

Estimation Level of Leptin and Resistin in Sera Patients with Type Two Diabetes among Iraqi Peoples

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Abstract

Leptin it is a protein hormone containing 167 amino acids, firstly discovered in 1994 by Jeffrey M. Friedman, It is secreted by adipocytes and has been found to regulate food intakes through central neuroendocrine mechanisms. Resistin has been found to be generated and released via adipose tissue to serve endocrine functions which are likely to be associated with insulin resistance.

Aim: The aim of this study determination of leptin and resistin hormone level in serum of male and female with type 2 diabetic patients and healthy control in Iraq.

Subject and Method: This respective study carried out at three main medical facilities in Baghdad; National Center For Teaching Laboratories, Poisoning Consultation Center/Specialized Surgeries Hospital and the National Blood Transfusion center in Medical City,Iraq during the period from November 2019 to February 2020. It was included 100 participants; divided into 2 groups(50 patient with type 2 diabetes and 50 healthy control).

Results: The result of serum leptin showed that there was highly significant difference when comparing the mean of total serum leptin of patient group with that of the control group. While the mean of total circulating resistin in T2DM patient and healthy with no significant difference between the two groups.

Conclusion: Increased serum leptin level in type 2 diabetes patient than healthy control and no significant difference in serum resistin level when compared between diabetics and control

Keywords: Type Two diabetes, Leptin, Resistin.

Introduction

Diabetes is a complex, chronic disorder requiring continuous medical care¹. It is a serious, long-lasting or chronic disorder that occurs when there are raised levels of glucose in a person's blood because their body cannot produce any or enough insulin, or cannot effectively use the insulin it produces. Insulin is an essential hormone produced by the beta cells in the islets of Langerhans in the pancreas. It allows glucose from the bloodstream to enter the body's cells where that glucose is converted into energy. The main function of this hormone is to lower the level of glucose in the blood by promoting the uptake of glucose by the adipose tissue and skeletal

muscle, known as glycogenesis². Ultimately to the homeostasis of glucose which leads to complications like retinopathy, atherosclerosis, cardiovascular diseases, nephropathy and peripheral neuropathy. Type II diabetes usually affects people aged over 40 years.³ This metabolic disorder is characterized by target tissue resistance to insulin, It is epidemic in industrialized societies, and is strongly associated with obesity, Thus obesity is generally considered to be a strong risk factor for the later development of T2DM, and at times, they frequently occur together. Statistics show that 60%–90% of all patients with T2DM are or have been obese⁴ Leptin originates from of the Greek root leptos, meaning

‘thin’⁵. Leptin is predominantly derived from white adipose tissue and released as a 16 kilo Dalton [kDa] Non-glycosylated protein with LEP encoding gene, also referred LEP gene in human. Leptin binds to its receptor (LEPR) expressed in the central nervous system and peripheral tissues and performs its biological acts^{5,6}. Generally, hyperleptinemia has been linked with T2DM, insulin resistance and complications of the vascular diabetes. Antidiabetic medicine can reduce leptin levels including sitagliptin, metformin, pioglitazone and liraglutide⁷. Resistin is a putative adipocyte-derived signaling of polypeptides hormone (ADSF) the Molecular weight is 12.5kDa, with a length of 108 amino acids That is generated and released into the bloodstream from white adipose tissue, primarily by macrophages in human Resistin functions as the pathogenic factor which results in insulin resistance by antagonizing the action of insulin, thus raising gluconeogenesis and impairing the absorption of hepatic glucose⁹⁻¹¹.

Subjects and Method

This respective study was carried out at three main medical facilities in Baghdad; National Center For Teaching Laboratories, Poisoning Consultation Center/ Specialized Surgeries Hospital and the National Blood Transfusion center in Medical City, Iraq during the period from November 2019 to February 2020. It included 100 participants; divided into 2 groups (50 patient with type 2 diabetes and 50 healthy control) and 2 subgroups. The type 2 diabetic patient group were subdivided

into (25 male, 25 female) with age (30-65) and healthy control group subgroup (25 male, 25 female) with age (29_65). All the information about each individual in the above groups including data about their age, height, weight, cigarette smoking, family history, duration of disease, habit and medication were collected by filling a questionnaire case sheet for each patient. Statistical Analysis: Data was conducted by using SPSS program (Statistical Package For Social Science) version 24.

