Serumleptin, Triglycerides, Cholestrol and Hdl-Cholestrol In Non Dlabetic Obese Subjects

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Abstract

This study was carried out to investigate the relationship between Serum leptin, Body Mass Index (BMI), Triglycerides, Cholesterol and HDL- Cholesterol in Non Diabetic Obese subjects comparingwith healthy subject. A 36 male and female Iraqis obese were studied, mean age 50.1, 43.3 years respectively and 23 healthy subjects. Serum leptin, Triglycerides, Cholesterol and HDL- Cholesterol were measured. Leptin, Triglycerides, Cholesterol, HDL- Cholesterol and BMI significantly increased in obesemalesand females compared with control, but there was no significant difference in HDL- Cholesterol and BMI when compared between obese males and females. A low significant positive correlation was found between leptin and HDL- Cholesterol, and no significant difference between leptin and other types of lipids. The findings suggested that serum leptin concentration topmost in obese subjects with noticeable effect on lipid metabolism.

Key word: Serum leptin, Obesity, lipids

Introduction

Obesity is increasing progressively worldwide, It is closely associated with increased morbidity and mortality caused by several of the most common diseases in the world including gallstone diseases and cancer [1]. Obesity is determined by an interaction between environmental, psychosocial, and genetic factors [2].

Leptin (from the Greek word leptose, meaning thin) is a protein hormone that is encoded by the *Ob* gene and is secreted by adipose tissue to in the circulation. It acts mainly in the hypothalamus by binding to specific Leptin receptor and regulates food intake and energy balance [3]. In addition Leptin activates sympathetic nervous system and increases energy expenditure. Leptin thus decreases body weight and adiposity as a novel messenger of energy metabolism [4].

The information concerning the relationship between serum Leptin concentration and levels of serum lipids is important. Furthermore, when evaluating Leptin levels and metabolic profiles of patients with and without ischemic heart disease, no differences in Leptin concentration and no relationships between Leptin and plasma lipid were observed [5]. However, serum Leptin concentration in individuals with first-ever hemorrhagic stroke was sharply higher than in controls suggesting some association between serum Leptin and alteration of lipid metabolism [6].

Therefore, the aim of the present study is to evaluate serum Leptin, triglycerides, cholesterol and HDL-cholesterol in Iraqis obese people comparing with normal subjects.

Materials and Methods

Subjects

A total of 36 (16 male and 20 female) Iraqis obese (BMI $\geq$ 30 Kg / m^2) were enrolled in this study. Median age of the 36 female/male volunteers was 43.0, 50.1 years respectively, ranged (20 -61),(20 - 78)years respectively. These out-patients were turned up to AL-Numan Hospital laboratory for check-up for the period from June to August 2010 .A total of 23 control subjects(11 male and12 female) with (BMI $\leq$ 25 Kg / m^2) were also enrolled in this study. Both test and control groups were non diabetic (serum glucose concentration $\leq$110) and with normal blood pressure. BMI was calculated as weight (in kg) divided by squared height (in m^2).

Sample Collections

Five milliliters (5ml) venous blood was obtained between 08:00 and 10.00 a.m. after a 12 hour fasting period. All blood samples were dispensed into dry glass test tubes for clotting and retraction to take place. Sera were obtained after samples were centrifuged at 2000g for five minutes and stored at -20°C until assayed for laboratory investigations [7].

Laboratory techniques

Fasting serum glucose concentrations had been measured by the glucose oxidase procedure and serum HDL-cholesterol, triglycerides, cholesterol were measured enzymetically by quantitative determination kit (SPINREACT, S.A.U. SPAIN). Stored frozen sera samples were retrieved, thawed, and tested for Leptin levels by means of a quantitative enzyme immunoassay using a commercial kit (DRG Instruments GmbH, Germany) (specificity, 100%). Reference standards were used to produce a standard curve to quantitate Leptin levels. The results were expressed in ng/ml. The normal value for Leptin levels was up 3.84±1.79 ng/ml in male and 7.36±3.73 ng/ml in female.

Statistical analysis

The statistical computer software package MINITAB was used to analyze the data. The mean, range, and 95% confidence interval (C.I.) for median, were calculated. The relationships between the individual parameters were evaluated using Spearman's correlation. P-value < 0.05 was considered statistically significant.

Results and Discussion

The study included 36 obese and 23 control subjects were divided in two groups, males and females. Mean, range and 95% confidence interval (CI) for age, serum Leptin, HDL, Triglyceride, Cholesterol, Glucose and BMI of obese females and control females are shown in table (1). The mean ages of the obese females and control females were 43.3 years (20-61) and 30 years (21-28), respectively. All of the parameters in table (1) were significantly higher than those of the control except glucose. Conversely, HDL and BMI were significantly lower between obese females and control females. The same parameters were applied to obese males and control males shown in table (2), the mean ages of obese males 50.1 years (20-78) and 35.25 years (24-43), respectively. Each of the parameters in table (2) was significantly high except glucose. In table (3) the triglyceride and cholesterol showed high significant increase in obese females compared
with males, while serum leptin showed low significant. Conversely, HDL, glucose, BMI, and age showed non significant change between obese males and obese females.

