Evaluation of Serum Leptin, Interlukein–6 and some Biochemical Parameters in Iraq obese Adult Patients

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Abstract

Objective: The current study conducted for evaluating serum level of interleukin-6 and leptin (IL- 6) among Iraqi obese adult people and other biochemical parameters related with obesity. **Methods:** Leptin and IL-6 Levels were assessed in serum samples from 43 Iraqi obese adults and 30 non-obese healthy subjects. **Results:** Significant elevation ($p<0.05$) in $S.Ca^{+}$ levels for obese females as compared to obese males and there is high decrease of significant ($p<0.0001$) in the $S. Ca^{+}$ level for obese male as compared to control male. The liver function enzymes S. GOT S. GPT levels showed significant elevation ($p<0.0001$ and $p<0.01$) in obese female in comparison to their control and a significant elevation appeared at level of cholesterol for both ($p<0.001$ in male) and ($p<0.01$ in female), S LDL $p<0.05$ for obese male and HDL $p<0.0001$ in obese female. Finally, High positive correlation ($p<0.01$) between serum leptin levels for obese subjects and their BMI. Also, IL-6 revealed strong positive correlation ($p<0.01$) with S. TRIG and S. VLDL. Whereas, S.CREAT was positive association at level ($p<0.05$). **Conclusions:** The data revealed effect the obesity in different human body function, liver enzyme, lipid profile and leptin in adult's male in different criteria according to the gender. As well as, the positive correlation between IL-6 with (S. CREAT, S. TRIG and S. VLDL) and leptin with BMI. Increased creatinine related with presence of inflammation or injury to the kidney, which was evidenced by the presence of a positive correlation with IL-6. Obesity effects on lipid profile and liver enzyme and leptin due to the sex hormone differences.

Keywords: *Leptin, IL-6 and obesity; health, toxicity; patients.*

Introduction

Obesity considered as accumulation of fat in body of human more than needed for the ordinary body functions. Weight gain is a result of accumulation as continue. Obesity had been considered a disease related with behavior, inadequate food intake coupled with relative inactivity. [1]

The body mass index (BMI) is correlated to body fat, and varies with age and sex in children more than it does in adults.[2] There are many risk associated with obesity, metabolic diseases and cardiovascular (CV). [3] Obesity affect on various substance levels produced by adipose tissues i.e. adiponectin, chemokines leptin, factor of tumor necrosis (TNF) and IL-6,.[4] Polypeptide hormone (leptin) is primarily produced and secreted via white adipocyte into the circulation [5]. Correlation as strong exist between mass of body fat and produced and secreted leptin amounts.[6] It is defined as hormone of anti-obesity. Leptin was discovered in 1994[7] as an adipocytokine regulator of body weight, food intake, fat mass, and an important regulator of the immune and neuroendocrine systems. Researchers found a role of crucial in hormonal metabolism and regulation.[8]

Also, adipocytes produced IL-6 an endogenous chemical which is active in inflammation, and in B cell maturation. One-third of total circulating levels are expressed predominantly by adipocytes. Also expressed in macrophages, endothelial cells, skeletal muscle, and fibroblasts.[9] Increase inflammatory mediators, such as C-reactive protein (CRP) and IL-6 in the plasma increases the risk of atherosclerotic complications and acute myocardial infarction.[10] IL-6 is also able to

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influence hormonal balance and some endocrinological abnormalities. It is suggested, that IL-6 may affect the increase of free fatty acids level, and cause lipid abnormalities.[11]

The current study conducted for evaluating serum level of interleukin-6 and leptin (IL- 6) among Iraqi obese adult people and other biochemical parameters related with obesity.

Patients and Methods

The study was carried out at Alkindy Medical College (Obesity Research and Treatment Unit). During the period January 2017 – July 2017, 43 obese (18 male and 25 female) were referred to the Unit, their age rang 16 – 63 years old. A clinical examination and diagnosis were done for each patient by the consultant medical staff and the biochemical laboratory examination results (FBS, blood urea, serum creatinine, lipid profile, serum GOT, serum GPT, serum calcium and uric acid) were as a routine work. They compared with 30 healthy adults (15 male and 15 female) with approximate age with patients.

