Blood Lipids and Serum Leptin Response to Triple Therapy in Obese Females

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ABSTRACT

Background: Obesity is a major public health problem associated with increased morbidity and mortality and it is the mother of all diseases. The aim of this study was to determine the response of blood lipids and serum leptin to triple therapy (diet control, exercises and acupuncture) following weight reduction in obese females. Subjects and methods: Forty obese women, their age ranged from 20 to 34 years and their body mass index (BMI) ranged from 30 to 36 Kg/m^2 participated in this study and divided into two equal groups; the training group received diet regimen, exercise training and acupuncture. Where the control group received only medical treatment intervention. Measurements of body mass index (BMI),serum leptin ,total cholesterol (TC), high density lipoprotein (HDL), low density lipoprotein (LDL) and triglycerides (TG) were taken before starting of the study and repeated at the end of the study (after three months). Results: There was a significant increase in values of HDL and decrease in BMI, serum leptin, TC, LDL and TG of the training, while the results of the control group were not significant. There was a significant difference between both groups. Conclusion: Triple therapy can be used as a method of treatment for obese females.
Key words: *Serum Leptin, Blood Lipids, Triple Therapy, Acupuncture and Obesity.*

INTRODUCTION

Obesity is the result of a long-standing imbalance between energy intake and energy expenditure, aided by a complex biological system that regulates appetite and favors intake[2,13]. The availability of a high-fat and high-energy diet has steadily risen over the past 30 years, while people have become increasingly sedentary. This lifestyle of poor diet and little physical activity caused the prevalence of obesity to be increased[3,7].

Obese people experience hypertension, elevated blood cholesterol as well as type II diabetes suffer more joint and mobility problems more than people within the normal weight[9].

Obesity should be treated chronically and prevention of weight regain must be part of any obesity treatment program as a relatively small weight loss produces a significant health gain[11].

Leptin is an adipocyte-derived hormone that regulates food intake and energy expenditure. It is crucial for energy homeostasis in mammals.Leptin has very strong food intake control, and body weight and energy expenditure. The name of "leptin "derived from the Greek word leptos meaning thin. The leptin receptor is glycoprotein. The plasma leptin concentration of normal human is about 8.0 ng/ml[5,17,18].

Weight management program must include dietary adjustment, increase physical activity and behavior modifications. Nutrition modification should take into account the diet's energy content, composition and suitability for individual patient[15,23].

Triple Therapy (diet control, exercises and acupuncture) enhanced weight loss without increasing heart rate and blood

pressure or detrimental changes in resting metabolic rate and substrate oxidation[1].

Triple therapy decreases plasma leptin. Leptin is a protein product of obesity gene expressed primarily by adipocytes, provides feedback information on the size of energy stores to central receptors controlling the food intake, energy expenditure and body weight homeostasis[12].

Also, triple therapy resulted in a satisfactory body weight reduction and good maintenance of the target weight after treatment. Acupuncture was reported to decrease body weight and improve water and salt metabolism by regulating nervous system and body fluids[20]. Furthermore, frequent aerobic exercise during treatment contributes greatly to body weight reduction and maintenance[10].

The aim of this study was to determine the response of blood lipids and serum leptin to triple therapy (diet control, exercises and acupuncture) following weight reduction in obese females.

SUBJECTS MATERIALS AND METHODS

Subjects

Forty obese women, their age ranged from 20 to 34 years and their body mass index (BMI) ranged from 30 to 36 Kg/m^2, free from respiratory, kidney, liver, metabolic and neurological disorders. The subjects were divided into two equal groups: Training group received triple therapy (Diet, Exercise and acupuncture) and control group received only medical treatment.

Instruments

A. Evaluation instruments

1. A scale to determine body weight and height scale to measure height, allowing calculation of body mass index (BMI). Body mass index was calculated by dividing the weight in kilograms by the square of the height in meters (Kg/ m^2).
2. Glass tubes containing few milligram of K_2EDTA an anticoagulant material.
3. Centrifuge to separate plasma and Freezer to store the samples at (-20º).
4. Commercial kits to measure leptin hormone by ELISA, triglycerides, total cholesterol as well as its contents in HDL and LDL.

B. Treatment instruments

1. Acupuncture needles: They are stainless steel needles, embedding needles and body needles. Where the auricle needle is 0.5 inches in length and 2.7 mm in diameter and body needles which varied in length, between 2.0 inches to 3.0 inches in length and 5.8 mm in diameter to 76 mm.
2. Electrical treadmill- (PRECOR 9.1/ 9.2, China) in order to perform aerobic exercise training.

