# Reduced Serum Adiponectin Levels in Type 2 Diabetic Patients in Zaria

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*Abstract*

**Background:** *Adiponectin is a collagen-like plasma protein secreted by adipocytes that has been suggested to play a causal role in the development of insulin resistance. Even though hypoadiponectinaemia is reported to be closely associated with obesity-related diseases such as ACVD, type 2 DM, dyslipidaemia, report from our environment is lacking.*

**Materials and Methods:** *Serum adiponectin, insulin and glucose were measured in 90 type 2 diabetic and control subjects respectively. The patients were known diabetics attending the diabetic clinic at the ABUTH, Zaria. The control subjects were apparently healthy individuals within the hospital and Zaria environs.*

**Results:** *Mean serum adiponectin levels were significantly lower (P<0.05) in the diabetic patients than in the control subjects. On the other hand, the mean values of insulin and glucose were significantly higher (P<0.05) in the diabetic patients than in the controls.*

**Conclusion:** *Measurement of serum adiponectin as an adjunct in the biochemical assessment of type 2 DM is suggested.*

**Keywords:** Adiponectin, Type 2 Diabetes Mellitus, Insulin and Glucose.

## Introduction

Diabetes mellitus (DM) is a group of metabolic disease in which a person has high blood glucose (hypergycaemia). This could either be because the pancreas does not produce enough insulin or the cells do not respond to the insulin produced [1]. This high blood glucose produces the classical symptoms of derangement of fluid and energy, manifesting as polyuria (frequent urination), polydipsia (increased thirst) and polyphagia (increased in hunger).

Types 2 DM results from insulin resistance, a condition in which the body cells fail to respond to insulin.

Adiponectin is a protein hormone that modulates a number of metabolic processes including glucose regulation and fatty acid oxidation [2]. Levels of adiponectin are reduced in diabetic patients compared to non-diabetic subjects [3]. The Hoorn study investigated the association between adiponectin and 6-year risk of type 2 DM and impaired glucose metabolism in 2500 older white men and women [4]. The study associated a lower adiponectin level with a higher risk of type 2 DM.

The present study was aimed at evaluating the levels of serum adiponectin in type 2 DM in Zaria.

## Materials and Methods

A total of 180 subjects were recruited for the study comprising of 90 consecutive type 2 diabetic patients attending the diabetic clinic at the ABUTH, Zaria and 90 apparently healthy subjects from the hospital and Zaria environs as controls.

Ethical approval was obtained from the ethical committee of the Faculty of Medicine ABU/ABUTH, Zaria.

Ten (10) mls of fasting venom blood was drawn from each subject. Seven (7) mls was dispensed into a blood sample bottle appropriately labeled for the subject. This was allowed to clot and the serum was extracted after spinning in the centrifuge at 3000g for 5 minutes. Three milliliters was carefully dispensed into a fluoride bottle also appropriately labeled for the subject and gently mixed by inversion. This was used for glucose estimation.

Full medical history of the recruited subjects was obtained, including weight, height and B.P. Fasting plasma glucose was estimated using enzymatic glucose oxidase-peroxidase method [5]. Adponectin was measured by the enzyme linked immune absorbent assay of Risch,

et al. [6]. On the other hand, insulin was measured by the enzyme-linked immune absorbent assay technique described by Anderson, et al. [7]. The data obtained were analyzed using statistical package for social science (SPSS) windows 15. Students' t-test was used to compare the values and p-value less or equal to 0.05 was considered statistically significant.

## Results

The results obtained from the current study are presented in Tables 1-3.

Table 1 shows the mean± SEM values of clinical parameters of the diabetic patients and controls. The mean values of BMI and blood pressures were significantly higher (P<0.05) in the diabetic patients than in the controls.

