

## Adiponectin and body mass index relation in CAD with and without type-II DM: A comparative study.

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### Abstract

**Background:** The Existing Metabolic disorder like diabetes mellitus, obesity and some other metabolic syndrome have an important risk factor for cardiovascular events, and adiponectin is a key molecule of metabolic disorders, with anti-atherogenic properties. Low plasma adiponectin levels are associated with CAD and future incidence of myocardial infarction. The involvement of adiponectin in coronary plaque vulnerability, which may be reflected by angiographic complex lesions, remains to be elucidated.

**Objectives.** To study the relationship between adiponectin, body mass index and glycosylated hemoglobin in patients with coronary artery diseases (CAD) with and without type-II diabetes mellitus.

**Materials & Methods:** - It is a type of observational study among the rural population of kamothe, where a total of 60 subjects were included in the study among which 30 were in CAD with diabetes and 30 in Diabetes mellitus respectively. BMI was calculated by height and weight and HbA1c was measured by HPLC and serum adiponectin level was analyzed by ELISA.

**Results:** -The mean level of BMI in the group –I that is in the coronary artery disease with diabetes is  $24.9 \pm 1.24$  and in only diabetes subjects is  $29.56 \pm 1.38$  and we have also found the statistical significance (P-0.001). In the regression analysis of adiponectin and BMI and HbA1c, we observed an inverse relationship in both the group whereas in CAD with DM adiponectin was positively correlated with HbA1c ( $r= 0.56$ ).

**Conclusion:** - The finding of the present study highlighted that subject with coronary artery diseases with diabetes mellitus had lower adiponectin levels in both the groups

**Keyword:** - Diabetes mellitus, Coronary artery diseases, Adiponectin & Body mass Index

### Introduction:

In human body white adipose tissue is a major energy storage site and has an important role to maintain an energy homeostasis. It is a well-recognized endocrine gland or organ which secrete a variety of biologically active adipokines such as tumor necrosis factor- $\alpha$ , plasminogen activator inhibitor-1, leptin, resistin, angiotensinogen, and adiponectin. Looking into the current scenario Adiponectin has become a major therapeutic biomarker for diagnosis of type-2 diabetes mellitus

and metabolic syndrome (MS). This is due to its anti-diabetic, anti-atherogenic and anti-inflammatory role. [1] The pathogenesis of coronary artery diseases is due to the atheromatous plaques. Atheromatous plaques will lead to the disruption of coronary plaque and initiate the formation of thrombosis, which is a type of complex lesion. This complex lesion is strongly associated with coronary events. The evaluation of this lesion can be the clinical beneficial for the estimation of plaque instability Metabolic syndrome and type II diabetes mellitus have a well contribution in the development of acute coronary syndrome. In this mechanism adiponectin may be involved in the vulnerability of complex type of coronary lesion. [2]

In the case of vascular damage Adiponectin become beneficial and modulate the endothelial inflammatory response to vascular injury as it possesses anti-inflammatory and anti-atherogenic properties. The normal or even induction in the levels of adiponectin are considered to be beneficial. [3] Due to its anti-diabetic and anti-atherogenic effect, there are a number of increasing evidence regarding adiponectin role in the progression and development of diabetes mellitus and various metabolic syndrome. [4]

The levels of this circulating peptide range from 5 to 30  $\mu\text{g/ml}$  which is 3<sup>rd</sup> time higher than that of other adipocyte derived hormones. It has also gained specifically interest on relation with insulin sensitivity, atherosclerosis, and inflammation. [5] The incidence of diabetes mellitus become an independent risk factor for various cardiovascular events such as acute coronary syndromes (ACS) myocardial infarction (MI) , is increasing worldwide [6] Similarly, the metabolic syndrome, a clustering of cardiovascular disease risk factors characterized by abdominal obesity, insulin resistance, dyslipidemia, and hypertension, is associated with increased cardiovascular morbidity and mortality [7]. Coronary artery diseases is one of the leading cause of mortality and morbidity among patients with type 2 diabetes. South Asians especially might have an underlying pro-inflammatory state that contributes to their increased risk for both cardiovascular events and diabetes. [8] So looking into above aspect we have planned the current study to find out the relationship of plasma adiponectin with BMI and HbA1c in patients of coronary artery diseases with and without type-II diabetes.