C. Chemical analysis

Blood sampling: After fasting for 12 hours blood sample was taken from each women in clean tubes containing few mg. of K_2EDTA, centrifuged and plasma was separated and stored frozen at -20° used for estimation of:

a. Plasma leptin level by immunoradimetric assay (IRMA).
b. Plasma lipid profile: Triglycerides, Total cholesterol, HDL and LDL.

Study Program

1. Training group received triple therapy included:

a. Low caloric diet: It provides about 1000 calories daily for two months for whole patients with different body mass index[6]. This includes the following:

- Breakfast includes: 2 boiled eggs (80 cal), 50 gm cheese (100 cal) and one bread (105 cal).
- Lunch includes: 2 pieces of boiled meat 100gm (240 cal) or chicken (300), 500 g

salad (105 cal), 300 gm boiled vegetables (110 cal) 100 gm and banana (100 cal).

- Dinner: 200 gm light milk (120 cal).

b. Aerobic exercise: Obese subjects participated in a supervised program 3 days a week, every other day for 3 months. The session of exercise started 2 hours after meal on treadmill walking, the time adjusted on computer attached to the treadmill and velocity was 1 kilometer/hour. The exercise started with 10 minutes intervals, till it reaches 30 minutes by the end of the third session and distance covered increased from 1.55 to 3.65 kilometer/hour. The program continued for 3 months.

c. Acupuncture: The obese females were treated by pressing needles in one ear, the needles were changed every 7 days for sterilization and to prevent adaptation, the auricular points were shenman, stomach, endocrine, duodenum, hunger and spleen points. Also subjects were treated by pressing needles in ``meridian acupuncture body points used in reduction of body weight. The meridian body acupuncture points were stomach ST 36, large intestine 4, lungs 5 and stomach 25. Each session was continued for 30 minutes; 3 sessions / week and for 3 months.

2. Control group received only medical treatment.

RESULTS

Table (1): Shows the difference between the pre and post values of BMI, leptin, TG, TC, LDL and HDL in the training group.

	Mean ±SD		t-value	Significance
	Pre	Post		
BMI	35.78±3.64	31.29±3.16	5.68	Sig
leptin	40.56±3.45	35.12±3.12	6.34	Sig.
TG	184.32±10.49	163.26±9.51	7.83	Sig.
TC	204.21±11.46	178.65±10.67	9.25	Sig.
LDL	135.25±10.25	110.16±9.34	8.56	Sig.
HDL	32.87±2.14	35.82±2.11	5.77	Sig.

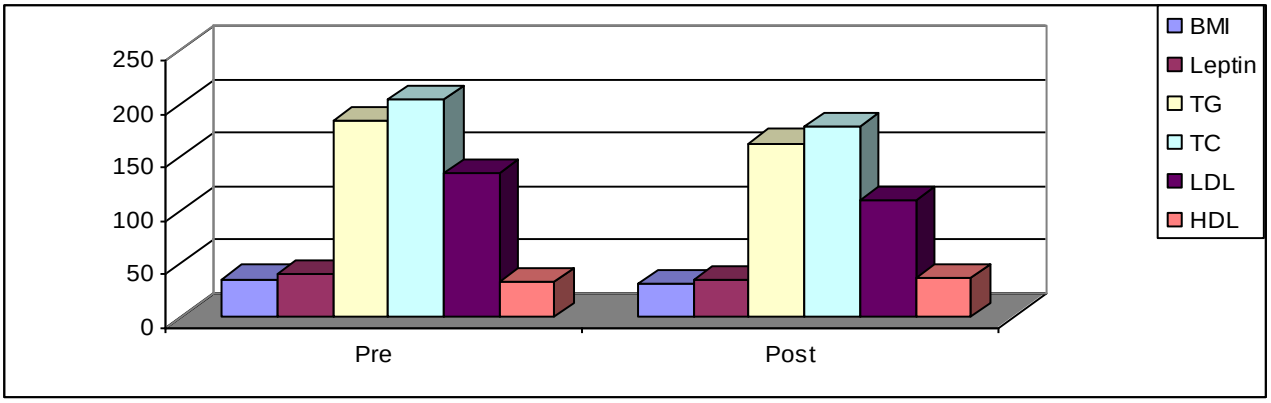

Fig. (1): Shows the difference between the pre and post values of BMI, leptin, TG, TC, LDL and HDL in the training group.

Table (2): Shows the difference between the pre and post values of BMI, leptin, TG, TC, LDL and HDL in the control group.