**Table 1: Clinical parameters (mean± SEM) in diabetics and control subjects**

| Subjects | n | Age (years) | BMI (kg/m2) | DODM (months) | SBP (mmHg) | DBP (mmHg) |
|---|---|---|---|---|---|---|
| Diabetic Patients | 90 | 52.1±1.12 | 29.5±0.65 | 72.9±8.12 | 140.1±2.52 | 89.09±1.50 |
| Controls | 90 | 51.2±0.99 | 25.5±0.42 | - | 123.8±1.79 | 79.2±1.26 |
| P-value | | 0.61(NS) | 0.000(5) | - | 0.000(5) | 0.000(5) |

n    =     Number of subjects
BMI   =     Body Mass Index
DODM=     Duration of diabetics Mellitus
SBP   =     Systolic Blood Pressure
DBP   =     Diabetic Blood Pressure
SEM   =     Standard Error of mean
S    =     Statistically Significant (P<0.05)
Ns   =     Not significant (P>0.05)

Table 2 shows the mean values of glucose, adiponectin and insulin in diabetic and non-diabetic subjects. A statistically significant increase was observed in the mean values of glucose and insulin in the diabetic patients than in the controls (P<0.05). On the other hand, a significant decrease in the mean value of adiponectin in diabetic patients than controls was obtained (P<0.05).

**Table 2: Glucose, adiponectin and insulin values (mean±SEM) in diabetic and non-diabetic subjects.**

| Subjects | n | FPG (mmol/L) | Adiponectin ($\mu$/ml) | Insulin ($\mu$Iu/mL) |
|---|---|---|---|---|
| Diabetic patients | 90 | 8.9±0.4 | 1.1±0.06 | 13.2±1.19 |
| Controls | 90 | 4.8±0.07 | 1.5±0.13 | 7.5±0.32 |
| P-value | | 0.000(S) | 0.002(S) | 0.002(S) |

n    =     Number of subjects
SEM   =     Standard Error of mean
FPG   =     Fasting Plasma Glucose
S    =     Statistically Significant (P<0.05)

Table 3 shows the mean± SEM values of adiponectin and insulin in diabetic patients with good (FPG ≤ 6.0mmol/L) and poor (FPG > 6.0 0mmol/L) glucose controls. No significant different was obtained for both good and poor controls (P>0.05).

**Table 3: Serum adiponectin and insulin levels (mean± SEM) in diabetic patients with good and poor glucose control.**

| Diabetic patients | n | Adiponectin ($\mu$/ml) | Insulin ($\mu$Iu/mL) |
|---|---|---|---|
| Good control (≤ 6.0 mmol/L) | 32 | 1.1±0.12 | 13.0±1.22 |
| Poor control (> 6.0 mmol/L) | 58 | 1.0±0.06 | 13.3±1.73 |
| P-value | | 0.4579(NS) | 0.62(NS) |

n    =     Number of subjects
SEM   =     Standard Error of mean
FPG   =     Fasting Plasma Glucose
NS   =     Not Significant (P>0.05)

## Discussion

In the current study, the mean serum adiponectin level in the diabetic patients was significantly decreased compared to similar value in the controls. This is in agreement with the work of Anita et al. [8]. Weyer et al. also reported a negative association between adiponectin and type 2 diabetes and obesity [9]. Obot, et al. however, did not report any significant difference in adiponectin values in their work among type 2 diabetics and controls [10]. This could be as a result of the fewer number of subjects that were studied.

Adiponectin has been postulated to play an important role in the modulation of glucose and lipid metabolism in insulin-sensitive tissues in both humans and animals. In the current study, adiponectin was not significantly different in type 2 diabetic patients with regards to good and poor glucose controls. Adiponectin causes insulin sensitizing effects due to its role in the activation of perxisome proliferator-activated receptors M (PPARM) in the liver [11].

In type 2 DM the serum adiponectin level is markedly decreased leading to abnormal glucose and lipid metabolism. Hypoadiponectinaemia leads to insulin resistance and hypergycaemia in type 2 DM. The mechanism of action is not very clear till date.

Previous studies in Japanese individuals have shown that the plasma adiponectin concentration is negatively correlated with body mass index (BMI) and accordingly, lower in obese that in lean subjects [8,12].

The findings of the present study confirm that report of Sadaf, et al. that mean serum adiponectin levels are lower in the diabetics that in the non-diabetic controls [13].

Bi-annual measurement of serum adiponectin levels is recommended to be included in the management of type 2 diabetic patients to establish whether there is need to boost serum adiponectin levels. This could be through the administration of insulin-sensitizing thiazolidinedione (TZD) class of compounds.

## Acknowledgement

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