

Original Article

CORRELATION OF SERUM ADIPONECTIN WITH LIPID PROFILE IN DIABETIC AND NON DIABETIC RATS

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Objective: To determine the relationship of adiponectin with lipid profile in diabetic and non diabetic rats.

Methods: A randomized controlled trial (RCT) study was conducted at Physiology department, Services Institute of Medical Sciences (SIMS), Lahore from August 2013 to January, 2014. This study was conducted on sixty male albino rats weighing 150-200gm.

Thirty rats were selected after induction of diabetes with alloxan monohydrate (group B). Another 30 non diabetic healthy rats were chosen and labeled as group A. A 4-5 ml intracardiac blood sample was taken from each rat. Biochemical parameters evaluated were adiponectin (by ELISA method), serum total cholesterol (by CHOD-PAP enzymatic colorimetric method), serum triglyceride (by GPO-PAP enzymatic colorimetric method), serum HDL-C (by Precipitation method) and serum LDL C (by using Friedewald formula, $LDL=TC-(HDL+TG/5)$).

Results: There was a significant negative ($r= -.404, p=.027$) correlation of serum adiponectin with serum triglyceride in diabetic group.

Serum VLDL also showed a significant negative ($r= -.404, p=.027$) correlation with serum adiponectin in diabetic group. No significant correlation was found between serum adiponectin and lipid parameters in non diabetic group.

Conclusions: The negative correlation of serum adiponectin with serum triglycerides and VLDL in diabetics depicts its association with insulin resistance in type 2 diabetics.

Keywords: adipocytokines, adiponectin,

Introduction

The white fat depot called as adipose tissue has been proved as endocrine organ¹. Presently, it is considered as the largest endocrine organ in the body². Adipose tissue secretes series of adipocyte-derived substances that are termed as adipocytokines. These include leptin, tumor necrosis factor- α (TNF- α), acylation-stimulating protein (ASP), plasminogen activator inhibitor-1 (PAI-1), interleukin-6, resistin, visfatin and adiponectin.^{3,4} Adiponectin is the most abundant of these adipocytokines which are secreted by white adipose tissue and contributes 0.01% of total plasma proteins.^{5,6} It has engrossed much attention due to its anti-inflammatory and insulin-sensitizing properties. In addition, it has valuable role in glucose metabolism⁷. It is the only adipose-specific protein identified up till now that has negative relation with obesity.⁸ Even though, adipocytes are the single site of its secretion, but its concentration has been found lower in obese individuals, particularly those who have abdominal fat. Decreased quantity of adiponectin is also coupled with insulin resistance and non insulin dependent diabetes.⁸ Adiponectin levels also differ between ethnic groups. Studies have shown that South Asian

people have low adiponectin levels while their leptin is more than that of European population. Because of consuming high glycemic index food, South Asian population is more insulin resistant⁹. Loss of weight, type 1 diabetes, leptin and anorexia nervosa have been known to up regulate adiponectin.¹⁰ Diabetes mellitus (DM) is a syndrome of impaired carbohydrate, fat, and protein metabolisms caused by either lack of insulin secretion or decreased sensitivity of the tissues to insulin.¹¹ The prevalence of DM is increasing around the world so dramatically as to have been characterized as an epidemic so much so, that 439 million cases of type 2 diabetes are projected by 2030.¹² WHO has estimated a rise of 170% in the incidence of DM in developing countries. The same trend is reflected in Pakistan as National Diabetes Survey estimates an increase in cases of type 2 diabetes from 4.3 million in 1995 to 14.5 million in 2025.¹³ Diabetes can lead to a wide range of complications that involve primarily arteries and capillaries. Type 2 diabetics are predominantly at increased danger of morbidity and mortality due to their long-standing complications.^{14,15} The study was planned to determine the correlation of serum adiponectin with lipid profile in diabetic and non diabetic rats.

Methods

A randomized controlled trial (RCT) study was conducted at Physiology department, Services Institute of Medical Sciences (SIMS), Lahore from August 2013 to January, 2014. This research project was approved by Institutional Research Ethical Committee. Sixty male albino rats (150-200gm weight) were selected. In 30 rats, diabetes mellitus was introduced by intraperitoneal injection of alloxan monohydrate (120mg/kg). After confirmation of diabetes, these were labeled as group B. Another 30 healthy rats (who did not receive injection of alloxan monohydrate) were chosen, these were labeled as Group A (non-diabetic control). A 4-5 ml intracardiac blood sample was taken from each rat. Biochemical parameters evaluated were adiponectin (by ELISA method), serum total cholesterol (by CHOD-PAP enzymatic colorimetric method), serum triglyceride (by GPO-PAP enzymatic colorimetric method), serum HDL-C (by Precipitation method) and serum LDL C (by using Friedewald fomula, $LDL=TC-(HDL+TG/5)$).

Results

The Pearson's correlation of serum adiponectin with lipid parameters was determined. There was a significant negative ($r = -.404, p = .027$) correlation of serum adiponectin with serum triglyceride in diabetic group (Table 1). Serum VLDL also showed a significant negative ($r = -.404, p = .027$) correlation with serum adiponectin in diabetic group (Fig 2).