Method

Leptin and resistin was estimated by using ELISA (Enzyme linked immunosorbent assay) Kit from SHANGHAI YEHUA Biological Technology, HbA1c was estimated for each type 2 diabetic patient (T2DM) and healthy control by using Arkray Adam HA-8160 HbA1c is a fully automated analyser is used for estimation that uses high performance liquid chromatography (HPLC) cation exchange method.¹²

Results

The study included 50 Males and 50 females were included in this study. The age range for patients and control groups was (30-65) and (29-65) years respectively as show in table(1-1). The Mean± Std. of glycated hemoglobin (HbA1c %) for patients and control . The mean for patient was highly significantly higher than that of the control group (7.83±1.36% and 5.47±0.234 % respectively) as shown in table (1-2).

Table (1): Distribution of patients and control according to Age

	Male		Female		Total	
	Range	Mean± Std.	Range	Mean± Std.	Range	Mean± Std.
Patients	32-64	48.28±10.17	30-65	40.60±9.51	30-65	49.40±9.461
Control	29-65	39.44±9.87	29-65	51.28±8.86	29-65	40.30±8.87

Table (2): Comparison between Studied Groups according to HbA1C percent

	Study Groups	Mean± Std.	t-test	P-Value	C.S
HbA1C%	Study	7.83±1.36	12.092	.000	P<0.01 (HS)
	Control	5.47±0.234			

The result of serum leptin level summarized in the table (1-2) and figure (1-1) showed that there was highly significant difference when comparing the mean of total serum leptin of patient group (44.48±12.41ng/

ml) with that of the control group (38.75±7.61ng/ml). While there was no significant difference between males and females of the control group in mean serum leptin level (36.982±6.705 and 40.522±8.169 respectively),

but there was significant difference among male and female patients ($P < 0.05$). And the results in table (1-3) and figure (1-2) showed the mean of total circulating resistin in T2DM patient and healthy control (10.18 ± 3.87 and 9.71 ± 2.02 ng/ml respectively) with no significant difference between the two groups. Furthermore,

there was no significant difference between (male and female patients (9.208 ± 3.632 and 11.1520 ± 3.933 ng/ml respectively). Similarly, no significant difference in circulating resistin between male and female control ($P > 0.05$).¹³

Table (3): Comparison in Leptin level among study groups and Gender

Leptin (ng/ml)	Total (Mean± Std.) ng/ml	Male (Mean± Std.) ng/ml	Female (Mean± Std.) ng/ml	t-test	P-Value	C.S
Control	38.75±7.61	36.982±6.705	40.522±8.169	1.975	.100	$P > 0.05$ (NS)
Study	44.48±12.41	40.720±12.765	48.237±11.039	2.227	.031	$P < 0.05$ (S)
t-test	2.782	1.296	2.809			
P-Value	.006	.201	.007			
C.S	$P < 0.01$ (HS)	$P > 0.05$ (NS)	$P < 0.01$ (HS)			

