



## Evaluation of adiponectin and calcium levels in patient's type II diabetics with obesity in Salah El-Din Province

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### ABSTRACT

The association between obesity and type 2 diabetes may be partially mediated by altered adipose tissue secretion of adipokines. Adiponectin is an adipokines with anti-inflammatory and insulin-sensitive properties. It is a regulated low secretion in obesity, the concentrations of adiponectin and calcium in the blood serum of obese patients and type 2 diabetes will be estimated in Salah al-Din Province: Iraq, where the study included (90) samples (60) for patients with diabetes - type II and (30) from healthy subjects. The ages of the affected and healthy people ranged between 35-75 years. The results showed a significant increase at the level of probability ( $P \leq 0.01$ ) in the level of adiponectin and calcium concentrations in patients with type 2 diabetes compared to healthy subjects, and through the results we obtained, adiponectin may play an important role in prevention of type 2 diabetes.

### Introduction

Diabetes is one of the diseases that were known in ancient times, Manuscripts dating back to the Chinese, Egyptian and Indian civilizations have been found that contain a description of diabetes [1]. Arab Researchers also knew diabetes and it was mentioned in the books of Ibn Sina and other doctors, Ibn Sina knew it (Exodus Rapid water) and the relationship of disease with other diseases [2]. There are several reasons for diabetes, including hormonal imbalance, imbalance in some fats, proteins, carbohydrates and electrolytes which leads to the emergence of several symptoms, including thirst, frequent urination, severe wasting, high cholesterol and triglyceride levels in the blood, weight loss, hunger and general weakness [3]. Adiponectin is a 244 – amino acid-long polypeptide, collagen like protein that is exclusively secreted by adipocytes and acts as a hormone with anti-inflammatory and insulin sensitizing properties by several mechanisms through which adiponectin may decrease the risk of type-2 diabetes mellitus, 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 [4]. These effects may be partly mediated by stimulatory effects of adiponectin on signaling pathways for 5'-adenosine monophosphate activated protein kinase (5'-AMPK), and peroxisome

proliferator- activated receptor gamma (PPAR- $\gamma$ )[5]. Adiponectin secretion, in contrast to secretion of other adipokines, is paradoxically decreased in obesity. These may be attributed to inhibition of adiponectin gene transcription by inflammatory and antigenic factors secreted by hypertrophic adipocytes[6]. A number of studies have shown that obesity, insulin resistance and atherosclerosis are accompanied by decreased adiponectin levels and that adiponectin replacement under experimental settings is able to diminish both insulin resistance and atherosclerosis [7].

Calcium is a very important and integral component of the human body as the skeleton contains 99% of the body's calcium ,Plasma calcium balance is vital in maintaining human life activities, such as maintaining the skeleton Regulating hormonal secretion [8].

Obesity is the occurrence of an increase in body weight above the normal limit, due to the accumulation of fat in the body, and it is defined as the increase in a person's weight to more than 30% of the ideal weight [9].

The objective of the presented work is to study the relationship between serum adiponectin levels and calcium in obese type 2 diabetic patients in Salah al-Din Province in Iraq.

### Materials and Methods

The study included (90) samples (60) of Person with

diabetes - type II with obesity and (30) Is healthy person (control group for the period from November 2021 until February of The year 2022, and the ages of infected and healthy person ranged between 35-75 years.

Body mass was measured by the common method, by dividing the weight by the square of the height (kg/m<sup>2</sup>) as in the following equation BMI = (weight (kg))/(length (m)<sup>2</sup>) [10].

Seven milliliters of fasting venous blood was using disposable syringes and needles. The blood was allowed to clot in plain tubes for 30-45 minutes at room temperature and serum was separated by centrifugation at 2000 rpm for 10 minutes and transferred into plain plastic tubes and kept frozen at -18 oC until the time of assay.

Adiponectin hormone was determined by ELISA method. Available kit for adiponectin was supplied from DRG Company / Germany [11].

In a normal acidic medium, calcium forms a stable blue complex with Arsenazo III. The intensity of the color is directly proportional to the amount of calcium in the sample [12].

Statistical analysis was used to show the mean and standard deviation of variables. The significance of difference between mean values was estimated by Student P-Value. The probability  $P \leq 0.05$  = significant,  $P \geq 0.05$  = non-significant. Correlation analysis was used to test the linear relationship between parameters.

