

## SERUM ADIPONECTIN LEVELS IN PATIENTS WITH CORONARY ARTERY DISEASE

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**Background:** Adiponectin is an adipocytokine secreted from white adipose tissue. Serum level of adiponectin has been shown to be reduced in several disease states like obesity and diabetes. Hypoadiponectinemia has also been included in the list of newer risk factors for Coronary Artery Disease (CAD). **Methods:** In this analytical cross-sectional study serum adiponectin level was measured by Enzyme Linked Immunosorbant Assay (ELISA) in 60 cases of coronary artery disease (CAD) (both sexes, aged 40–60 yrs) and 60 healthy controls. **Results:** Low levels of adiponectin were seen in CAD patients as well as controls. These levels were lower as compared to western standards. **Conclusion:** Our study conforms to the previous observation of lower serum adiponectin levels in South Asians compared to the western standards. Serum adiponectin level should be considered in the laboratory work-up of CAD patients.

**Keywords:** Coronary Artery Disease (CAD), adiponectin, hypoadiponectinemia, adipocytokine, Enzyme Linked Immunosorbant Assay (ELISA)

### INTRODUCTION

Adiponectin was discovered in 1990's by 4 independent research groups. Scherer *et al* in 1995 referred to it as adipocyte complement-related protein of 30 kDa (ACRP 30).<sup>1</sup> Hu *et al*<sup>2</sup> in 1996 called it Adipo Q, Maeda *et al*<sup>3</sup> in 1996 used the term Adipose most abundant gene transcript and Nakano *et al*<sup>4</sup> in 1996 named their discovery gelatin binding protein of 28 KDa (GBP28). Human adiponectin is a 30 kDa protein comprising 247 amino acids. This cytokine is a member of the collagen super family of proteins; and resembles collagens 8 and 10 and complement c1q.<sup>4</sup> Total plasma adiponectin level usually ranges from 3–30 µg/ml in human subjects.<sup>5</sup> It is produced exclusively in the white adipose tissue and its concentration in plasma is relatively higher compared to other hormones. Gender and ethnic background also affect adiponectin level. Women have generally higher levels compared to men and Caucasians have higher levels compared with BMI matched Indo Asians.<sup>6</sup>

High plasma adiponectin concentrations are associated with a reduced risk of MI in men.<sup>7</sup> It was found that hyperadiponectinemia was associated with a lower risk of MI over a follow-up period of 6 years among men without previous history of cardiovascular disease, independent of traditional cardiovascular disease risk factors.<sup>8</sup> In another study, reduced adiponectin was found to be highly associated with CAD incidence. The study revealed that male patients with hypoadiponectinemia (<4.0 µg/mL) had a 2-fold increase in CAD prevalence, independent of well-known CAD risk factors.<sup>9</sup>

Hypoadiponectinemia in South Asians has been consistently demonstrated in clinical studies to date. Retnekaran *et al* in 2006 reported that hypoadiponectinemia may be the reason for the increased risk of type-II diabetes and cardiovascular disease (CVD) in South Asians.<sup>10</sup> Vishwanathan *et al* carried out a study to assess the relation of adiponectin levels in Asian Indians, a high-risk group for premature coronary artery disease and diabetes. The study was conducted on subjects selected from the Chennai Urban Rural Epidemiology Study, an ongoing population study in Chennai in southern India. Lower adiponectin levels were found to be associated with the metabolic syndrome and its components, particularly, diabetes and dyslipidemia.<sup>11</sup>

Valsamaki *et al* demonstrated for the first time, the effect of ethnicity on adiponectin levels by showing a difference in adiponectin levels between male Caucasians and BMI-matched Indo-Asians. Indo-Asians were found to have lower serum adiponectin levels compared with Caucasians.<sup>12</sup>

### MATERIAL AND METHODS

The study was conducted in the University of Health Sciences Lahore. The study population consisted of 60 patients of angiographically proven CAD admitted in PIC and 60 healthy controls without history of angina or myocardial infarction. Subjects suffering from diabetes mellitus, severe liver and renal disease were excluded. Fasting venous blood samples were collected. Adiponectin in the samples was measured using the Biosource Adiponectin ELISA assay. The data was analysed using SPSS-16.

## RESULTS

As regards our principal study parameters, the serum adiponectin level ranged from 1.03–9.14 µg/dl in the patients and from 1.45–13.49 µg/dl in the controls. The mean serum adiponectin level was 3.84 µg/ml in the patients and 3.89 µg/ml in the controls. There was no significant difference between the two groups.

**Table-1: Mean serum adiponectin level in cases and controls**

Variable	Cases (n=60) Mean±SD	Controls (n=60) Mean±SD	p-value
Adiponectin ( g/ml)	3.84±1.99	3.89±2.05	0.890

