), non dieting, and no apparent occupational or leisure time responsibilities that impede their participation.

The following measurements were made at baseline prior to the start of the exercise program and at after completion of the 2- month training program.

Dietary Intake
Caloric expenditure was calculated based on the weight of the subject. To minimize any affect that dietary composition might have on the measured metabolic variables in experimental group, the initiation of the study all subjects were instructed on the American Health Association (AHA) diet by registered dietician. The composition of this diet was 50-55% carbohydrate, 15-20% protein, <30% fat (New et al ., 1997).The subjects were asked to maintain this diet composition throughout the study's duration (2mo).Compliance was monitored by review of 7-day food records taken every week.

Anthropometric measurement
Body weight and height were recorded and body mass index (BMI) was calculated as weight (kg) divided by height (m) squared. Fat mass, percent body fat and lean mass were assessed with bioelectrical impedance equipment (BIA- 106, RJL Systems, USA). In addition, all subjects were weighed every week.

Blood analysis
Blood samples were collected after an overnight fast (>12 h) in a sitting position and centrifuged at 1500 rpm for 30 minutes at 4^{o} C within 2 h. Serum samples from each participant were stored frozen at -20^{o} C until analyzed. Total cholesterol, triglyceride and were measured by standard colorimetry using an auto -analyzer (dimension RxL auto-analyzer. Newark, NJ, DADE Behring).Plasma glucose (FBS)was measured by means of Vitros DT60 II Chemistry Analyser (Ortho-Clinical Diagnostics, Rochester, NY, USA) with VITROS reagents (catalogue number 1532316) and control (catalogue numbers 8420317, 1448042).

Exercise program
The program included warming-up phase for 5 minutes of stretching exercises, 30 minutes walking at 50-75% of maximum heart rat and cooling-down phase for 5 minutes of stretching, three times a week for 2 months.
Stretching exercises were performed for the arms, leg, back and stomach. A target heart rate range between 50-75% of age adjusted maximum heart rate intensity was calculated by each walker from her age and walking supine resting heart rate (Swain et al., 1994). Heart rate was measured with an electronic heart rate meter (Sport Tester PE, Polar Electro, Finland). The exercise program was accompanied by music. All sessions were supervised by a professional exercise physiologist leader.

Statistical Analysis
The data were analyzed using the SPSS statistical package (SPSS 13 for Windows; SPSS, Chicago, USA).Mean and standard deviation (SD) was used as descriptive statistic. Student's t-test was used for normally distributed variables. Unpaired t-test was used to assess the change in BMI, body weight, total cholesterol, and triglyceride, FBS before and after the exercise intervention. The final level of significance was accepted as $p<0.05$ for all comparisons.

Results

Twenty subjects (100%) completed the training program. No major change in menstrual status was observed during the study. Table 1 shows the physical characteristics of the study subjects (pre, post study), there were no significant differences in mean age, height, BMI between the two groups at the first. Percent body fat (2.2%), fat mass (2%) and lean mass (1.1%) changes in response to training were significant in the exercise group. The lean mass in exercise group were significantly increased but the present body fat, fat mass were significantly decreased (all $p = 0.000$).The mean body weight was 1.3% lower at the end of the study. Body mass index (BMI) in the exercise group (2.3%) significantly differ from before the intervention compare with the control group ($p<0.05$). Also total cholesterol, triglyceride, FBS significantly decreased (p<0.05).

Table1. Changes in variables in pre and post test exercise (X±SD)

variable	**Obese**(Exe)		**Obese**(Con)		
	pre	**post**	**pre**	**post**	
Age (year)	22.22±1.98	-	22.67±1.50	-	**P value**
Height (cm)	157.78±5.11	-	159.11±1.50	-	
Weight (kg)	74.98±8.11	73.27±7.74	78.11±10.88	78.06±10.14	0.000*
BMI (kg/m^2)	30.20±1.83	28.88±2.10	30.93±3.57	30.41±3.05	0.000*
Lean mass (kg)	43.27±5.25	44.38±6.21	43.86±6.03	43.25±6.67	0.000*
Fat mass (kg)	29.11±4.54	27.17±6.30	31.16±6.28	31.42±7.13	0.000*
% Body fat	38.80±3.97	36.35±6.84	39.97±3.51	39.00±5.16	0.000*
FBS(mg/dl)	85.20±5.20	81.00±0.12	91.20±1.35	90.22±2.67	0.021*
Triglyceride(mg/dl)	104.01±2.30	82.01±1.21	107.11±3.42	143.11±0.51	0.033*
Cholesterol(mg/dl)	190.01±3.25	179.01±0.55	198.01±1.15	197.01±2.95	0.001*

