

Evaluation of Adiponectin in Patients with Type 2 Diabetes Mellitus in Erbil City

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Abstract: *The current study focused to assess Adiponectin in patients afflicted with type 2 diabetes mellitus, it was carried out in the Martyr Layla Qasm Centre for diabetes in Erbil city during the period from April to July 2012. A total of 100 blood samples were collected from patients with age range between (30-79) years and Fifty persons as control with the same age range. Serum Adiponectin was measured by ELISA method. Measurements of Random Blood Sugar (RBS) and Glycated Hemoglobin (HbA1c) also have been performed. This study revealed a highly significant ($p=0.000$) decrease in mean concentration of adiponectin in patients as compared to control group.*

Keywords: Diabetic patients, Adiponectin, RBS & HbA1c

1. Introduction

Diabetes mellitus (DM) is a metabolic disorder resulting from a defect in insulin secretion, insulin action, or both, insulin deficiency in turn leads to chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism. (Bastaki, 2005). There are two main types of DM, type 1 insulin dependent diabetes mellitus (IDDM), which is usually manifested in childhood or adolescence, and characterized by pancreatic β -cell destruction mediated by immune mechanisms, severe insulinopenia and dependence on exogenous insulin to preserve life, whereas type 2 non insulin dependent diabetes mellitus (NIDDM), is characterized by insulin resistance, with association and often progressive defect in insulin secretion, it occurs after age 40, but it may occur at any age, other types of diabetes could be gestational, or secondary due to other diseases (Saleh, 2011). Adiponectin is a 244 amino acid collagen like protein that is solely secreted by adipocytes and acts as a hormone with anti inflammatory and insulin sensitizing properties (Li *et al.*, 2009). Structurally, Adiponectin has a carboxyl-terminal globular domain and an amino-terminal collagen domain and is structurally similar to complement 1q which belongs to a family of proteins (Kadowakiet *al.*, 2006). Adiponectin concentration is reversely associated with type 2 DM, coronary artery disease and obesity, all together called the metabolic syndrome. Adiponectin decreases blood glucose and free fatty acid serum concentrations and increases insulin sensitivity (Duntaset *al.*, 2004). The production of adiponectin by adipocytes is inhibited by pro-inflammatory factors, such as TNF- α and IL-6. (Aprahamian and Sam, 2011). Evidence suggests that adiponectin has anti-atherogenic properties by improving endothelial function and having anti-inflammatory effects in the vascular wall. In addition, adiponectin modifies vascular intracellular redox signalling and exerts indirect antioxidant effects on human myocardium. (Antoniadeset *al.*, 2009).

2. Materials and Methods

2.1 Study Design

One hundred of diabetic patients who were admitted to the Martyr Layla Qasm centre in Erbil city evaluated in this study during the period from April to July 2012. Out of 100 patients 65(65%) were female while 45(45%) represent male, their age ranged between (30-79) years. Fifty healthy individual (30 female & 20 male), with same age range served as a control group.

2.2 Blood Sampling

Blood sampling was performed by withdrawing 5 ml venous blood from each patient and control group using disposable syringe (venipuncture technique). 2.5 ml of the blood were collected in heparinized tube (EDTA) for the performed Hemoglobin A1c (HbA1c) test and remaining blood were collected in vaccination tube with gel, allowed to clot at room temperature then centrifuged at 2500 round per minute for five minute, the sera obtained were divided into two parts, the first part was analyzed for random glucose, The second part of sera kept in a freezer (-20 C°) to perform serum adiponectin test.

2.3 Measurement of serum glucose

Using enzymatic and colorimetric method GOD/POD. This enzymatic test used for quantitative determination of glucose in human or plasma according to plasmatic glucose kit.

2.4 Quantitative colorimetric determination of glycohemoglobin (HbA1c) in whole blood.

2.5 Quantitative determination of serum Adiponectin

Estimation of Adiponectin was done by Enzyme-Linked ImmunoSorbent Assay (ELISA) technique, which obtained from Merocodia Company (Sweden)

2.6 Statistical Analysis

SPSS (Statistical Package for Social Science) version 16 was used for data entry and analysis. Data are expressed as mean \pm S.E., independent student t-test was used to compare between means of two different samples. The attained values of P value < 0.05 were considered statistically significant.