The relationships between the studied parameters in the obese males and females group are shown in table (4). As expected a highly significant positive correlation was found between BMI and serum leptin. In addition the table demonstrated a low significant positive correlation between leptin and HDL. Furthermore no significant correlation between leptin and cholesterol,

triglyceride was foun
. Also there was no significant correlation between BMI and cholesterol, triglyceride, HDL.

In humans, it is well established that plasma leptin levels are directly proportional to percentage body fat. Most obese individuals have high concentrations of leptin in their serum and plasma but exhibit

leptin resistance because of decrease leptin transport into the central nervous system or down regulation of leptin receptors [8, 9].

In our study higher leptin concentrations were found in Iraqis obese males and females (BMI $\geq$ 25.00kg/m^2) than the normal control group. The difference between the median of leptin in both obese males and females was significant depending on the distribution and composition of fat in the body or depending on the effect of sex steroids like estrogen and progesterone. [10, 11, 12]

In the subjects investigated in the present study, the relationship between leptin and BMI was linear, as shown in table 4. The results similarly results presented in this study in good agreement with result reported in Saudian overweight and obese females in Makkah community [13], where significant relationship was found between leptin, BMI and waist circumference. Also the results seemed to agree with those reported by Chaisiri *et al.* in Japanese obese women [14], where a linear relationship between serum leptin and BMI was found. On the other hand, the relationship between leptin and BMI in Caucasian individuals is not linear in very obese persons because Caucasians have different metabolic states from Asians, in addition for the differences might be the greater height of Caucasians, so that an increase in the volume of fat tissue to a given height does not correspond in the same way as in Asians. The increase in fat tissue in Asians, with a relatively shorter height, results in a more direct relationship between fat tissue and BMI. It was found that blood-brain barrier transportation had a threshold level for serum leptin (about 25-30 ng/ml), above which increases in serum levels were not translated into proportional increases in cerebrospinal or brain leptin levels, which means that it may result in apparent leptin resistance and obesity[8].

Most investigations have demonstrated, in agreement with the data of this study, a lack of correlation between serum leptin and lipid profiles [15,16,17,18,19] mainly when body weight and degree of adiposity are taken into account

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Table (1) :Mean, ranges and%95 CI of age, leptin, HDL, Triglyceride, Cholesterol, Glucose and BMI in obese and control females

		Obese Female		Control Female		
Parameters	**Mean (range)**	**95%CI**	**Mean (range)**	**95%CI**	**P-value**	**Normal value**
Age yrs	43.3(20-61)	33.5-41.81	30(21-28)	21.6-23.8	0.00	
BMI Kg/m^2	31.27(30-34.6)	26.3-30.8	24.3(21.5-25.3)	22.3-23.1	0.05	20-25
Leptin mg/ml	15.83(1.2-50.7)	8.3-11.6	2.8(1.8-7)	0.4-1.2	0.00	7.3
Triglyceride mg/dl	172.78(70.7-265)	141.2-156.8	106.1(79.6-132.7)	82.4-110.9	0.00	40-140
Cholesterol mg/dl	198.47(69.5-243)	196.3-218.2	138.8(108-154.5)	115.7-130.8	0.00	250-140
HDL mg/dl	46.49(38.6-61.7)	41.3-48.6	57.9(54-61.7)	46.3-526	0.01	72-40
Glucose mg/dl	83.35(55.8-110)	75.4-88.6	79.2(72-84.6)	75.6-81.7	N.S.	70-110

BMI = body mass index, HDL-C= high density lipoprotein cholesterol, Significant difference between obese Female and control Female subjects $p0.05 \geq$

Table (2): Mean, ranges and 95%CI of age, leptin, HDL, Triglyceride, Cholesterol, Glucose and BMI in obese and control males

		Male Obese		Control male		
Parameters	**Mean (range(**	**%95CI**	**Mean (range)**	**%95CI**	**P-value**	**Normal value**
Age yrs	50 .1(20- 78)	33 .6 -51 .6	35-25(24-43)	28 .6 -39.1	0.01	
BMI Kg/m^2	32. 7(30- 38 .1)	29 .6- 32. 1	24 (21 . 5 -25.3)	21 .1 -23 .1	0.05	20-25
Leptin mg/ml	17 .4 (1. 3- 44 .1)	6 . 9 -10 .6	1.7(1-4)	0. 37- 1.1	0.00	3.8
Triglyceride mg/dl	136.(70.7-273)	128 .6 – 163. 1	106(106 - 106)	95 .3 -198	0.00	60-160
Cholesterol mg/dl	169.5(96.5-243.2)	146 .3 – 191 .6	108 (84 .9 -131)	91 .78 -118.3	0.00	250-140
HDL mg/dl	49.9(34.7-65.6)	43 .13 – 51 .7	63 .35 (65-61 .7)	54.81-59.1	0.00	72-40
Glucose mg/dl	93.9(72-113.6)	85 .3 – 88 .63	82.8(75.6-90)	68.6-81.33	N.S.	110-70