* Significantly different from the 'Pre' value:* p < 0.05;***
* Exe=Experimental, * Con=Control

Discussion

This study finding revealed that 2 months walking exercise was of sufficient duration and intensity to result in significant improvements in the all components of body composition in obese exercise group. Moreover decrease in total cholesterol, triglyceride, FBS in exercise group accounts for the responses of insulin to walking exercise compare with the control group. Exercise training can be considered a type of stress that is known to induce a number of metabolic changes (Wareham et al., 1998). Some researchers have suggested that the physical activity generated by active transportation is helpful in weight control. Walking performed regularly, can result in substantial amounts of energy expenditure (Rennie et al., 2003). Narayani et al. (2010) similarly have shown that an isolated walking training program for obese women for 45 min a day decreased body fat percentage , total cholesterol and increased HDL in 20 female obese women with age 17-25 year after six weeks of endurance training. Thompson et al (2004) also indicated an inverse association between body fat daily walking. Zeelie et al. (2010) have shown that 10 – week physical activity intervention significantly decreased body mass index (BMI), fasting insulin and FBS in 194 boy and girls with 15-19 years.

Epidemiological and clinical studies have demonstrated that the regular practice of physical activity is important factor for prevention and treatment of this disease (Solomon et al., 1997). Kang et al (2004) has shown that the physical activity did not differ between patient with and without metabolic syndrome. Also Misra et al. (2005) reported physical activity by women aged 30-64 years were not significant associated with metabolic syndrome and any other risk factors. Ahn et al. (2007) similarly reported that 1 hour mothered – intensity walking exercise 5 days per week for 3 months had not significant differences on body composition, Total cholesterol, and triglyceride in obese postmenopausal women. Cross-sectional studies also suggest that a combination of walking and vigorous exercise activity is optimal for weight management and the prevention of metabolic syndrome (Bassey et al., 1984; Rippe et al., 1988). In this study demonstrated that a program of regular physical activity such as 2 month walking exercise can significantly reduced some of selected metabolic syndrome in sedentary obese girls. The implications of the results are that obese individual should be encouraged to increase their physical activity levels, which may result in significant improvements in selective markers of the metabolic syndrome.

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UČINCI AEROBNOG VJEŽBANJA NA NEKE ODABRANE METABOLIČKE SINDROME GOJAZNIH DJEVOJAKA

Sažetak

Postoje dokazi da je gojaznost mladih mnogo snažniji prediktor ovih rizika nego metabolički sindorm odraslih. Svrha ovog istraživanja je utvrđivanje učinka vježbanja hodanjem s ciljem redukcije nekih odabranih metaboličkih sindroma kod gojaznih sedentarnih djevojaka. Ukupno 20 netreniranih gojaznih (BMI>30) djevojaka uzrasta 19-25 godina dragovoljno se prijavilo za ovo istraživanje a zatim su slučajno podijeljene u dvije skupine (kontrolna: n=10 i eksperimentalna n=10). Na početku i nakon 2 mjeseca ispitane su sve komponente tjelesnog sastava, ukupni kolesterol, trigliceridi i FBS. Zatim je eksperimentalna skupina započela program vježbanja koji se satojao od hodanja u trajanju od 30 minuta intenzitetom od 50% - 70% od maksimalnog srčanog ritma, tri puta tjedno u trajanju od 2 mjeseca. Podaci su analizirani t-testom na razini sigurnosti od p<0.05. Rezultati istraživanja su pokazali da je vježbanje hodanjem pozitivno djelovalo na sve komponente sastava tijela (svi p=0.000). Štoviše, kolesterol, trigliceridi, FBS su se značajno snizili (p<0.05). Implikacije rezultata su da gojazne pojedince treba ohrabriti prema povećanju razine tjelesnih aktivnosti, što može rezultirati u značajnom poboljšanju odabranih markera metaboličkog sindroma.

Ključne riječi: *metabolički sindromi, vježbanje hodanja, gojazne djevojke*

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