Sys Rev Pharm 2020;11(12):1729-1733
A multifaceted review journal in the field of pharmacy

Correlation Between Serum Asprosin Level And Oxidative Stress In Iraqi Patients With Type Ii Diabetes Mellitus

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Abstract

Background: Asprosin, a new protein hormone identifies by USA researcher team in 2016, secreted by the white adipose tissue. Asprosin induce releasing of hepatic glucose, its pathologically increased in insulin resistant, obesity and diabetic mellitus.

Method: Cross sectional study were carried out to evaluate the concentration of serum asprosin, glucose, Total antioxidant capacity-TAC, malondialdehyde –MDA, Glutathione-S-transferase-GST and HbA1c for 121 sample of patients with type II diabetes mellitus (age between 25-45) collected from Specialized Center for Diabetes and Endocrinology / Baghdad-Alrasapha from 1/10/2019 to 20/12/2019. The groups of samples were divided into three groups, 1st group G1 include twenty four patients(12male and 12female) newly diagnose with type II diabetic mellitus without any treatment(new onset), 2nd group G2 include sixty nine(36male and 33female) patients with type II diabetic mellitus taken a treatment(old diagnostic cases) and twenty eight sample(12male and 16 female) for healthy individuals as control group-C.

Results: The results showed that the concentration of asprosin, glucose, HbA1c and MDA were significantly higher P≤0.05 in G2 as compared with control group, with no significant change P≤0.05 to the concentration of asprosin , glucose and MDA in G1 as compared with control group, while at the same group the concentration of HbA1c and GST significantly higher P≤0.05 comparing with C, The concentration of TAC significantly decreased P≤0.05 in G1 and G2 as comparing with control group.

Conclusion: The concentration of asprosin was increase in type II diabetic mellitus, this result associated with the complication of the disease.

Keywords: asprosin, total antioxidant capacity, diabetic mellitus, Glutathione-S-transferase.

INTRODUCTION

Glucose is a monosaccharide that provides energy for all the cells in human body, the regulation of blood glucose in human body carried out mainly by pancreatic hormones such as Insulin, glucagon, preptin, amylin and somatostatin and also by other hormones such as Growth hormone, Epinephrine, Cortisol and Glucocorticoids within narrow limit[1,2]. Asprosin also promotes glucose production by liver[3].

Asprosin, is a protein hormone contain 140 amino acid (~30 kDa), the C-terminal of hormone product from the protein(fibrillin1). Asprosin discovered in 2016, secreted by white adipose tissue-WAT that stimulate the hepatic glucose production during fasting, in which circulating asprosin increase in fasting state and decrease with re-feeding[4,5], while the pathological elevation positively correlated with insulin resistant, Polycystic ovary syndrome and also in some subject with type II diabetes mellitus-T2DM[6,7].

Diabetes mellitus-DM is one of the common metabolic disease characterize by a rise the circulating glucose concentration to more than the normal range(4.0-6.0)mmol/L[8], due to the insulin sensitivity or a lack in the insulin production[1,8], There are more than one types of the disease, the common types are type-I DM (juvenile diabetes or insulin-dependent diabetes) and type-II DM(adult-onset diabetes)[8]. Type-II diabetes mellitus mainly associated with insulin resistance-IR, in which IR attributed to obesity.

o the present study aimed to evaluate the correlation between serum asprosin level and oxidative stress in Iraqi patients with type II diabetes mellitus, as the first study in Iraq, in which the oxidative stress has been communicate as a known pathway in the pathogenesis of DM complications.

MATERIAL AND METHODS:

Study design: Cross-sectional study were carried out to 121 sample of patients with type II diabetes mellitus (age between 25-45) collected from Specialized Center for Diabetes and Endocrinology / Baghdad-Alrasapha from 1/10/2019 to 20/12/2019. The groups of samples were divided into three groups:

- First group G1 include twenty-four patients (12male and 12female) new-onset type II diabetes mellitus without any treatment.
-Second group G2 include sixty-nine (36male and 33female) patients with type II diabetic mellitus taken a treatment (old diagnostic cases).
-Control group-C include twenty-eight sample (12male and 16 female) for healthy individuals as control group-C.

The present study include determination the concentration of

serum asprosin, glucose, Total antioxidant capacity-TAC, malondialdehyde –MDA, Glutathione-S-transferase-GST and glycated hemoglobin-HbA1c in blood by using standard colorimetric methods for all parameters except for Asprosin which determined by enzyme linked immunosorbent assay-

ELISA.

