THE EFFECT OF AEROBIC EXERCISE ON SOME DIABETIC RISK FACTOR IN OBESE WOMEN

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Abstract
Purpose: Exercise has been shown to prevent diabetes, and delay it. The purpose of the present study is to examine the effect of walking exercise in order to reduce to some diabetic risk factor in sedentary obese women. Methods: 18 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=9, Exercise: n=9). At first and after 8 weeks lipid profiles and anthropometric variables were measured. 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. Result: The results of this study showed that walking exercise positively changed all selected diabetic risk factors variables in obese women (p<0.05). Conclusion: This study demonstrated that the diabetic risk factor can reduce by a program of regular physical activity such as walking, 3 times a week, in young obese women.
Key words: *Walking exercise, Obesity, Diabetic Risk Factors.*

INTRODUCTION

Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have an adverse effect on health, leading to reduced life expectancy and/or increased health problems. Obesity increases the likelihood of various diseases, particularly diabetes [1, 2]. Diabetes mellitus is a condition where the body has trouble taking glucose from the blood and delivering it to the rest of the body so that it can be used as energy. This is because of a lack of, or an inability to use insulin, the hormone required to "escort" glucose from the blood to cells of the body [3, 4]. Regular exercise can help your body respond to insulin and is known to be effective in managing blood glucose. Exercise can lower blood glucose and possibly reduce the amount of medication you need to treat diabetes, or even eliminate the need for medication. Exercise helps reduce stress, which can raise your glucose level [5, 6]. Any activity that raises your heart rate and keeps it up for an extended period of time will improve your aerobic fitness. Aerobic exercise helps decrease the risk of type 2 diabetes and helps those with diabetes to better manage their blood sugar levels [7, 8]. Besides the health benefits, exercise is fun and boosts your mood. It's hard to feel stressed when you're walking fast on a treadmill.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 and related diseases. Furthermore it is popular and feasible for the obese population [9]. For example Miyatake et al indicated that daily walking improved parameters of body composition and the amount of insulin hormone in 31 obese Japanese males in age from 32 to 59.They concluded that Taken together, intra-abdominal visceral adipose tissue is critically involved in insulin resistance and daily walking rather than improvement of exercise capacity correlated with the reduction of visceral adipose tissue in obese Japanese males [10]. While numerous studies confirm the benefit of regular exercise training on improving insulin sensitivity and body composition in human it was also reported that the exercise training effect on improving insulin sensitivity and glucose tolerance is not effective in every people [11,12]. However, although many studies suggest that physical activity may reduce risk of diabetes, the role of moderate-intensity activity such as walking is not well understood. The purpose of the present study is to examine the effect of walking exercise in order to some diabetic risk factor in sedentary obese women.

METHODS

18 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 (Exercise n=9, Control n=9). 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), nondieting, 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 8- weeks training program.

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° C within 2 h. Serum samples from each participant were stored frozen at -20° C until analyzed.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). Serum insulin also by an enzyme-linked immunoassay (ELISA) analysis was measured.

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 8 weeks. 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 [13]. 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, serum insulin before and after the exercise intervention. The final level of significance was accepted as $p<0.05$ for all comparisons.

RESULTS

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. No major change in menstrual status was observed during the study compare with the control group. After 8 weeks, significant change was observed in all anthropometric variables ($p<0.05$). Serum insulin ($p = 0.008$) and FBS ($p = 0.021$) also significantly decreased in exercise group not in control group.

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

variable	**Obese**(Exe)		**Obese**(Con)		**P value**
	pre	**post**	**pre**	**post**	
Age (year)	22.22 ± 1.98	-	22.67±1.50	-	
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*
Insulin (µg/ml)	6.26±7.50	4.88± 4.50	6.37± 6.27	6.18± 17.35	0.008*
FBS(mg/dl)	85.20 ± 5.20	81.00 ± .12	91.20 ± 1.35	90.22 ± 2.67	0.021*

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

DISCUSSION AND CONCLUSION

Exercise training can be considered a type of stress that is known to induce a number of metabolic changes. Indeed exercise stimulates insulin in the liver and muscles to take in excess glucose [14].Beneficial effect of physical activity on insulin sensitivity that is separate from any influence of physical activity on body composition. In fact, it appears that the enhanced insulin action in physically trained individuals involves not only muscle tissue but also liver and adipose tissue [15]. A meta-analysis of 43 randomized controlled trials by the Cochrane Collaboration found that exercising alone led to limited weight loss [16]. At the present study our finding revealed that 8 weeks 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 serum insulin and FBS in exercise group accounts for the responses of insulin and fasting glucose to walking exercise compare with the control group. Zeelie et al similarly have shown that 10 – week physical activity intervention significantly decreased body mass index (BMI), fasting glucose and insulin resistance in 194 boy and girls with 15-19 years. [17]. Janssen et al but reported that The improvement in the metabolic profile such a fasting and insulin was not enhanced by the addition of 16 week aerobic exercise in 38 premenopausal healthy obese women compare with the control groups . They findings reinforce the importance of diminished visceral fat in the treatment of insulin resistance [18].The degree and the extent of any exercise should be adapted to the age, the physical ability of the individual. Even though exercise as carried out in the general population has only modest effects, a dose response curve is found, and sometimes very intense exercise can lead to substantial weight loss [19].

Exercise affects macronutrient balance. During moderate exercise, equivalent to a brisk walk, there is a shift to greater use of fat as a fuel [20].To maintain health the American Heart Association recommends a minimum of 30 minutes of moderate exercise at least 5 days a week[21].In this study demonstrated that the diabetic risk factor can reduce by a program of regular physical activity such as walking, 3 times a week, in young obese women.

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EFEKTI AEROBNOG VJEŽBANJA NA NEKE RIZIKO FAKTORE DIJABETESA PRETILIH ŽENA

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Sazetak

Cilj: Vježbanje se pokazalo da spriječava i odlaže pojavu dijabetesa. Cilj ove studije je da istraži utjecaj aktivnosti hodanja sa namjerom da reducira neke riziko faktore dijabetesa kod pretilih žena koje provode mnogo vremena sjedeći. Metoda: 18 netreniranih pretilih (BMI> 30) djevojaka starosti od 19 do 25 godina je dobrovoljno učestvovalo u ovom istraživanju pri čemu su nasumično podjeljne u dvije grupe: Kontrolna grupa: n=9, grupa koja vježba: n=9. Na početku i nakon 8 sedmica mjereni su lipidni profil i antropometrijske varijable. Eksperimentalna grupa je počela sa izvođenjem programa koji se sastojao od 30 minuta hodanja intenzitetom od 50%-75% maksimalnog rada srca, 3 puta sedmično u periodu od 2 mjeseca. Podaci t-testa za zavisne uzorke na nivou značajnosti od p<0.05 su analizirani. Rezultat: Rezultati ovog istraživanja su pokazali da je vježba hodanja pozitivno promjenila vrijednosti varijabli riziko faktora za dijabetes kod pretilih zena (p<0.05). Zaključak: Ova studija je pokazala da se riziko faktori dijabetesa kod mladih pretilih žena mogu smanjiti programom redovne fizičke aktivnosti kao što je hodanje,3 puta sedmično.

Ključne riječi*: vježba hodanja, pretilost, riziko faktori dijabetesa.*

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