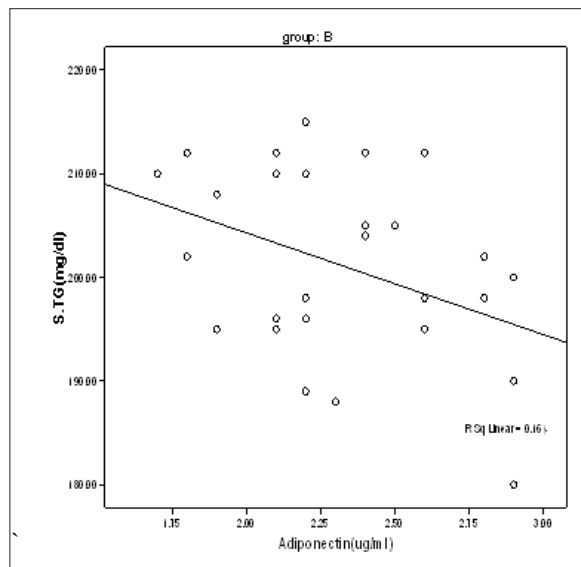


Fig-1: Scattered diagram showing the negative correlation of serum adiponectin with serum

triglyceride in group B ($r = -.404, p = .027$). No significant correlation was found between serum adiponectin and lipid parameters in non diabetic group (Table 1).

Table-1: Pearson's correlation of serum adiponectin with serum lipid profile and in two groups.

Correlation of serum adiponectin with	Group A (n=30)		Group B (n=30)	
	r	q	r	q
Serum HDL	.112	.556	.214	.256
Serum Triglyceride	.082	.666	-.404	.027*
Serum Cholestterol	-.245	.192	.218	.247
Serumy LDL	-.100	.600	.110	-.562
Serum VLDL	.081	.671	-.404	.027*

P < 0.05, significant

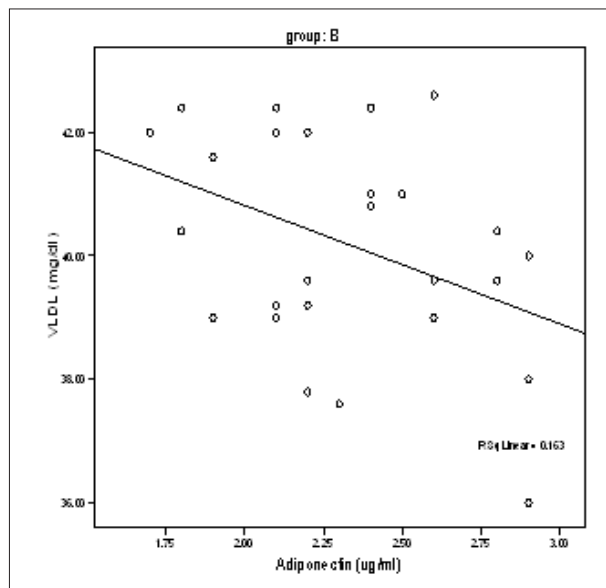


Fig-2: Scattered diagram showing the negative correlation of serum adiponectin with serum VLDL in group B ($r = -.404, p = .027$).

Discussion

The study was conducted on male albino diabetic rats to see the correlation of serum adiponectin with lipid parameters. Our study showed that there was significant negative correlation of serum adiponectin with serum triglyceride in diabetics. Serum VLDL also showed a significant negative correlation with serum adiponectin in diabetic group. A prospective, non interventive study on human beings was carried out by Matthias et al. The correlation of plasma adiponectin with high density lipoprotein and other lipid parameters was investigated. They concluded that high plasma adiponectin were positively associated with HDL cholesterol and had a negative correlation with triglyceride.¹⁶ Their results are in consistent with our study. Non interventional studies

have been carried out and reported that in general high serum adiponectins levels are associated with HDL cholesterol and negative association have been observed with other lipid parameters (i.e., LDL, VLDL Cholesterol) in insulin resistant type 2 diabetic people.¹⁷

Deranged lipid profile which is characterized by low concentrations of apolipoprotein A₁ and high concentrations of triglycerides lipoproteins has a negative relationship with serum adiponectin concentrations.¹⁸ According to a study, elevation of serum TG/HDL, TC/HDL and LDL/HDL ratios reduces the plasma concentration of adiponectin.¹⁹

Diminished adiponectin focuses have been connected to higher LDL cholesterol and TG fixations presumably due to adiponectin straightforwardly influencing lipoprotein lipase.^{20,21}

These ratios project insulin resistance²². The

correlation between serum adiponectin and HDL is possibly under the control of both physiological and pathological mechanisms. Adiponectin regulates HDL concentration by decreasing HDL catabolism and inhibiting hepatic lipase activity.²³

Conclusion

The present study concludes a negative correlation of serum adiponectin with serum triglycerides and VLDL exists in diabetics. This depicts association of serum adiponectin with insulin resistance in type 2 diabetics.

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