Statistical analysis: The results obtained from the present study were analyze by using variance test-ANOVA the statistical program Minitab. Averages were compared to calculations of the characteristics of the application Duncan's Multiple Range Test by probability level ($P \leq 0.05$).

RESULTS:

The results obtained from this study were summarized in Table 1, which showed the Mean±SD of Glucose, HbA1c and asprosin concentration in sera of groups under investigation which G1 represent newly diagnose patients with type II diabetic mellitus without any treatment, G2 represent patients with type II diabetic mellitus taken a treatment (old diagnostic cases), and healthy individuals as control group.

Table 1. Mean±SD of Glucose, HbA1c and asprosin concentration

Parameters	Control	G_1	G_2
Glucose (mmol /L)	6.752±1.741[a]	7.768±2.873[a]	13.622±4.648[b]
HbA1c (mmol /L)	5.208±0.225[a]	7.312±1.713[b]	8.832±2.431[c]
Asprosin (ng /ml)	0.182±0.050[a]	0.170±0.048[a]	0.218±0.052[b]

Table 1 showed that the Mean±SD for glucose concentration were 7.768±2.873 mmol /L in sera of G1, 13.622±4.648mmol /L in sera of G2 and 6.752±1.741mmol /L in sera of control groups. The results indicate that the level of glucose significantly $P \leq 0.05$ increased in G2 as compared with G1 and C, with no significant change between G1 and C(Fig.1).

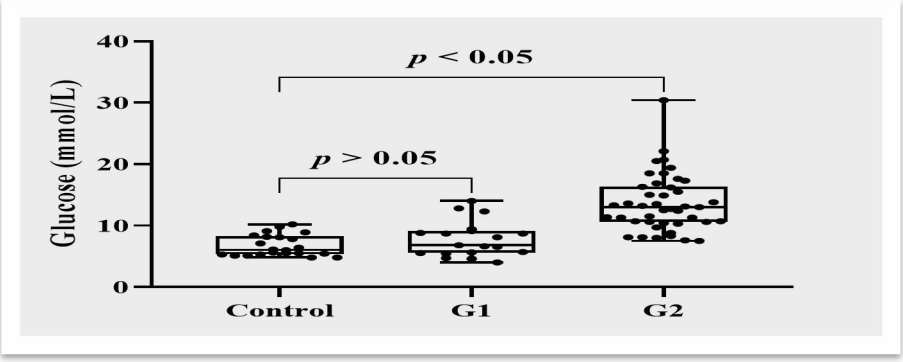


Figure 1. The concentration of serum glucose

The mean±SD of glycated hemoglobin were 7.312±1.713 mmol /L in blood of G1, 8.832±2.431mmol /L in blood of G2 and 5.208±0.225mmol /L in blood of control groups. The results indicate that the level of HbA1c significantly $P \leq 0.05$ increased in G1 and G2 as compared with control group, and also the level significantly elevated in G2 as compared with G1(Fig.2).

Figure 2. The concentration of HbA1c

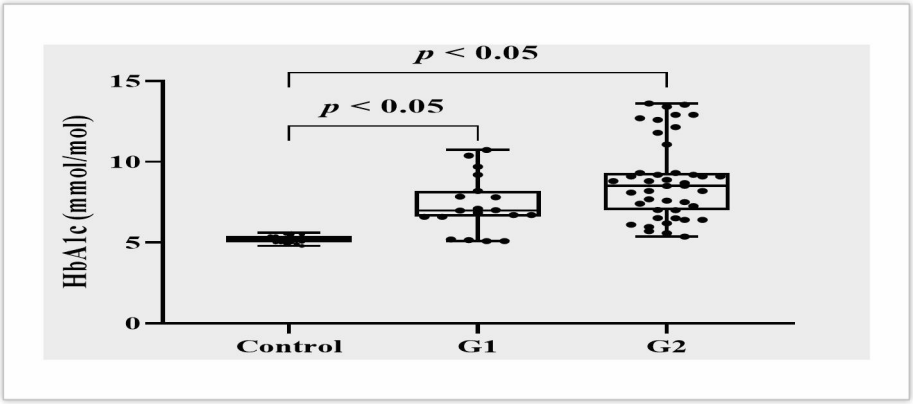


Table 1 also showed that the mean±SD of serum asprosin concentration was 0.170±0.048ng/ml in sera of patients in G1, 0.218±0.052ng/ml in sera of patients in G2 and 0.182±0.050ng/ml in sera of control group. The results indicate that the level of asprosin significantly $P \leq 0.05$ increased in G2 as compared with G1 and C, with no significant change between G1 and C(Fig.3).