### Results and Discussion

The results in Table 1 indicate that the level of adiponectin shows a significant and increase at the probability level ( $P \leq 0.01$ ) in the sera of patients with type 2 diabetes with obesity group compared to the control group.

#### (1) mean $\pm$ standard deviation of adiponectin in the studied samples

Group Parameter	Control	Patient	P -Value
	Mean $\pm$ S.D		
No.	30	60	....
Adiponicten(mg/l)	2.50 $\pm$ 11.60	3.56 $\pm$ 17.00	$\leq 0.01$

The results of our study did not agree with the study of (Scherer et al 2018) and colleagues found that a sharp increase in adiponectin stimulates a transient decrease in glucose level by inhibiting the secretion of liver enzymes responsible for glucose production and by decreasing the rate of endogenous glucose production in people with diabetes [14]. However, the results for the control group agreed with (Koncsos et al; 2016), where it was shown that the normal level of adiponectin in the control group was (8.8-14.4 ug/ml) [13].

The results in Table 2 indicate that the calcium level shows a significant and increase at the probability

level ( $P \leq 0.01$ ) in the sera of patients with type 2 diabetes with obesity group compared to the control group.

#### (2) Mean $\pm$ standard deviation of calcium in the studied samples

Group Parameter	Control	Patient	P -Value
	Mean $\pm$ S.D		
No.	30	60	....
Calcium (mg/dl)	1.33 $\pm$ 9.41	1.43 $\pm$ 10.34	$\leq 0.01$

These results are in agreement with (Rasha M H 2014), Excess calcium suppresses gene expression in pancreatic beta cells, which reduces insulin production [15].

The results in Table 3 indicate that the BMI showed a non-significant increase at the level of probability ( $P \geq 0.01$ ) in the group of patients with type 2 diabetes with obesity group compared to the control group.

#### (3) mean $\pm$ standard deviation of the BMI value in the studied groups

Group Parameter	Control	Patient	P -Value
	Mean $\pm$ S.D		
No.	30	60	....
BMI (Kg/m <sup>2</sup> )	3.30 $\pm$ 30.17	4.38 $\pm$ 30.63	$\geq 0.01$

These results are agreed with the study of (Federica, et al 2020), which indicated that increased nutrition has a role in the occurrence of chronic inflammation and thus activation of immune cells that accumulate in the fatty tissues of people with obesity and this is a risk in the development of insulin resistance and the occurrence of type 2 diabetes [16].

#### Correlation coefficient:

Pearson's linear correlation coefficient (r) was measured for the results included in this study to determine the extent of the relationship Among the hormone adiponectin with Calcium and BMI .

The straight line and therefore the correlation is weak and the value of the correlation coefficient ranges between (1 $\pm$ ), and the correlation coefficients are described as perfect when the value  $\pm 1$  and strong when it exceeds 0.8, medium when it lies around 0.5 and weak when it is less than 0.3, and the relationship is direct between the two variables when the value is Positive and inverse when the value is negative and when there is no relationship between the two variables, the value of the correlation coefficient is equal to zero.

#### 1- Evaluation of the relationship between the level of the hormone adiponectin and the body mass function

The results showed that there is a weak inverse relationship between the level of adiponectin and the body mass function in patients with type 2 diabetes, and the value of the correlation coefficient was (r = -0.1099) as in Figure (1).

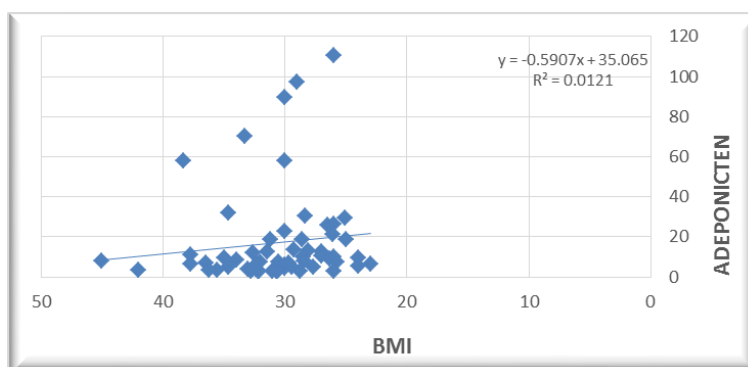


Fig. 1: Correlation coefficient between the level of adiponectin and the body mass function in patients

## 2- Evaluation of the relationship between the level of the hormone adiponectin and the level of calcium

The results showed that there is a weak direct

relationship between the level of adiponectin and the level of calcium in patients with type 2 diabetes, and the value of the correlation coefficient was ( $r = 0.106$ ) as in Figure (2).

