

## Effect of adiponectin on T2DM and its correlation with IR in Iraqi Arabic population

Majid Kadhum Hussein<sup>a</sup>

Asia Ali Hamza<sup>a</sup>

Ali Abdulzahra Ahmed<sup>b</sup>

<sup>a</sup>- Department of biochemistry, faculty of medicine- Kufa university, Iraq

<sup>b</sup>- Department of pharmacology and therapeutics, faculty of medicine, Kufa university, Iraq

Email: [majid.alfatlawi@uokufa.edu.iq](mailto:majid.alfatlawi@uokufa.edu.iq)

Email: [asiar.alasady@student.uokufa.edu.iq](mailto:asiar.alasady@student.uokufa.edu.iq)

**Abstract:** Adiponectin is a cytokine released from adipose tissue and may have an influence on many metabolic pathways, including insulin resistance and T2DM.

**Aim:** To find the relationship between adiponectin and IR and its effect on glucose level in T2DM patients in Iraqi population.

**Method:** This study has a two hundred participants (control) and another two hundred T2DM patients. The affirming of T2DM was introduced following criteria of WHO. FBG and HOMA-IR were also measured.

**Results:** A significant correlation between IR and T2DM with a significant reciprocal relationship between adiponectin level HOMA-IR.

**Conclusion:** The present study clarifies that T2DM patients have a significant low level of adiponectin. Adiponectin has a glucose and IR lowering effect as low level of adiponectin is associated with increased IR and hyperglycemia.

**Key words:** overweight, Insulin resistance, adiponectin, T2DM.

### 1-Introduction:

T2DM is a chronic disorder resulted from insulin resistance (IR) or from insulin secretory defect. Among different types of diabetes, T2DM considered as the most widespread type compared to other types as it is accountable for about 90% incidence prevalence (1).

Aetiology is multifactorial for T2DM: 1- Environmental: environmental toxins, low physical activity, obesity, diet and stress. 2-Genetics.3-Medical: some health problems and medications (glucocorticoids) (2,3).

IR is associated with T2DM, one of the main causes of IR is obesity (4). Adiponectin is a cytokine released from adipose tissue with an important function in reducing blood glucose level in human (5). It is an insulin sensitizing protein in many organs, also adiponectin prevents inflammation with a protective function against atherosclerosis. in hepatocytes, adiponectin prevents the synthesis of fatty acid and gluconeogenesis (6). Improvement of insulin action was shown by many studies after administration of adiponectin in a purified recombinant form that lowers glucose level (7). So, this study was done to explore the correlation between insulin resistance and circulating level of adiponectin in Iraqi population.

### 2-Materials and methods:

Ethical committee approval from faculty of medicine/ Kufa university has been taken before starting the research. After taking the approval, the research was proceeds in

the same college at the biochemistry laboratory. The collection of samples was from the Diabetic centre in Al-Sader Teaching hospital from November 2016 to February 2017.

IR was determined by Homeostasis model assessment (HOMA) via equation : $HOMA = [\text{glucose (in mmole/L)} \times \text{insulin (in microU/mL)}] / 22.5$ .

blood glucose level was estimated by enzymatic methods and Adiponectin blood level was estimated by ELISA.

**Table 2.1: Chemicals used in this study with their suppliers.**

No	Chemicals	Source
1	Adiponectin human EIA kit of 96 wells	BioAim Scintific. (Canada)
2	Glucose kit	Plasmatic , France

**Table 2.2 : Apparatus used in this study with their suppliers .**

No	Apparatus	Company and country
1	ELISA system	Bio-tech instruments.Inc. USA
2	Centrifuge	Hettich EBA 20 Germany
3	UV-VIS Spectrophotometer	APLE PD-303 UV Japan
4	Water bath	Memmert -Japan

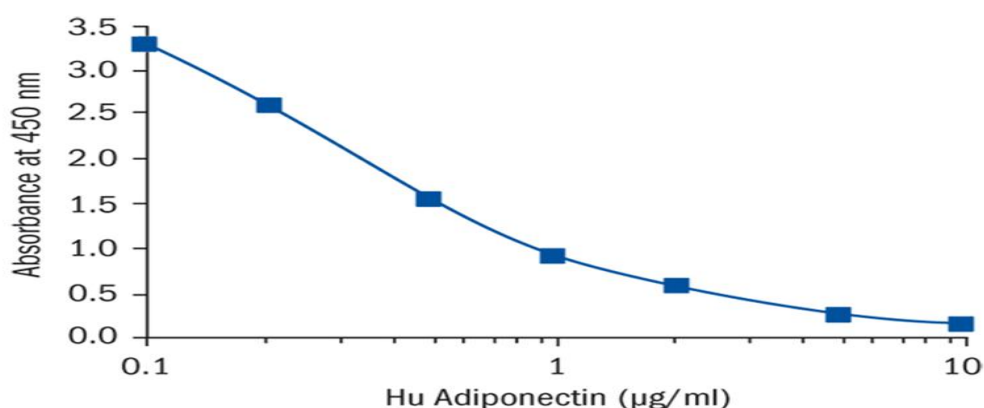


Figure 2.1: Standard curve for determination of adiponectin concentration.