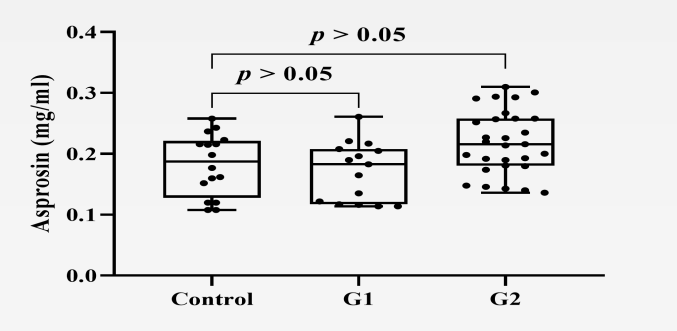


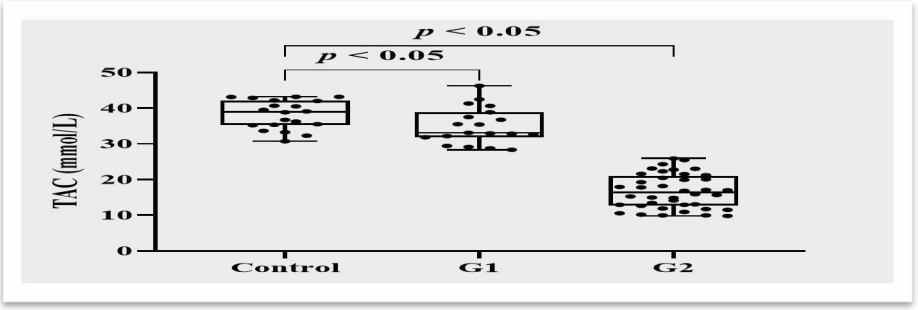
Figure 3. The concentration of serum asprosin

Table 2 summarized the mean±SD of serum TAC, MDA and GST activity in sera of groups under investigation. The table showed that the TAC concentration were 35.058±5.072 µmol / L in G1, 16.708±4.791 µmol / L in G2 and 38.218±4.012 µmol / L in sera of control group, While the level of MDA were 13.121±4.323 nmol / L in G1, and 19.303±4.991 nmol / L in G2 and 11.891±2.314 nmol / L for control group. The Mean±SD for GST activity were 62.566±15.974U/L in G1, 41.578±12.783U/L in G2 and 35.358±7.803U/L in control group.

Table 2. Mean±SD of TAC, MDA and GST concentration

Parameters	Control	G_1	G_2
TAC (µmol / L)	38.218±2.132[c]	35.058±3.763[b]	16.708±4.791[a]
MDA (nmol / L)	11.891±2.314[a]	13.121±4.323[a]	19.303±4.991[b]
GST (U / L)	35.358±7.803[a]	62.566±15.974[b]	41.578±12.783[a]

The results indicate that the level of TAC significantly $P \leq 0.05$ reduction in G1 and G2(especially in G2) as compared with control group, and also the level significantly reduction in G2 as compared with G1(Fig.4),otherwise the results indicate that the level of MDA significantly $P \leq 0.05$ increased in G2 as compared with G1 and C, with no significant change between G1 and C(Fig.5), and also the activity of GST significantly $P \leq 0.05$ increased in G1 as compared with Control and G2, with no significant change in G2,(Fig.6).