## DISCUSSION

Adiponectin levels were found to be low in both the patients and controls with no significant difference between the two means. The mean adiponectin level in patients was 3.84±1.90 µg/ml while the mean level in controls was 3.89±2.05 µg/ml. Kumada *et al* in 2003 demonstrated that hypo-adiponectinemia (<4.0 µg/mL) was independently associated with the presence of CAD after adjustment for other well-known CAD risk factors in men.<sup>13</sup> This is in accordance with our results on CAD patients. The low level seen in controls is in agreement with various studies carried out on South Asians where levels of adiponectin have been found to be lower than Caucasians. A study conducted in 2003 by Valsamakis demonstrated, for the first time, ethnic differences in serum adiponectin between male Caucasians and BMI-matched Indo-Asians. Adiponectin was lower in Indo-Asians compared with BMI-matched Caucasians; median adiponectin was 3.3 vs 4.9 g/ml respectively.<sup>12</sup> Similar results were also seen in Asian Indian men by Abate in 2004.<sup>14</sup> Low levels of adiponectin in controls could also be due to the fact, that only diabetes and CAD were considered as an exclusion criteria for the controls, while hypertension and dyslipidemia were not. Adiponectin is reduced in hypertensives, diabetics and CAD patients<sup>15</sup> and dyslipidemia is also associated with decreased adiponectin concentration.<sup>16</sup> Although most studies show lower levels of adiponectin in CAD patients, a study conducted by Kistorp *et al* in 2005 showed no difference in incidence of IHD in groups with high and low adiponectin levels.<sup>17</sup> Most studies however show lower adiponectin levels in CAD as compared to healthy controls. In a study by Hotta *et al*, adiponectin levels were lowest in participants with coronary artery disease.<sup>8</sup> Kojima *et al*, found significantly lower adiponectin levels in patients with acute MI compared with individuals without coronary artery stenosis.<sup>18</sup> Similarly Matsubara *et al* also

reported lower plasma concentrations of adiponectin in patients with coronary artery disease as compared to control subjects.<sup>16</sup>

## CONCLUSION

Our study conforms to the previous observation of lower serum adiponectin levels in South Asians compared to the western standards. Serum adiponectin level should be considered in the laboratory work-up of CAD patients.

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## REFERENCES

- Scherrer PE, Williams S, Fogliano M, Baldini G, Lodish HF A novel serum protein similar to c1q produced exclusively in adipocytes. *J Biol Chem* 1995;270:26746–9.
- Hu E, Liang P, Spiegelman. AdipoQ is a novel adipose-specific gene dysregulated in obesity. *J Biol Chem* 1996;271:10697–703.
- Maeda K, Okubo K, Shimomura L, Funahashi T, Matsuzawa Y, Matsubara K. cDNA cloning and expression of a novel adipose tissue collagen like factor , apM1 (adipose most abundant gene transcript 1). *Biochem Biophys Res Commun* 1996;221:286–9.
- Nakano Y, Tobe T, Choi-Mura NH, Mazda T, Tomita M. Isolation and characterization of GBP28, a novel gelatin-binding protein purified from human plasma. *J Biochem* 1996;120:803–12.
- Gil-Campos M, Canete R, Gil A. Adiponectin, the missing link in insulin resistance and obesity. *Clin Nutr* 2004;23:963–74.
- Hopkins TA, Ouchi N, Shibata R, Walsh K. Adiponectin actions in the cardiovascular system. *Cardiovasc Res* 2007;74:11–8.
- Oh DK, Ciaraldi T, Henry RR. Adiponectin in health and disease. *Diabetes Obes Metab* 2007;9:282–9.
- Hotta K, Funahashi T, Arita Y, Takahashi M, Matsuda M, O Yoshishisa, *et al*. Plasma concentration of a novel adipose specific protein, adiponectin, in type 2 diabetic patients. *Arterioscler Thromb Vasc Biol* 2000;20:1595–9.
- Pischoon T, Girman CJ, Hotamisligil GS, Rifai N, Hu FB, Rimm EB. Plasma adiponectin levels and risk of myocardial infarction in men. *JAMA* 2004;291:1730–7.
- Retnakaran R., Hanley A, Zinman B. Does hypo adiponectinemia explain the increased risk of diabetes and cardiovascular disease in South Asians? *Diabetes Care* 2006;29:1950–4.
- Vishwanathan M, Deepa R, Deepa R, Vimalaswaran KS, Mohan A, Velmurugan K *et al*. Association of low adiponectin levels with the metabolic syndrome—the Chennai Urban Rural Epidemiology Study (CURES-4). *Metabolism* 2004;54: 476–8.
- Valsamakis G, Chetty R., McTernan PG, Al-Daghri NM, Barnett AH, Kumar S. Fasting serum adiponectin concentration is reduced in Indo-Asian subjects and is related to HDL cholesterol. *Diabetes Obes Metab* 2003;5:131–5.
- Kumada M, Kihara S, Sumitsuji S, Kawamoto T, Matsumoto S, Ouchi N, *et al*. Association of hypo adiponectinemia with coronary artery disease in men. *Arterioscler Thromb Vasc Biol* 2003;23:85–9.

14. Abate N, Chandali M, Snell PG and Grundy SM. Adipose tissue metabolites and insulin resistance in non diabetic Asian Indian men. *J Clin Endocrinol Metab* 2004;89:2750–5.
15. Mahmud A, Feely J. Adiponectin and arterial stiffness. *Am J Hypertens* 2005;18:1543–8.
16. Matsubara M, Maruoka S, Katayose S. Decreased plasma adiponectin concentrations in women with dyslipidemia. *J Clin Endocrinol Metab* 2002;87:2764–9.
17. Kistorp C, Faber J, Galatius S, Gustafsson F, Frydystk J, Flyvbjerg A, *et al.* Plasma adiponectin, body mass index, and mortality in patients with chronic heart failure. *Circulation* 2005;112:1756–62.
18. Kojima S, Funahashi T, Sakamoto T, Miyamoto S, Soejima H, Hokamaki J, *et al.* The variation of plasma concentrations of a novel, adipocyte derived protein, adiponectin, in patients with acute myocardial infarction. *Heart* 2003; 89:667–8.

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