	Mean ±SD		t-value	Significance
	Pre	Post		
BMI	36.57±3.82	35.86±3.41	0.78	Non Sig
leptin	39.93±4.26	39.43±3.31	0.12	Non Sig
TG	187.12±11.29	185.25±10.19	0.98	Non Sig
TC	209.48±11.89	206.30±11.14	1.10	Non Sig
LDL	138.71±10.34	135.61±9.89	1.32	Non Sig
HDL	31.91±2.56	32.10±2.14	0.27	Non Sig

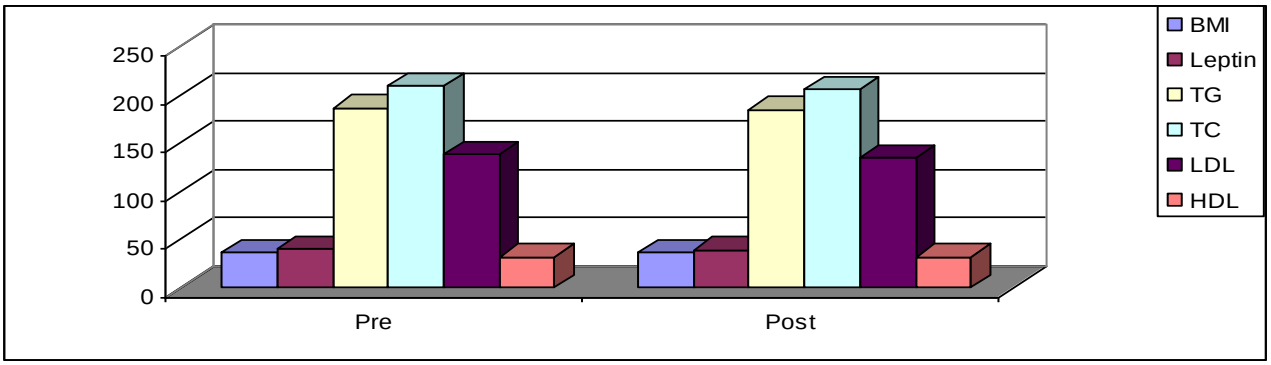

Fig. (2): Shows the difference between the pre and post values of BMI, leptin, TG, TC, LDL and HDL in the control group.

Table (3): Shows the difference between the training and the control groups in BMI, leptin, TG, TC, LDL and HDL after 3 months.

	Mean ±SD		T-value	Significance
	training	control		
BMI	31.29±3.16	35.86±3.41	3.13	Sig
leptin	35.12±3.12	39.43±3.31	3.01	Sig.
TG	163.26±9.51	185.25±10.19	4.99	Sig.
TC	178.65±10.67	206.30±11.14	5.67	Sig.
LDL	110.16±9.34	135.61±9.89	5.93	Sig.
HDL	35.82±2.11	32.10±2.14	3.95	Sig.

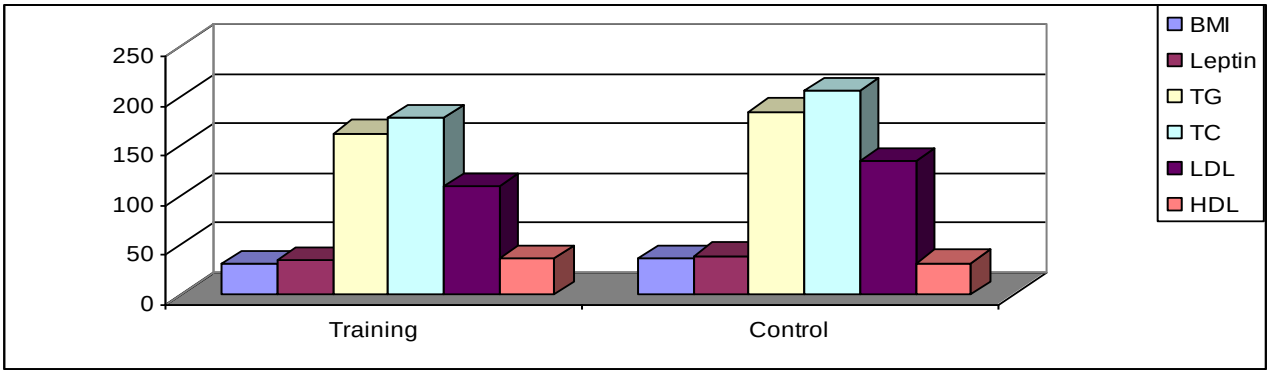

Fig. (3): Shows the difference between the training and the control groups in BMI, leptin, TG, TC, LDL and HDL after 3 months.