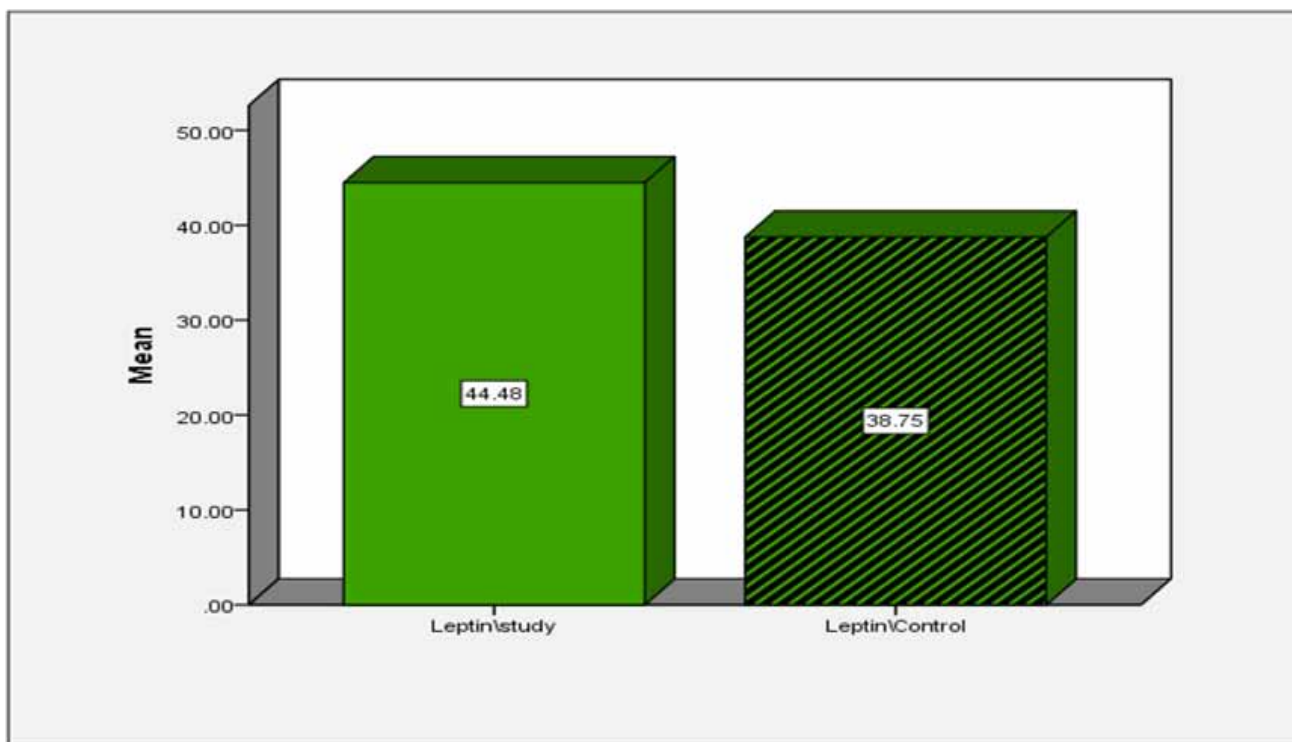


Fig. (1-1): Mean Value of Leptin among study groups

Table (4): Comparison between studied Groups and Gender according to serum resistin

	Total (Mean± Std.) ng/ml	Male (Mean± Std.) ng/ml	Female (Mean± Std.) ng/ml	t-test	P-Value	C.S
Control	9.71±2.02	9.924±1.805	9.504±2.236	0.731	.468	$P > 0.05$ (NS)
Patient	10.18±3.87	9.208±3.632	11.1520±3.933	1.816	.076	$P > 0.05$ (NS)
t-test	0.768	0.883	1.821			
P-Value	.446	.203	.075			
C.S	$P > 0.05$ (NS)	$P > 0.05$ (NS)	$P > 0.05$ (NS)			