BMI = body mass index, HDL-C= high density lipoprotein cholesterol, Significant difference between obese male and control male subjects $p \leq 0.05$

Table (3) Mean, ranges and 95%CI of age, leptin, HDL, Triglyceride, Cholesterol, Glucose and BMI in Obese males and females

	Obese male		Obese female		
Parameters	**(Mean (range**	**CI%95**	**(Mean (range**	**CI%95**	**P-value**
Age yrs	50.1(20-78)	33.6-51.6	43.3(20-61)	33.5-41.81	.N.S
BMI Kg/m^2	32.7(30-38.1)	29.6-32.1	31.27(30.65)	26.3-30.8	.N.S
Leptin mg/ml	17.4(1.3-44.1)	6.9-10.6	15.83(1.2-50.7)	8.3-11.6	0.05
Triglyceride mg/dl	136.9(70.7-274)	128.6-163.1	172.78(70.7-265)	141.2- 156.8 .	0.001
Cholesterol mg/dl	169.5(96.5-243.3)	146.3-191.6	198.47(89.5-243)	196 .3- 218.2	0.00
HDL mg/dl	49.9(34.7-65.6)	43.13-51.7	46.49(38.6-16.7)	41.3-48.6	.N.S
Glucose mg/dl	93.9(72-113.5)	85.3-88.63	83.35(55.8-110)	75.4-88.6	.N.S

BMI = body mass index, HDL-C= high density lipoprotein cholesterol, Significant difference between obese male and control female subjects $p \leq 0.05$

Table (4) Correlation coefficients of age, leptin, HDL, Triglyceride, Cholesterol and BMI in obese males and females

Parameters	**Leptin**	**Cholesterol**	**Triglyceride**	**HDL**	**BMI**	**Age**
Leptin	1.00	-0.029	-0.059	0.205*	0.710**	0.361**
Cholesterol	-0.029	1.00	0.285**	0.204**	-0.043	0.338**
Triglyceride	-0.059	0.285**	1.00	-0.410**	0.041	- 0.201**
HDL	0.205*	0.204**	0.140**	1.00	-0.038	0.244**
BMI	0.710**	-0.043	0.041	-0.038	1.00	0.722
Age	-0.361**	0.338**	-0.201**	0.244**	0.722	1.00

Significant difference: *p <0.05,**p<0.01

هرمون اللبتين ، الدهون الثلاثية ، الكولسترول و البروتينات الدهنيه عالية الكثافة في مصل دم البدناء غير المصابين بالسكر

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الخلاصة

تم التحري في هذه الدراسة عن العلاقة بين هرمون اللبتين ، مؤشر كتلة الجسم (BMI) ، الدهون الثلاثية ، الكولسترول فضلآ عن البروتينات الدهنية عالية الكثافة لدى البدناء غير المصابين بمرض السكر مقارنة بالأصحاء. شملت الدراسة 36 شخصآ من البدناء العراقيين ذكورا و إناثا لهم معدل عمر 50,1 : 43,3 سنة على التوالي و 23 عينة للأصحاء. قيس تركيز هرمون اللبتين و نسبة الدهون وشملت الكولسترول ،و الدهون الثلاثية، و البروتينات الدهنيه عالية الكثافة ، لوحظ وجود فرق معنوي وزيادة بتركيز هرمون اللبتين ، البروتينات الدهنيه عالية الكثافة،و الكولسترول، و الدهون الثلاثية فضلآ عنBMI عند عينات الدراسة للبدناء الذكور و الإناث مقارنة بالأصحاء، لكن لم يلاحظ وجود فرق معنوي للبروتينات الدهنية عالية الكثافة، و BMI عند المقارنة بين البدناء الذكور مع البدناء من الإناث . كما وجد فرق معنوي ايجابي قليل في العلاقة بين هرمون اللبتين و البروتينات الدهنيه عالية الكثافة بينما لم يلاحظ فرق معنوي بين هرمون البتين و بقية أنواع الدهون . من تلك النتائج وجد أن هرمون اللبتين كان بمستوى عال عند الأشخاص البدناء مقارنة بالأصحاء ولم يكن له تأثير ملحوظ في التكوين الأيضي للدهون.

الكلمات المفتاحية : هرمون اللبتين , البدانة , الدهون

Age