### **Materials and Methods:**

The present study was a type of observational study in the patients of coronary artery diseases with or without type-II diabetes mellitus, who visited into OPD department of Medicine at MGM Hospital and study were done with the collaboration of Biochemistry department and cardiology department after getting the approval from Institutional Ethics Committee. The patients were Included in the study according to inclusion criteria. A total 60 subjects of either sex having (age group of 25-70 years) were enrolled in this study and were categorized into following two groups: Group I have 30 patients of coronary artery disease with type-II diabetes Mellitus.

Group II have 30 patients with type-2 diabetes Mellitus

Patients with sexually transmitted disease, rheumatoid arthritis, sepsis, asthma, malignancy, renal disease, liver disease, chronic illness, malnutrition pregnant women and were excluded from the present study. General Information about detailed history was noted. Anthropometric (height,

weight and calculated body mass index) measurement was recorded from each and every subjects. There were two series of samples were collected. In the first series - About 5 ml of blood sample was collected from each and every individual with all the aseptic precautions than. After that, 3 ml blood was transfer in plain vial to measure the Adiponectin and 2 ml blood sample was transferred to the EDTA vial for estimation of glycosylated hemoglobin. To obtain the serum and plasma the blood sample was centrifuged at 3000 rpm for 10 minutes and transferred to the two different aliquots for serum and plasma for further biochemical investigations.

**Methodology: -**

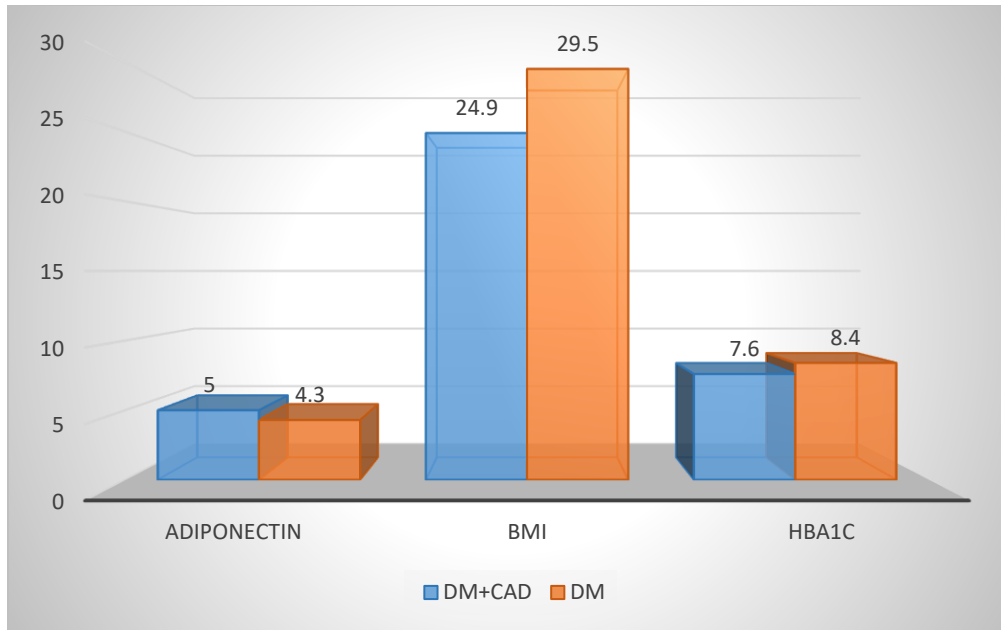
- ✓ Height (m) and weight (Kg) of each subject were measured.
- ✓ Body mass Index (BMI) in kg/m<sup>2</sup> was calculated by formula height (m<sup>2</sup>)/weight (Kg).
- ✓ Estimation of Glycosylated hemoglobin (HbA1c) was done by HPLC ion Exchange Method.
- ✓ Measurement of serum Adiponectin level was done by Enzyme linked immunoassay (ELISA).

**Statistical analysis: -** Data were presented in the form of mean ± S.D. for continuous data, the present study was analyzed by ‘SPSS, Version 21. A ‘p’ value of ≤ 0.05 was considered as significant.