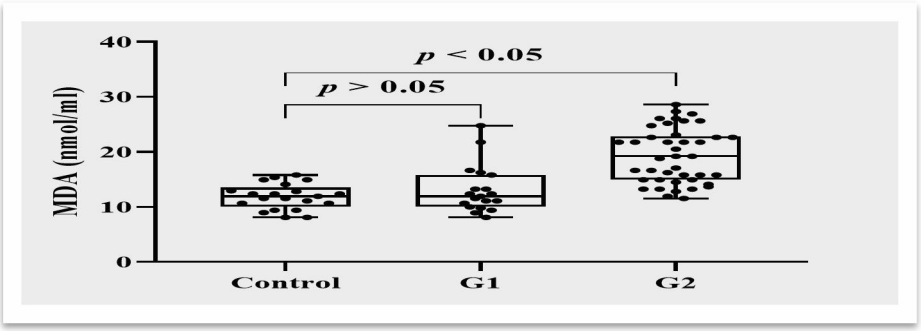


Figure 4. The concentration of serum TAC
Figure 5. The concentration of serum MDA

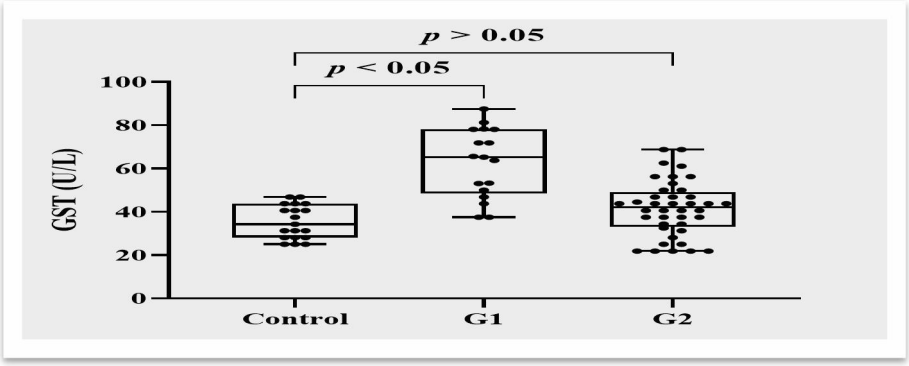


Figure 6. The activity of serum GST

The present study also evaluates the correlation between serum asprosin concentration and serum concentration of parameters under investigation (Glucose, HbA1c, TAAC, MDA and GST), Table 3 show this correlation.

Table 3. The correlation between serum asprosin with Glucose, HbA1c, TAAC, MDA, GST

Parameters	Asprosin (r)		
	Control	G_1	G_2
Glucose (mmol / L)	r= -0.361	r= -0.549*	r= -0.211
HbA1c (mmol / L)	r= 0.253	r= -0.543*	r= 0.010
TAC (µmol / L)	r= -0.019	r= 0.061	r= 0.037
MDA (nmol / L)	r= -0.088	r= 0.168	r= 0.035
GST (U / L)	r= -0.235	r= 0.393	r= -0.236

The results obtained from table 3 showed that the significant correlation between asprosin with glucose and HbA1c only in G1 (r=-0.549), (r= -0.543) respectively, and all other correlation were non-significant.

DISCUSSION:

Asprosin is a novel protein hormone secreted from white adipose tissue, the level of hormone pathologically increased in patient with IR. The information about the role of hormone in T2DM remains unavailable. So the present study evaluate the role of hormone to the incidence of disease,The present study indicate that the concentration of asprosin significantly elevated in sera of T2DM or G2 group as compare with control group, this results are in agreement with results of Lei *et al*,[9] which indicate that the concentration of asprosin significantly increased in patients with type II diabetes mellitus, and the study suggest that the level of hormone may be serve as a risk factor correlated with the pathogenesis of the disease, however the results in G1 are disagreement with the finding of Naiemian *et al*.[10] which conclude that the level of serum asprosin are increased in new onset patients with type II diabetes mellitus.

New-onset type II diabetes mellitus patients(uncomplicated type 2 diabetes) shown high TAC level as compared with old cases of T2DM, and also less than control group, otherwise the MDA was higher in G2 as compared with G1, due to increase the production of reactive oxygen species-ROS, which depend to the Chronic exposure to high levels of blood glucose which cause increase the oxidative stress in islet cells, in which the pancreatic beta-cell contain very low concentration of antioxidant enzymes[11].

The finding of Xing et al, [12] agree with the finding of the present study which indicate that the serum asprosin conc. was high correlated with glucose metabolism and HbA1c, this finding indicate that serum asprosin might be universal hrmone marker for complication of T2DM, and risk factor to reveal insulin resistance and glucose homeostasis.

In conclusion, the conc. of serum asprosin are elevated in patients with type II diabetes mellitus (old diagnostic cases) but not in newly diagnosed T2DM. We suggest that the level of hormone might act as risk factor for development the complication of the disease.

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