Laboratory methods

Serum isolated from five milliliters vinous blood for each participant. The sera were assessed for IL-6 and leptin by an ELISA kit (Elabscience, USA). The instructions of manufacturer were followed to assess the two variables.

Statistical Analysis

The results were assessed in a data sheet of SPSS version 20, which was utilized to carry out analysis. The significant differences mean ± SD were assessed by Kruskal-Wallis, Mann-Whitney and Independent-Samples T test and. The correlation between IL-6, leptin and other biochemical parameters were estimated by Person's correlation. A probability **(*P*) value** <0.05 considered as significant.

Results

Results showed no differences of significant among obese females and males in all parameters except for S. Ca^{+} level which revealed a significant elevation in obese female ($p<0.05$) as compared to the control female Figure 1.

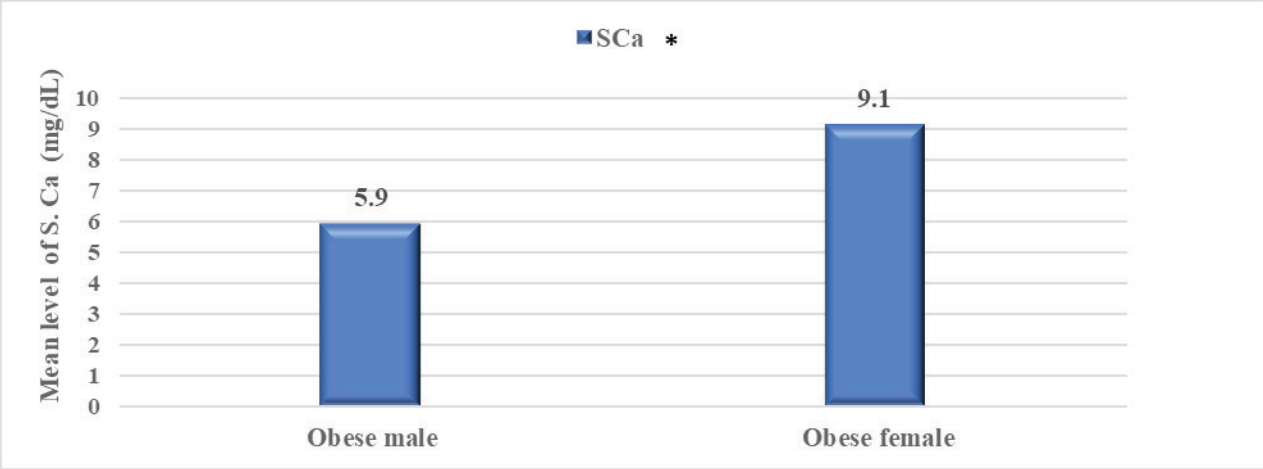

Figure 1. Serum Calcium (S. Ca) means levels in Obese male *vs*. obese female (*P < 0.05)

The biochemical parameters involve renal function tests were assessed and there was highly significant decrease ($p<0.0001$) in S. Ca^{+} level for obese male as compared to control male Figure 2A. Whereas no significant differences have been observed in any of these parameters with female studied groups Figure 2B.