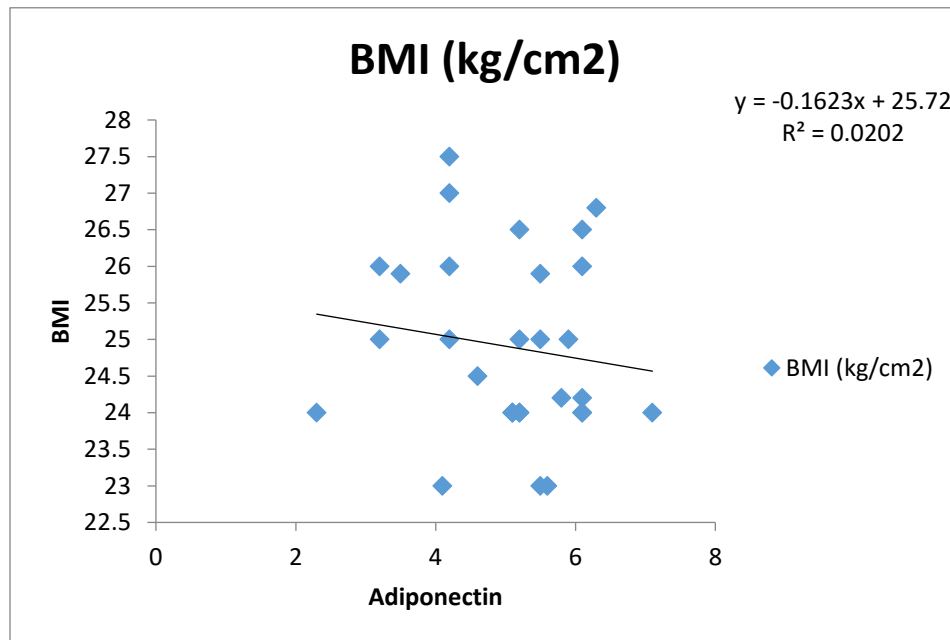
**Results & observation**

**Table-1** Comparison of Plasma Adiponectin, BMI and HbA1c in coronary artery diseases with and without Diabetes

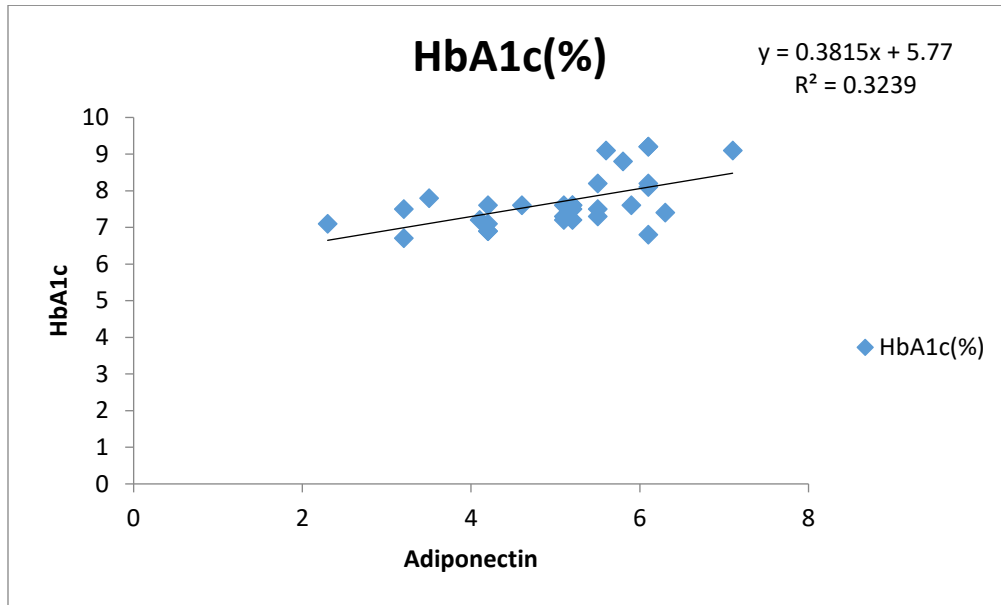
<b>Baseline Characteristic</b>	<b>CAD with Diabetes (Mean ± SD)</b>	<b>Diabetes mellitus (DM) (Mean ± SD)</b>	<b>P-Value</b>
Adiponectin	5.05±1.08	8.4±0.93	0.0001**
Body mass index (BMI)	24.9±1.24	29.56±1.38	0.0001**
HbA1c	7.69±0.72	8.4±0.93	0.0001**