3. Results

3.1 Mean concentration of random blood glucose (mg/dl) in sera of study groups.

There was highly significant difference ($p=0.000$) in the mean concentration of patients and control group, 258.81 ± 8.1 and 93.05 ± 1.8 respectively. (Table 1)

Table 1: Mean concentration of random blood glucose (mg/dl) in study groups

Study groups	No.	Mean \pm SE	Statistical evaluation
Patients	100	258.81 ± 8.1	P = 0.000
Control	50	93.05 ± 1.8	

3.2 Mean % of HbA1c category in study groups.

The number of patients having poor control ($HbA1c > 7.6$) were higher, when compared with the other category of HbA1c (Table 2)

Table 2: Mean % of HbA1c category in study groups

Category of HbA1c	No.	Mean
Good control (5.5-6.8)	8	6.181
Fair control (6.9-7.6)	17	7.335
Poor control > 7.6	75	10.11
Control	50	5.905

3.4 Estimation of Adiponectin (ng/ml) in sera of study group

The mean concentration of Adiponectin in sera of patients represented low concentration 0.608 ± 0.01 , when compared with control group 7.36 ± 0.284 with highly significant elevation ($p=0.000$). (Table 3)

Table 3: Mean concentration of Adiponectin (ng/ml) in sera of study group.

Study groups	No.	Mean \pm SE	Statistical evaluation
Patients	100	0.60 ± 0.01	P = 0.000
Control	50	7.36 ± 0.28	

4. Discussion

4.1 Mean % of HbA1c category in study groups

This study demonstrated that the high number 75 of patients have poor control ($HbA1c > 7.6$), as compared with other level of HbA1c categories. Similar results have been reported by a study, which reported that three quarter of the type 2 diabetes mellitus patients had poor controlled level of HbA1c (Ismail *et al*, 2011). Another previous study found that Poor control was detected in the majority of the patients with diabetes (Al-Ghamdi, 2004). A key element in diabetes management is glycemic control, which may be indicated by

a person's HbA1c. The hemoglobin A1C test measures the percent of glucose in the bloodstream attached to hemoglobin molecules in the previous two to three months, which is the lifespan of red blood cells. Thus, the more excess glucose in the bloodstream, the higher the percentage of hemoglobin molecules attached, the higher the HbA1c level (Davila, 2010). Longer DM duration, diabetic retinopathy, diabetic nephropathy, cigarette smoking, and uncontrolled glycemic levels were significantly associated with higher levels of HbA1c (Mbenza *et al.*, 2008). Good glycemic control has been associated with fewer diabetic complications and better metabolic control. macrovascular and microvascular complications are related to poor glycemic control (Delamater, 2006).

4.2 Adiponectin and Type 2 DM.

The result in the present study showed that the mean concentration of adiponectin decrease significantly in patients as compared with control group. The above results are similar to results obtained from many other studies. One of them showed that the mean baseline of adiponectin was lower in the diabetic subjects than in the non diabetic subjects (Snehalatha *et al.*, 2003). Another group of worker found decreased serum levels of adiponectin in the type 2 DM patients (Daimonet *et al.*, 2003).

Findings from animal studies and metabolic studies in humans suggest several mechanisms through which adiponectin may decrease the risk of type 2 DM, including suppression of hepatic gluconeogenesis, stimulation of fatty acid oxidation in the liver, stimulation of fatty acid oxidation and glucose uptake in skeletal muscle, and stimulation of insulin secretion, these effects may be partly mediated by stimulatory effects of adiponectin on signaling pathways for 5_adenosine monophosphate-activated protein kinase and peroxisome proliferator-activated receptor α (Li *et al.*, 2009).

A study recorded that *In vitro*, adiponectin suppressed adhesion molecule expression on endothelial cells, reduced vascular inflammatory responses by inhibition of endothelial cell nuclear factor (NF- κ B) signaling, and suppressed macrophage function. *In vivo*, adiponectin adhered to endothelial lesions and prevented neointimal formation and atherosclerosis in mice, adiponectin thus seems to have protective metabolic and anti-inflammatory properties (Engeliet *et al.*, 2003).

Haluziket *et al.*, 2004 reported that administration of the adiponectin was accompanied by a weight loss and a decrease of plasma glucose, free fatty acids and triglycerides in mice consuming a high-fat/high-sucrose diet.

5. Conclusion

From the present study, we can conclude that baseline serum adiponectin concentrations were statistically significantly, inversely associated with risk of type 2 diabetes.

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