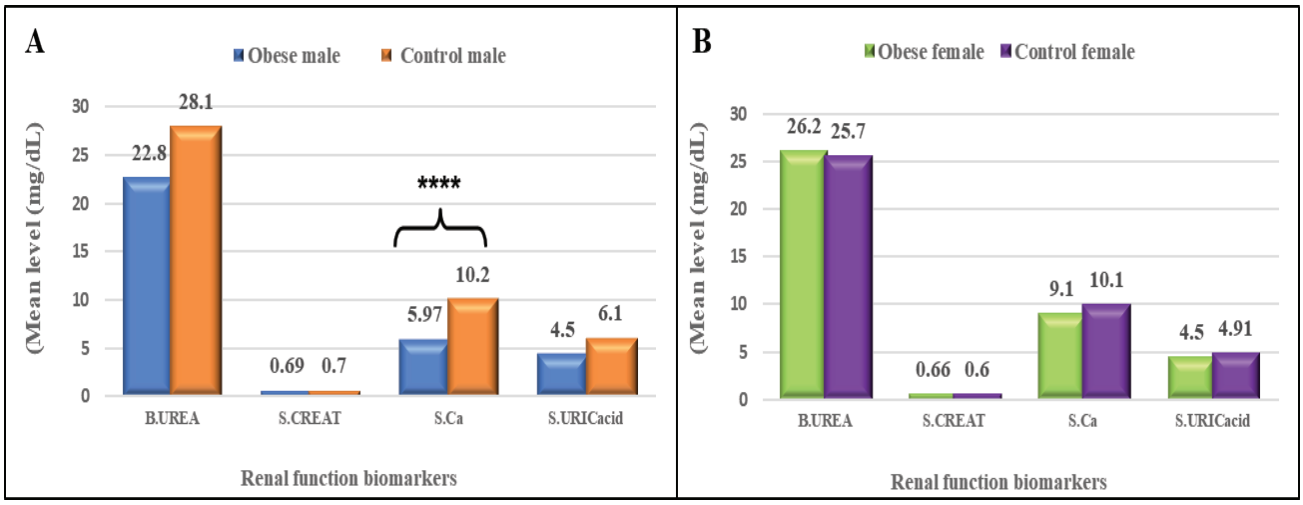

Figure 2. Renal function biomarker in obese male and female *vs.* their control (**P < 0.0001)**

Lipid profile analysis appeared significantly increase in cholesterol ($p<0.001$ and $p<0.01$) for obese male and female respectively Figure 3. Also, S. LDL elevated significantly in obese male ($p<0.05$) Figure 3A. Whereas, in obese female the significant elevation ($p<0.0001$) was in S. HDL Figure 3B.