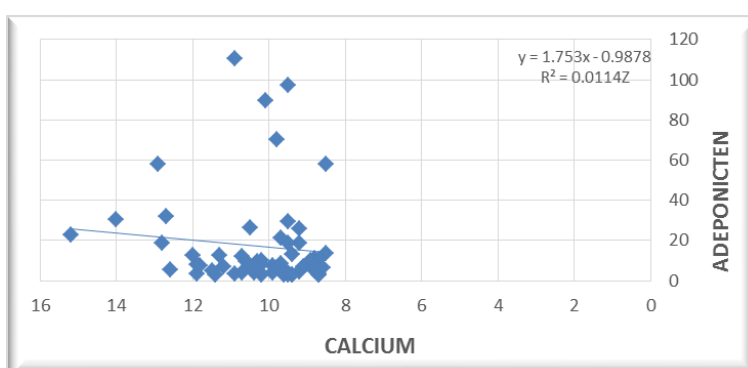


Fig. 2: Correlation coefficient between the level of adiponectin and the level of calcium in patients

## Conclusion

The result of the current study showed that a high level of adiponectin in the blood is associated with obesity and type 2 diabetes, and a high level of adiponectin was inversely associated with body mass

function, and it was also directly correlated with calcium level. Therefore, adiponectin plays an important role in the prevention of hyperglycemia by reducing Insulin resistance.

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## تقييم مستويات الأديبونكتين والكالسيوم لدى مرضى السكري من النوع الثاني المصابين بالسمنة في

### محافظة صلاح الدين

صالح عطاء الله برجس الجبوري ، نادية احمد صالح الجبوري

قسم الكيمياء ، كلية التربية للعلوم الصرفة ، جامعة تكريت ، تكريت ، العراق

#### الملخص

من المعروف أن السمنة وداء السكري من النوع الثاني متلازمان في أغلب الأحيان، حيث أن السمنة وزيادة الخلايا الدهنية هي السبب الأساسي لمقاومة الخلايا للأسولين. إضافة إلى أن الخلايا الدهنية تعمل كغدة صماء مسؤولة عن إفراز العديد من الهرمونات التي لها دور كبير في تحول الشخص المصاب بالسمنة إلى مريض بداء السكري، ومن بين هذه الهرمونات الهرمون البروتيني الأديبونكتين المكتشف حديثاً، حيث يتميز هذا الهرمون عن بقية الهرمونات التي تفرزها الخلايا الدهنية بأن نسبتها تقل كلما ازدادت نسبة السمنة، وكذلك تشير بعض الدراسات السابقة إلى أن مستوى الأديبونكتين يقل في المرضى المصابين بداء السكري النوع الثاني، إضافة إلى خاصيته باعتباره مضاداً للالتهابات وعلاقتها باضطرابات نسبة الدهون بالدم. تم تقدير تراكيز الأديبونكتين والكالسيوم وكذلك دالة كتلة الجسم في مرضى السمنة والسكري من النوع الثاني، حيث تضمنت الدراسة (90) عينة (60) من الأشخاص المصابين بالسمنة وداء السكري - النوع الثاني و(30) من الأشخاص الأصحاء وتتراوح أعمار الأشخاص المصابين و الأصحاء من 35-75 سنة. حيث أظهرت النتائج ارتفاع معنوي عند مستوى الاحتمالية ( $P \leq 0.01$ ) في مستوى تركيز الأديبونكتين والكالسيوم مقارنة مع مجموعة السيطرة. كذلك بينت النتائج ارتفاع معنوي عند مستوى الاحتمالية ( $P \geq 0.01$ ) في دالة كتلة الجسم لدى مرضى السكري من النوع الثاني مقارنة مع مجموعة السيطرة. حيث وجد ارتفاع واضح في مستوى هرمون الأديبونكتين ومستوى الكالسيوم ودالة كتلة الجسم في المرضى الذين يعانون من السمنة والسكري من النوع الثاني مقارنة مع الأشخاص الأصحاء.