

Evaluation of Serum Leptin Level in Males with Elevated Blood Pressure

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Abstract: Leptin is a hormone secreted from adipose tissue, proved to be related to inflammatory, hemostatic, and metabolic factors, and thought to be involved in the development of hypertension. We aim to evaluate serum leptin levels and lipid profile in males with elevated blood pressure to be compared with healthy controls males of matched body mass index (BMI) and age. The present study were included 50 subject, 24 healthy controls males whose BMI (Mean±SD 27.6±4.9) as control group and 26 hypertensive males with essential hypertension whose BMI (Mean±SD 28.3±3.4), those two groups were aged and BMI matched Fasting serum leptin level, triglyceride (TG), total serum cholesterol, high density lipoprotein(HDL) and low density lipoprotein(LDL) were measured. Leptin was found to be significantly higher in the hypertensive males (group2) when compared with the control group (group1) (21.5±2.3ng/ml against 14.3±1.4 ng/ml, respectively; $p<0.03$), while a very high significant difference in triglyceride, systolic and diastolic blood pressure ($p<0.0001$) and a significant difference in cholesterol was ($p 0.01$), LDL was ($p<0.01$) and HDLwas ($p<0.05$). The present study concluded that male patients with elevated blood pressure had significantly higher serum leptin level compared with healthy subjects of a same BMI. More over patients with hypertension had an unfavorable lipid profile.

Keywords: Leptin, Obesity, BMI, Hypertension, Lipid profile

Introduction

Until 1994 adipose tissues considered to be an energy storing organ only in the form of lipids, but in the recent years, it has been recognized as a major endocrine organ as it is produce many hormones called adipocytokines like leptin hormone, estrogen, resistin, Adiponectin, interleukin-6 (IL-6), tumor necrosis factor-alpha (TNF α) and others (Henry *et al.*, 2012, Buck *et al.*, 2019).

Leptin is a 167 amino acid hormone acts on a receptors in the hypothalamus to control energy balance by inhibiting hunger, increasing energy expenditure and elevating temperature, in addition, Leptin, may play an important role in cardiovascular and renal regulation. Leptin hormone initially was concenter to be an anti-obesity hormone, due to its many metabolic effects (Yonis and Al-doski 2013, Ghanem *et al.*, 2019).

However, obese peoples, for unknown causes become resistant to the weight-reducing and satiety effect of leptin hormone, in similar way that patients with diabetes mellitus type 2 (DM type2) develop resistance to the effects of insulin hormone, but preserve leptin-mediated sympathetic activation to non-thermogenic tissue such as the heart, the kidneys, and the adrenal glands so it is playing a role in physiological processes of the blood vessel tone, renal hemodynamics, and blood pressure (Vinelá *et al.*, 2017).

Cardiovascular diseases and hypertension represent the most common health complication in obese individuals, over one billion individuals affected by hypertension worldwide and estimated to reach up to 1.56 billion by the year 2025. (Faulkner and Chantemèle 2018), recently there is a believe that the central nervous system may play a critical role, through the action of leptin hormone, in linking obesity with hypertension (Henry *et al.*, 2012).

In fact, obesity accounts for about 65–75% of the essential hypertension (essential hypertension mean elevated blood pressure with unknown secondary cause while secondary hypertension result from underlying diseases for example renal failer). So it is very important to understanding the exact mechanisms of obesity-induced essential hypertension in order to reduce the cardiovascular disease (Bell and Rahmouni 2016).

Material and Method

The present study was conducted in Mosul city during the period from the 5th of April 2019 to the 10th of September 2019. The 50 participants of this study were classified into 2 groups:

1. Group(1): 24 healthy controls males whose BMI (Mean±SD 27.6±4.9), age(Mean±SD 39.6±9.5) as control group
 2. Group(2): 26 hypertensive males with essential hypertension whose BMI (Mean±SD 28.3±3.4),age(Mean±SD38.8±9.8).
- Those two groups were aged and BMI matched.