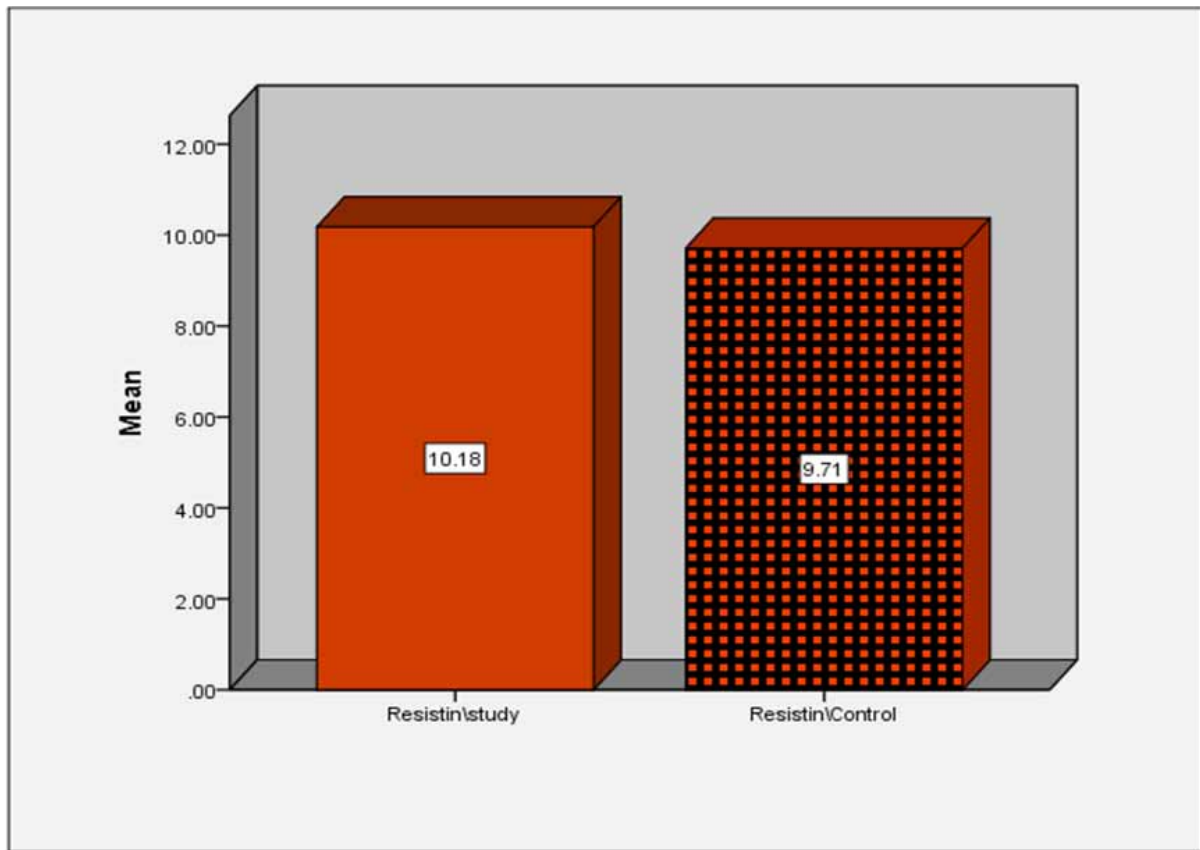


Fig. (1-2): Mean Value of Resistin among groups

Discussion

HbA1c analysis in the blood provides proof of the average blood glucose levels through the previous 2 to 3 months, which is estimated half-life of red blood cells (RBCs). HbA1c provides a most reliable measure of chronic glycemia and is well associated with the risk of long term complications of diabetes, so it is widely considered the test of choice for chronic diabetes management and monitoring¹⁴.

The association between leptin and diabetes mellitus in humans was examined in few studies. But Leptin is an essential hormone derived from adipose tissue which has been shown to be involved in patho-physiological processes relating to diabetes. This study is consistent with Kumar, et al.,¹⁵ as the study found that the level of leptin is higher in diabetic patients compared to healthy subjects¹⁵. The human laboratory studies indicate levels of leptin are closely linked to body fatness. Serum leptin is reportedly a good biomarker of obesity. Thus, body fat can mediate an association between serum leptin and diabetes mellitus¹⁶.

Another study was agreement with these finding Gupta & Mukherjee., who was reported that the level of serum leptin were significantly increase in diabetic patient when compared to healthy control¹⁷. In addition to that Osegbe, et al., found differences in the concentration of leptin levels, female with T2DM has higher serum leptin than healthy female and this compatible with our study¹⁸. Females with diabetes have a higher concentration of leptin compared to males, and this is consistent with Diwan, et al., study in India reported that the serum leptin levels in females were higher than in males. In addition, the serum leptin levels in diabetics were significantly higher than in nondiabetics¹⁹. On the other hand, we found that there was no difference in the level of leptin in males suffering from diabetes compared to healthy controls, and These result was compatible with Zamil.,2019 study in Iraq did not find any significant association in leptin concentration between male with T2DM and healthy control²⁰.

In present study there was no significant difference between type 2 diabetic patient and control . This study is in agreement with Zamil .2019 a study in Baghdad that

concluded that there is no difference in the concentration of resistin in patients with type 2 diabetes and among healthy subjects²⁰. The main biological effects of resistin are associated with increased blood glucose levels and obesity in some animal models, explained in part as a result of increased production of hepatic glucose²¹. Resistin is an adipokine that acts as a biomarker for inflammation and a mediator of insulin resistance linked to obesity²². Resistin in humans reduce insulin-stimulated glucose in the isolated adipocytes. The fundamental mechanisms these effects remain unclear while data aim to suppress resistin AMPK activity, primarily in the liver, due to cytokine stimulation-3 suppressor activation²³. These results are also in agreement with Pfützner, et al., No significant association was found between serum resistin levels and obesity and insulin resistant clinical measures²⁴. Bu et al. also found resistin levels in both the T2DM and the normoglycemic group had no relationship to insulin resistance²⁵.

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the National Blood Transfusion Center and all experiments were carried out in accordance with approved guidelines.

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