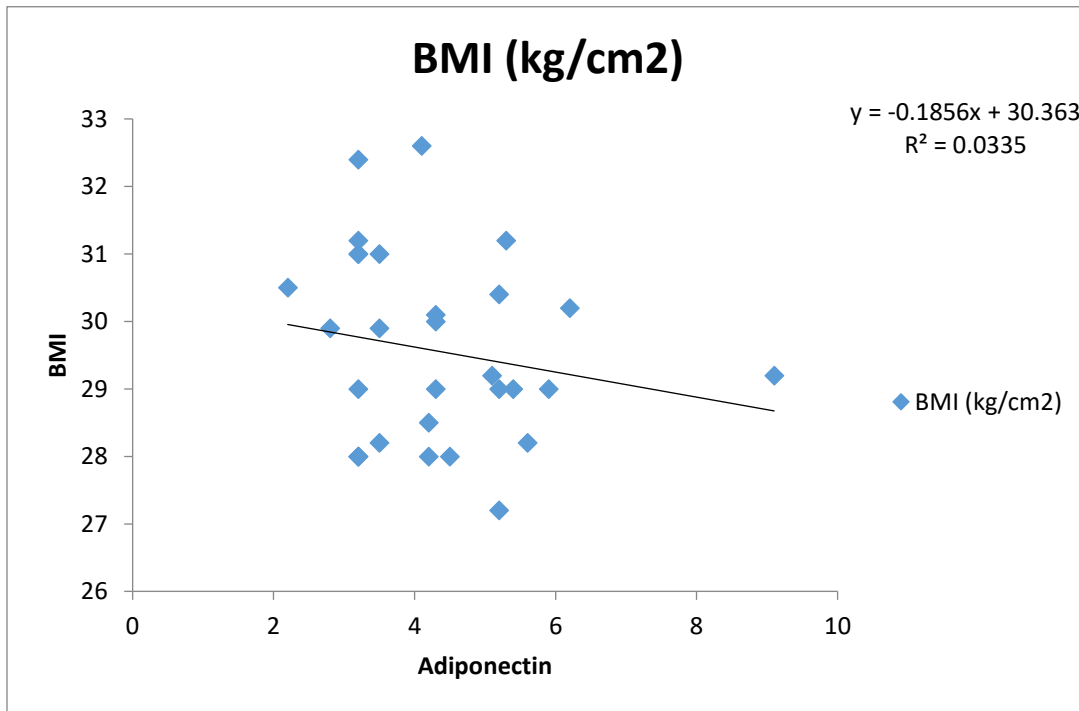
**Graph-2** Relationship between Plasma Adiponectin and BMI in coronary artery diseases with Diabetes mellitus



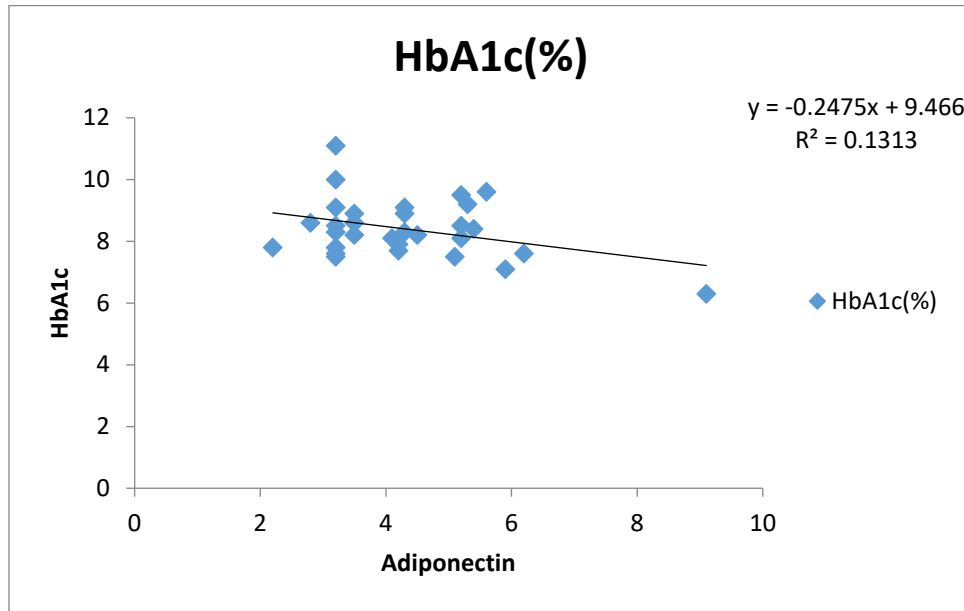
**Graph-3** Relationship between Plasma Adiponectin and HbA1c in coronary artery diseases with Diabetes mellitus