Informed consent was obtained from all patients. Five ml of venous blood have been collected after an overnight fasting, the serum obtained was divided equally in to two aliquots and kept frozen at -20 °C for analysis of lipid profile and leptin weekly .

Leptin hormone was measured in Serum using (ELISA) enzyme linked immunosorbent assay technique, the DRG (Germany) leptin ELISA Kit used which is an immunoassay for in vitro diagnostic measurement of leptin hormone in plasma and serum.

The serum lipid profile was measured by cobas c111 system.

LDL- c was calculated by using Friedewald mathematical equation

$$\text{LDL-C (mg/d)} = \text{Tc} - \text{HDL-C} - \frac{\text{TG}}{5}$$

The data of the current study was analyzed using statistical package for social sciences (SPSS) (version 11.5). The values was expressed as Mean± standard deviation (SD) and P value of a(≤0.05) was considered to be of a statistically significant.

The diastolic and systolic blood pressures were assisted using a mercury sphygmomanometer, a 3 measurements were taken for systolic and diastolic pressures. Patients were considered to be hypertensive if the systolic blood pressure was ≥140 mm Hg and/or the diastolic blood pressure was ≥90 mm Hg. (Kario *et al.*, 2019).

Results

There was a very high significant difference in triglyceride, systolic and diastolic blood pressure (p <0.0001), a significant difference in LDL(p<0.01), cholesterol(p 0.01), leptin (p<0.03) and HDL(p<0.05).

Biochemical parameters	Healthy control male	Hypertensive male	P-value
	Mean±SD	Mean±SD	
Age	39.6±9.5	38.8±9.8	NS
BMI	27.6±4.9	28.3±3.4	NS
Leptin	14.3±1.4	21.5±2.3	<0.03
Systolic Bp	116±4	146±1	<0.0001
Diastolic Bp	69±2	89±2	<0.0001
TC	160.4±29.3	183.2±47.3	0.01
HDL-c	41.0±10.3	36.0±11.9	<0.05
LDL-c	90.8±24.8	112.1±39.4	<0.01
TG	89.8±58.3	166.2±93.5	<0.0001

Significant at p-value ≤ 0.05

Discussion

Many studies in obese people as well as animal showed close relationship between obesity and hypertension. The elevated level of serum leptin hormone in combined with selective leptin resistance in obese individuals have emerged as potential mechanisms driving sympathetic activation and elevated blood pressure in obesity (Schutte *et al.*, 2005, Bell and Rahmouni 2016)

In the present study leptin was found to be significantly higher in the hypertensive males when compared to a healthy control group of a same BMI.

This finding is in line with those reported by other investigators (Golan *et al.*, 2002; Canatan *et al.*, 2004) also reported higher leptin hormone levels in hypertensive obese compared with normotensive obese subjects, even after controlling of body mass index (BMI) and age.

The same result was reported by Shankar *et al.*, whose found that higher plasma leptin hormone levels were positively associated with hypertension after adjusting for sex, age, alcohol intake, smoking and body mass index (BMI). They conclude that higher plasma leptin hormone levels are associated with hypertension both among men as well as women in a representative sample of United State adults. (Shankar *et al.*, 2010)

Hazimi and Syiamic (2004), conclude that serum leptin hormone and angiotensin II hormone levels were a strong predictor of elevated blood pressure in obese females.

In disagreement of these data, a study of El-Gharbawy *et al.*, they found that leptin level in African Americans individuals has no significant relationship with blood pressure even after adjusted for obesity (El-Gharbawy *et al.*, 2002).

The present study showed a very high significant difference in triglyceride, and a significant difference in cholesterol, LDL, higher in hypertensive males and significant lower HDL in those patients when compared with the healthy males.

This bad lipid profile finding is in agreement with Nayak *et al.*,(2016) study which showed a significantly raised in total serum cholesterol, triacylglycerol(TG), Low Density Lipoprotein cholesterol(LDL-C), Very Low-Density Lipoprotein (VLDL), in the hypertensive patients when compared to the control group whereas serum High-Density Lipoprotein cholesterol (HDL-C) registered a fall in the hypertensive patients.

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