DISCUSSION

This study was designed to determine the blood lipids and leptin response following weight reduction after triple therapy in obese females. Forty obese women participated in this study and were divided into two equal groups; the training group received triple therapy (Diet, Exercise and acupuncture) and the control group received no treatment intervention.

The results of the study concerning BMI showed that there was a significant decrease in the training group only .The difference between the training and the control groups was significant.

There was a higher efficiency of low caloric diet and acupuncture than low caloric diet only in lowering of BMI and body weight of obese persons[24]. Triple therapy enhanced weight loss and produced detrimental changes in resting metabolic rate and substrate oxidation[1].

Also, acupuncture can increase excitability of the satiety center of the VMH in rats with experimental obesity, with a better long-term effect[22].

The results of the study concerning serum leptin showed that there was a significant decrease in the training group only .The difference between the training and the control groups was significant.

Triple therapy decreases plasma leptin, provide feed back information on the size of energy stores to control receptors controlling the food intake; energy expenditure and body weight[14]. Increasing physical activity was associated with lower plasma leptin concentrations even after adjusting for BMI. Physical activity may lower leptin concentrations not only due to the decreased body fat mass, but potentially through an increase in leptin sensitivity[3].

Serum leptin levels are up to four times higher than in lean subjects, indicating a failure of the feedback loop and central leptin resistance[16]. Also, circulating leptin is low in trained subjects and closely related to fat contents also leptin might be regulated by overall subcutaneous fatness in athletes[19].

The results of the study concerning TC and TG showed that there was a significant decrease in the training group only. The difference between the training and the control groups was significant.

Auricular acupuncture plus body acupuncture reduce TG and TC levels in overweight and obese subjects[20]. Acupuncture has a good regulation effect on lipid metabolism and plasma cycling adenosine monophosphate. Auricular acupuncture plus body acupuncture decreased total blood cholesterol. The beneficial effect of acupuncture can be attributed to its effect on hypothalamus-pituitary axis. cAMP in adipose tissue and in liver is produced by the membranous enzyme adenylate cyclase that acts on ATP producing cAMP and liberating pyrophosphate. cAMP is involved in the activation of phosphorylase helping glycogenolysis and on lipase enzyme helping lipolysis[21].

The results of the study concerning HDL showed that there was a significant decrease in the training group only. The difference between the training and the control groups was significant.

Exercise-induced increases in HDL and decreases in triglyceride are similar in hyper- and normo-cholesterolemic men and may be mediated, at least in part, by an increase in lipoprotein lipase activity[8].

The results of the study concerning LDL showed that there was a significant decrease in the training group only .The difference between the training and the control groups was significant.

The decrease in LDL level after receiving therapy could be the result of decreased synthesis. In obese men, energy restriction resulting in even modest weight loss suppresses endogenous cholesterol synthesis which contributes to a decline in circulating lipid concentrations. Increased insulin sensitivity is an improvement factor in improving lipoprotein profile after treatment of obesity[4].

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الملخص العربي

أستجابة دهنيات الدم و هرمون اللبتين للعلاج الثلاثى فى النساء البدينات

تهدف الدراسة الى معرفة فوائد انقاص الوزن نتيجة العلاج الثلاثى فى النساء البدينات من خلال قياس معامل كتلة الجسم و مستوى هرمون الليبتين و نسبة الدهون ، أشتملت الدراسة على أربعين مريضا تراوحت أعمارهم بين 20-34 سنة وتم تقسيمهم الى مجموعتين متساويتين المجموعة الأولى تلقت تمارين هوائية وبرنامج غذائى بالأضافة الى العلاج بالأبر الصينية فى حين لم تتلقى المجوعة الثانية (المجموعة الضابطة) أية علاج تم أجراء التحاليل قبل بدء الدراسة وبعد ثلاثة شهور فى نهاية الدراسة . أظهرت النتائج انخفاض ذو دلالة احصائية فى معامل كتلة الجسم ومستوى هرمون الليبتين والكولستيرول نو الكثافة المنخفضة وتحسن فى الكولستيرول نو الكثافة العالية فى المجموعة الاولى فقط فى حين لم تظهر المجموعة الضابطة تحسن ذو دلالة احصائية ووجد فروق ذات دلالة احصائية بين المجموعتين . لذا يوصى باتباع برنامج العلاج الثلاثي لانقاص الوزن للنساء البدينات .