**Graph-4** Relationship between Plasma Adiponectin and BMI in Diabetes Mellitus



**Graph-5** Relationship between Plasma Adiponectin and HbA1c in Diabetes Mellitus



**Table: - 2-** Correlation analysis between Adiponectin with BMI and HbA1c

Independent variables	CAD with Diabetes (r value)	Diabetes mellitus (r value)
	<b>BMI</b>	<b>HbA1c</b>
Adiponectin	-0.14	-0.18
	0.56	-0.36

**DISCUSSION:**

With rising population figures, like any other developing country India is undergoing demographic and epidemiological transition and with changing dietary habits, the number of non-communicable case are rising as nutrition plays a key role in the prevention and causation these diseases. [9] There are few studies which have the evidence that decreased level of adiponectin observed in coronary artery diseases and diabetes mostly in Indian population. [10] Hence, looking into above aspect a type of observational study to find out the relationship between Adiponectin and body mass index and glycosylated hemoglobin (HbA1c). In the present study, a total of 90 subjects were included in the study among which 30 were CAD with diabetes and 30 Diabetes mellitus. In our study, we have done the various anthropometric measurement and biochemical parameter estimation. In the aspects of anthropometric measurement, we have calculated Body mass index (BMI) by World

health organization formula (WHO)-2005, that is BMI is calculated by weight (Kg) upon height ( $m^2$ ) and we found the mean level of BMI in the group –I that is in the coronary artery disease with diabetes was  $24.9 \pm 1.24$  and in the group-II that is diabetes subjects it was observed that  $29.56 \pm 1.38$ . In the aspects of comparison between these two we have also observed that the difference is statistically significant ( $P=0.001$ ). (Table-1)

For the biochemical parameter measurement, we have measured the concentration of glycosylated hemoglobin and adipokines (adiponectin) in both the group

The Adipose cells in our body secreted large amount of adiponectin, which is appear in an abundant form, that may be the 0.01 % of concentration of total plasma protein. [5]

In this study we found that the mean level of glycosylated hemoglobin (HbA1c) in the group-I (i.e. coronary artery diseases with diabetes mellitus) was  $7.69 \pm 0.72$  and in group-II (i.e. Diabetes mellitus subjects) was  $8.4 \pm 0.93$  and found statistically significant. ( $P=0.001$ ). (Table-1)

Hotta et al. and his coworkers in 2000 showed that the level of plasma adiponectin is significantly lower in patients of CAD and type-II diabetes mellitus. However, we have also observed the similar pattern. This may be due to the insulin resistance state or the obesity. [11]

Mohan et al and its coworkers demonstrated that the lower adiponectin levels were commonly associated with the components of metabolic syndrome mostly in Asian population such as diabetes, dyslipidemia. So high level of adiponectin could be beneficial for vascular damage. [12]

In the present study we have also analyzed the relationship between Adiponectin with body mass index and glycosylated hemoglobin in both the groups and found that there is significantly negative relationship between Adiponectin with body mass index ( $r = -0.14$ ) but there is significantly positive correlation between Adiponectin and glycosylated hemoglobin ( $r = 0.56$ ) in coronary artery diseases with diabetes patients shown in graph-2 & 3. This may be due to deposition of more adipose cells to periphery of the body. However, in the diabetes subjects the relationship of plasma adiponectin with body mass index is negatively correlated ( $r = -0.18$ ) whereas glycosylated hemoglobin is also negatively correlated with the adiponectin ( $r = -0.36$ ) shown in graph 3 & 4. (Table-2) In the study of Chow et al. (2007) observed that hypoadiponectinemia can be a good predictor for development of hypertension even after adjustment for risk factors such as BMI, sex, and age [13]. The negative correlation between adiponectin concentration and body mass index in diabetes subjects was explained in several studies on metabolic syndrome (Mts.) that may be due to effect of an intra-abdominal fat mass on circulating adiponectin. [14]

### **CONCLUSION:**

The finding of the present study highlighted that subject with coronary artery diseases with diabetes mellitus had lower adiponectin levels. Glycosylated hemoglobin is positively correlated with adiponectin in coronary artery diseases with diabetes but adiponectin is negatively correlated with body mass index and glycosylated hemoglobin in in diabetes subjects whereas there was negative relationship between adiponectin and body mass index in CAD with diabetes. These observations could be implied for therapeutic analysis in vascular damage.

**Limitation of study:** small sample size is the major limitation of the current study and this could be the major responsible factor to establish the association. And it also led to the lacking in power to detect significant association.

**Conflict of Interest:** There is no conflict of interest.

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