**Table 2.3: Fasting blood glucose, insulin and visfatin levels in T2DM and control groups**

parameter	T2DM	Control	P value
	Mean $\pm$ SD	Mean $\pm$ SD	
FBG (mmol/L)	8.77 $\pm$ 0.52	3.9 $\pm$ 1.33	<0.001
adiponectin ( $\mu$ g/ml)	17.65 $\pm$ 2.31	24.96 $\pm$ 4.75	<0.001
BMI (kg/m <sup>2</sup> )	24.53 $\pm$ 4.11	22.75 $\pm$ 1.34	<0.001

**Discussion:** Studies demonstrated that levels of adiponectin is positively correlated with cellular sensitivity to insulin, and inversely associated with IR and diabetic predisposing factors (8). Serum adiponectin is decreased in overweight persons due to the inhibition for inflammatory cytokines effect (9). Researchers have suggested that decreased adiponectin levels are associated with the risk of T2DM (10). Adiponectin produces an elevated level of oxidation to fatty acid and results in inhibition of IR as FA is the most cause of IR (11). Adiponectin cause activation to AMPK (adenosine monophosphate kinase) in addition to elevation of activity of 1CPTI (carntyl phosphotidyl transferase) which in turn produce an increase in their oxidation as their entrance to mitochondria is increased (12). Outcome data of this study are in accordance with the previous studies by different researchers as it clarifies the significant reciprocal concentration between circulating level of adiponectin with blood glucose level and IR, additionally data of this study correlates between IR and increased BMI. It is obvious that adiponectin is a n important cytokine that has a protective effect against IR and consequently to T2DM.

#### References:

- 1-Megan L. Gow, Sarah P. Garnett Louise A. Baur and Natalie B., Lister (2016),The Effectiveness of Different Diet Strategies to Reduce Type 2 Diabetes Risk in Youth nutrients. 1-13 9 August.
- 2-Brunetti A, Chiefari E, Foti D (2014). Recent advances in the molecular genetics of type 2 diabetes mellitus. World J Diabetes; 5(2): 128-140.
- 3-Donath MY, StorlingJ, BerchtoldLA, BillestrupN, Mandrup PoulsenT(2008),Cytokines and beta - cell biology: from concept to clinical translation. Endocrine Reviews; 29: 334 – 350.
- 4-Boden G. 1 and G. I. Shulman, (2002), Free fatty acids in obesity andtype 2 diabetes: defining their role in the development of insulin resistance and  $\beta$ -cell dysfunction,European Journal of Clinical Investigation Volume 32, Issue Supplement s3,. pages 14–23, June.
- 5-Wang H, Junlong Wu, Weijie Gu, Beihe Wang. Fangning Wan,1,2 Bo Dai, et al (2016) ,Serum Adiponectin Level May be an Independent Predictor of Clear Cell Renal Cell Carcinoma,; 7(10): 1340-1346. doi: 10.7150/jca.14716.
- 6-Ghoshal K and Bhattacharyya M. Adiponectin: (2015) Probe of the molecular paradigm associating diabetes and obesity. World JDiabetes.;6:151-166.

- 7-Berg AH, Combs TP, Du X, Brownlee M, Scherer PE (2001). The adipocyte-secreted protein Acrp30 enhances hepatic insulin action. *Nature medicine.*; 7:947–953.
- 8-Jiang Y Jiang, Ibiye Owei, Jim Wan, Sotonte Ebenibo, Samuel DagogoJack, (2016), Adiponectin levels predict prediabetes risk: the Pathobiology of Prediabetes in A Biracial Cohort (POP-ABC) study *BMJ Open Diabetes Research and Care*; 4:e000194.
- 9-Behre CJ. Adiponectin, obesity and atherosclerosis (2007) , *Scand J Clin Lab Invest*; 67, 449-458.
- 10-Ruan H and Dong LQ. (2016), Adiponectin signaling and function in insulin target tissues. *J Mol Cell Biol.*
- 11-Bernstein EL, Koutkia P, Ljungquist K (2004), acute regulation of adiponectin by free fatty acids. *Metabolism*; 53: 790-793 .
- 12-Yoon MJ, Lee GY, Chung JJ. (2006), Adiponectin increases fatty acid oxidation in skeletal muscle cells by sequential activation of AMP-activated protein kinase, p38 mitogen-activated protein kinase, and peroxisome proliferator-activated receptor alpha. *Diabetes*; 55