

TO INVESTIGATE THE ASSOCIATION BETWEEN THE DEVELOPMENT OF CORONARY HEART DISEASE AND SERUM LEVELS OF ADIPONECTIN

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ABSTRACT

Objective:

To investigate the association between the development of coronary heart disease and serum levels of Adiponectin.

Materials and Methods:

It was a case control study done at the Department of Physiology Basic Medical Sciences Institute (BMSI) Jinnah Post Graduate Medical Centre(JPMC) in collaboration with Abbasi Shaheed Hospital Karachi.

The study included total 100 subjects , 50 subjects with angiographically confirmed coronary heart disease and 50 normal healthy age and gender matched controls. All the subjects were briefed about the the nature of the study and an informed consent were taken from all the recruits.

Result:

Adiponectin serum concentration was found (7.1 μ L) in coronary disease patients, and the serum concentration of adiponectin in control subjects was (11.98 μ L).

Key words:

Coronary heart disease, Adiponectin.

INTRODUCTION

Coronary heart disease is still the leading cause of morbidity and mortality world wide. It severely threatens the health of humans with increas-

ing prevalence and incidence.¹ Coronary heart disease is more prevalent with increase age because a number of risk factors increase with aging include hypertension, diabetes mellitus, obesity and metabolic syndrome, all of which continue to fuel the prevalence of coronary heart disease in aging population.⁸

Atherosclerosis constitutes single most important contributor to the growing burden of cardiovascular disease. Atherosclerosis is a chronic inflammatory arterial disease which is contributed by an inflammation and immune response.¹⁸ It is thought that endothelial dysfunction is amongst the first events in atherosclerosis, this if unabated and excessive leads to the advance complicated lesion.⁹

Major cause of endothelial dysfunction leading to atherosclerosis includes

elevated modified low density lipoproteins, Plasma homocysteine levels, Hypertention, Diabetes Mellitus, Insulin resistance and Genetic alteration.³

Adipose tissue is a complex essential and highly active metabolic and endocrine organ. Besides adipocytes, adipose tissue contains connective tissue matrix, nerve tissue, stromovascular cells, immune cells which work as an integrated unit. Adipose tissue not only respond to an afferent signals from traditional hormone system and the central nervous system but also secrete factors with important endocrine functions. These factors are leptin, adiponectin, resistin, TNF- α , PAF-1, proteins of renin angiotensin.²

The adipose tissue has traditionally been regarded as a silent organ that passively stores

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excess energy. However recent evidence suggests that adipose tissue especially visceral fat, is to be considered as endocrine organ, directly involving in the pathophysiology of metabolic syndrome and cardiovascular diseases.⁷

Adiponectin most abundantly circulating protein hormone derived by adipocyte was originally identified by four separate groups in mid 1990.

With in the vascular wall adiponectin inhibits monocyte adhesions by decreasing expression of adhesion molecules, inhibits macrophage transformation into foam cells by inhibiting scavenger receptors and decreases proliferation and migration of smooth muscle cells.¹²

In addition adiponectin increases nitric oxide production in the endothelium and stimulate angiogenesis, all these prevent the development of atherosclerosis thus preventing its complication cause by atheroma as infarction. Adiponectin suppress the inflammatory cytokines activation, adhesion molecules expression, formation of foam cells, formation of macrophage slow reacting substance of anaphylaxis(SR-As).¹³Accordingly adiponectin limits the initiation of atherosclerotic plaque formation, and appears to protect against all stages of atherosclerotic plaque formation, maintaining functional healthy endothelium, preventing plaque initiation, formation and progression protecting against rupture and thrombosis.

MATERIALS AND METHODS

This was a case control study conducted in the department of Basic Medical Sciences Institute(BMSI), Jinnah Post Graduate Medical Centre(JPMC) in collaboration with Abbasi Shaheed Hospital Karachi. The samples were collected between september to december 2009.

A total of 100 subjects were recruited in the study, and divided into 2 groups:-

A group consisting of 50 normal healthy control subjects with no history of coronary heart disease.The other group included 50 subjects which

were selected from the angiographically confirmed cases of coronary heart disease, stable angina and myocardial infarction. We excluded the cases of unstable angina, acute myocardial infarction, acute infections and malignancy in the study. Normal and diseased subjects were from both sexes of age ranging from 40 years to 80 years.