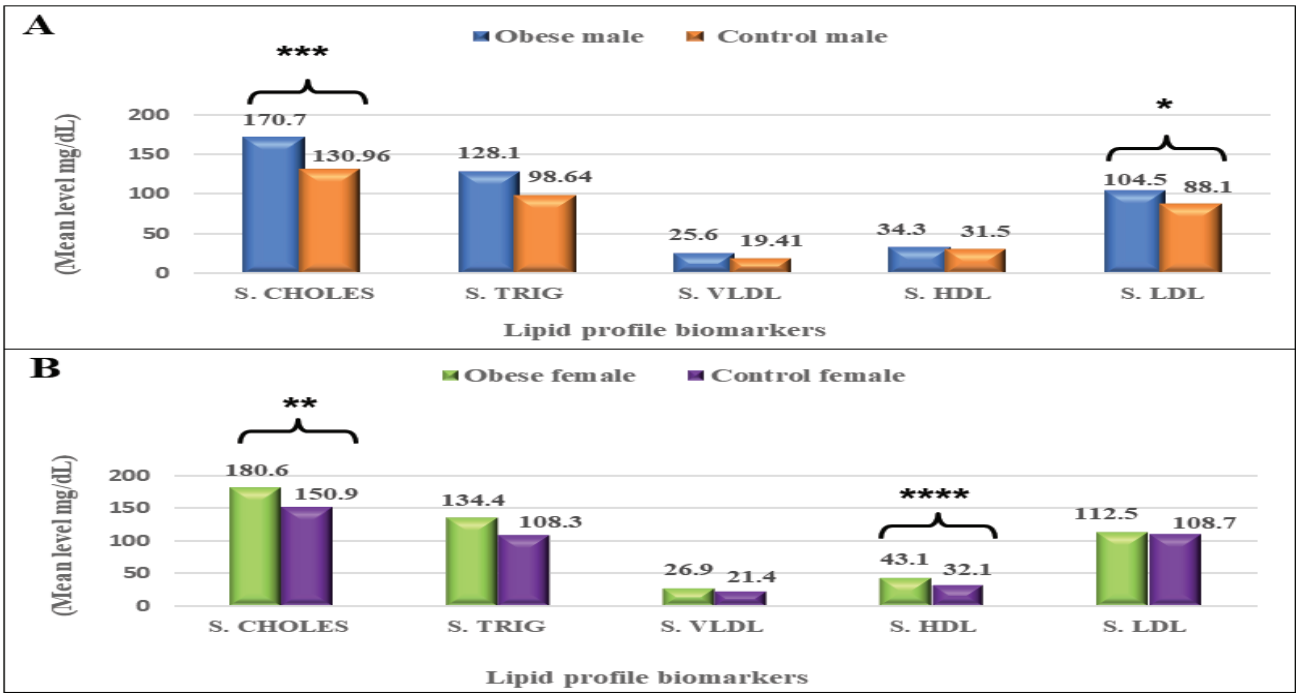

Figure 3. lipid profile (S. CHOLES., serum cholesterol; S. TRIG serum triglyceride; S. VLDL, serum very low-density lipoproteins; S. HDL, serum high-density lipoproteins; S. LDL, serum low-density lipoproteins) in Obese male and female *vs* their control.(*P < 0.05, **P < 0.01, ***P < 0.001, ****P < 0.0001)

No differences significant for the two cytokines were observed among obese females and males as compared to their controls, only leptin revealed a significant elevation ($p<0.01$) in obese male as compare to control subjects Figure 4A.

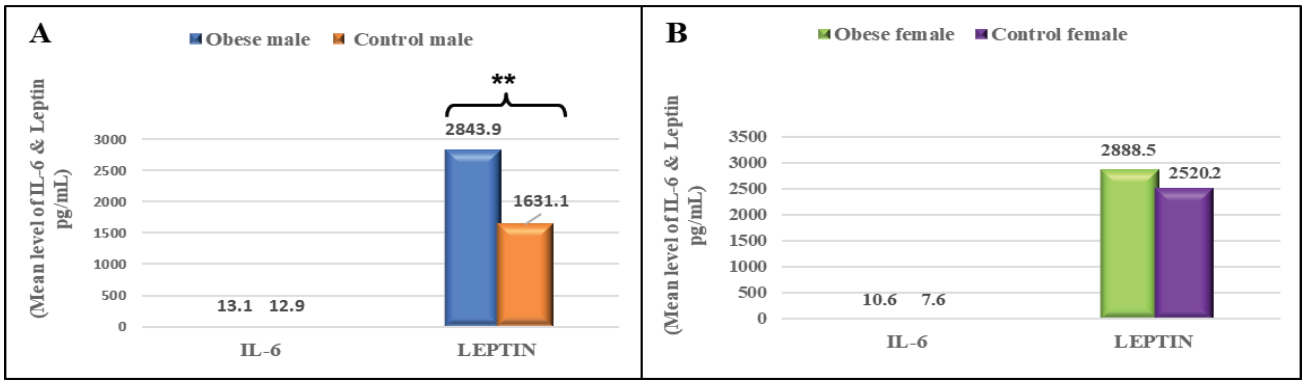

Figure 4. Leptin and IL-6 in obese females and males *vs* their control (P < 0.01)**

The IL-6 and Leptin correlation were assessed and the results showed strong positive association p<0.01 between levels of serum IL-6 for obese individuals and (S. TRIG and S. VLDL) and S. CREAT p<0.05. The only positive correlation of Leptin was p<0.01 with BMI.

Discussion

The present study, showed significant elevation in S. Ca^{+} level in obese females than obese males Figure (1). This is consistent with the study that showed the obesity induces the production of inflammatory cytokines which stimulates bone absorption by osteoclasts that might subsequently lead to a higher serum calcium level in obese people.[12] Another study by.[13] reported that an obesity gene expressed in human adipocytes and the protein produced by this gene stimulates calcium influx and promotes energy storage in human adipocytes by stimulating the expression and activation of fatty acid synthase and inhibiting lipolysis. We also believe that parathyroid hormones (PTH) has effective role in increasing level of calcium in obese people especially females this consistent that PTH of serum is increased abnormally in obese individuals.[14]

In regard to renal functions, no significant differences have been observed between obese subjects and their control except decrease S. Ca^{+} level in obese male as compared to control (Figure 2A). Inverse studies revealed high levels of Ca in blood circulation. The Intracellular calcium which is regulated by calciotropic hormones, which in adipocytes, consequently stimulates high intracellular Ca levels. In adipocytes, Ca high levels cause lipogenesis stimulation and lipolysis inhibition.[12] Others reported that hypercalcemia is associated with vitamin D deficiency in the obese individual.[14] The differences in results may due to the small sample size of obese male.