A written consent was taken from all the participants of the study six ml of the venous blood was drawn from the subjects under all aseptic procedures. The blood sample was transferred to the gel tube. After 30 min to 60 min the blood was centrifuged for 10 minutes at the speed of 3000 rounds per minutes (rpm). Serum was separated to dry clean aliquot tube and stored at -20 degree centigrade. Before analyzing, the samples were thawed and allowed to attain the room temperature. Serum adiponectin was measured by enzyme linked immunoassay, using the kit provided by Biosource France.

RESULTS

Table 1 shows the comparison of mean ages among 2 groups i.e normal healthy control group and the group having diagnosed cases of coronary heart disease. Mean ages of 2 groups were comparable on average, as the samples were collected from the matched cases.

Table 1 also shows the comparison of height among the 2 groups i.e between cases and control subjects, non significant changes were recorded in the height among the 2 groups. On comparison of weight among the 2 groups i.e between cases and the control subjects, weight in group B was significantly increased as compared to control subjects (73.5 ± 0.5) and (66.0 ± 0.10) respectively ($p < 0.001$). Independent t-test was applied.

Table 2 shows comparison between serum Adiponectin concentration in coronary diseased subjects with that of control. The Adiponectin concentration was found to be significantly ($p < 0.001$) decreased in CHD patients ($7.10\pm 1.40^{**}$) when compared with controls (11.98 ± 0.59).

TABLE 1

COMPARISONS OF AGE, HEIGHT AND WEIGHT IN CONTROL & CORONARY ARTERY DISEASE (CAD) GROUPS

Variables	Group B Coronary artery disease (CAD)	Group A Mean \pm SEM (control)
Age (Years)	54.17 \pm 2.24	55.18 \pm 1.12
Height (Meter)	1.56 \pm 0.02	1.60 \pm 0.02
Weight (Kg)	73.5 \pm 0.19**	66.0 \pm 0.10

***P < 0.001 highly significant when compared to controls*

TABLE 2

COMPARISON OF SERUM ADIPONECTIN CONCENTRATION IN NORMAL CONTROL GROUP WITH CORONARY DISEASED SUBJECTS GROUP

Variables	Group B	Group A
Serum Adiponectin (μ gm/ml)	Coronary artery disease (CAD)	Control
	Mean \pm SEM	Mean \pm SEM
	7.10 \pm 1.40**	11.98 \pm 0.579

***P < 0.001 highly significant when compared to controls.*

DISCUSSION

The results of our study show marked decrease in the concentration of adiponectin in coronary heart disease subjects when compared to controls, this suggests that subjects having lower concentration of serum adiponectin are more prone to develop coronary heart diseases. The study indicate that low adiponectin levels are associated with coronary disease. Our study is comparable with

Ouchi et al who found that plasma adiponectin levels are inversely correlated with an endothelial dysfunctions. These results were confirmed in animal studies by showing that adiponectin-deficient mice display impaired endothelium-dependent vasodilation and NO production thus prone towards atherosclerotic vascular diseases.¹⁹

It has been reported by the results of the study that plasma adiponectin concentrations are lower in patients with clinical manifestations of coronary artery disease than in age- and BMI-adjusted control subjects. Our results are supported by previous prospective studies. In a study among 227 patients, plasma adiponectin levels were an inverse predictor of cardiovascular events.

Our data suggests that the decrease in adiponectin concentration may lead to the development of coronary disease, and even more fatal outcomes in established coronary diseased patients. Tan et al showed that hypoadiponectinemia is associated with increase coronary artery disease outcomes. The same group found that adiponectin administration increases NO production in human aortic endothelial cells, which has a protective effects against the development of atherosclerosis thus preventing coronary disease.¹⁹ The results of our study has generated an enthusiasm for the idea that hypoadiponectinemia might be a pathogenetic element in the development of coronary heart disease. This is revealed by the lower concentration of adiponectin in coronary diseased subjects and subjects having cardiovascular risk factors in comparison with controls. This is comparable with the study done by Kumada et al., (2004), Nakumara et al., (2004) and Baretta et al., (2004) in which they show inverse association between levels of adiponectin and coronary heart disease risk factors.

CONCLUSION

Our data suggested that the decrease in adiponectin concentration may lead to the development of coronary disease.

Determination of adiponectin serum concentration at an early stage in those patients who are at high risk of developing coronary disease will guide clinician to take appropriate measures to prevent the development of cardiovascular disease. The result of this study concluded that serum adiponectin concentration can be used as a marker to determine future coronary heart disease and suggested that high adiponectin concentration is cardioprotective and prevent from atherogenic arterial disease.

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