The increasing in enzyme levels of GOT and GPT were statically significant in obese female but not in obese male when compared with their control Figure 3. Similarly the two enzymes were elevated significantly in obese females having syndrome of polycystic ovary.[15] Inversely, study in Hilla-Iraq population have been indicated no significant differences GOT and GPT in obese and normal individuals.[16], which is consistent with results of obese male Figure 3A.

A significant increment appeared in the level of cholesterol in obese patients for both gender male and in female, S. LDL for obese male as compared to control male Figure 3A and a significant increment appeared in the level of S. HDL for obese female Figure 3B. Other lipid profile parameters ware elevated but statically not significant Figure 3.

The lipids abnormality in obese patients have been diagnosed by[17] including elevated VLDL, non-HDL cholesterol, serum triglyceride, and apolipoprotein B levels. S. TRIG increasing is because of increasing production of hepatic for particles of VLDL and a decline in TRIG rich lipoproteins clearance. Levels of HDL cholesterol are normally low and are linked to the increase in triglycerides of serum. Levels of LDL cholesterol are in range of normal frequently while there is an elevation in small dense LDL.

The different results between genders may depend on the location of the fat tissue in human body, which effect in lipid metabolism. Visceral, subcutaneous, and trunk

(especially upper one) adipose tissue are linked to higher levels of triglycerides and lower ones of HDL cholesterol. In contrast, accumulation fats in subcutaneous tissue is associated with lower triglycerides. The protective effect of leg fat may explain why women and African-Americans have lower triglycerides.[18],[19] Our idea is factors of environmental i.e. activity as physical and factors of dietary influence levels of lipids.[20]

From the results of the present study, level of leptin for obese male appeared highly significant elevated Figure 5A and was non-significant in obese female Figure 4B. In agreement with our results leptin significantly was higher in male and has a significant positive correlation with BMI.[21] Whereas, study in obese men displayed that leptin levels and percentage body fat correlate positively, and obese men therefore have elevated in serum leptin levels.[22] The abnormal accumulation of adipose tissue will cause change and increment in leptin level.[23] Inverse results regarding to the obese women, Study in Pakistan revealed significant increase of leptin in obese female than in obese male. [24] Jenks MZ *et al.* demonstrated that 17β-estradiol increased the abundance of transcript leptin and increase secreted leptin in murine adipocytes.[25] Variation in circulating estradiol concentrations may have an influence on circulating leptin in female subjects.[26] The increased concentration of serum leptin are significantly associated with obesity in postmenopausal women. [27] Hormones of sex are associated significantly along adiposity, and the androgens associations qualitatively vary according to sex. Heterogeneity might help explaining the sex hormones contribution complexity to differences in sex in cardio-obesity.[28]

IL-6 level was statically not significant in our data. Contrary to many studies, augmentation of TNF-α and IL-6 levels is more in obese than in nonobese diabetics patients.[29] Circulating levels of IL-6 and leptin were significantly increased in obese patients than in controls. [30] A significant increment have been observed of IL-6 expression in obese subcutaneous adipose tissue biopsies when compare with lean individual.[31] The controversial results my due to IL-6 secretion is regulated via many pathologic or physiologic factors: cytokines, hormones, diet, stress, hypoxia, physical activity, and others. [32]

Finally, there was highly positive correlation between IL-6, S. TRIG and S. VLDL and the level of IL-6 in obese were similar to healthy controls subjects. Many studies revealed Overproduced IL-6 minimized levels of blood lipid via elevating VLDLR expression in different tissues. They concluded that blockade of IL-6 normalizes levels of reduced lipid due to IL6, but does not influence metabolism of normal lipid.[33]

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq

Conflict of Interest: Non

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