



RESEARCH ARTICLE

APO-A1 LEVELS IN DIABETES MELLITUS WITH OR WITHOUT CAD

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ABSTRACT

Study background: There is an increased incidence of Type-II Diabetes and Coronary artery disease (CAD) in the Indian subcontinent during the past few decades.¹ Abnormalities in the Lipid profile considered to be atherogenic include hypertriglyceridemia, low HDL-Lipoprotein and hypercholesterolemia. Recently sub-fractions of the Lipoproteins are found to be predictive of CAD especially in type-II Diabetic patients.

Aim of study: The present study consists of estimating Apo-A1 lipoprotein levels in Diabetic patients with CAD and without CAD.

Study type: comparative study.

Study sample: includes 60 type-II Diabetes patients with or without CAD from King George Hospital, Visakahapatnam.

Result of study: Apo-A1 levels are found to be significantly lower in type-II Diabetes patients than normal controls. Apo-A1 levels are also lower in those with CAD than those without CAD in type –II Diabetes patients.

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INTRODUCTION

One of the factors contributing to the increased risk of CAD is the high prevalence rate of low plasma concentrations of HDL-C and its Apo lipoprotein (Apo-A1). Apo-A1 is the principle protein component of HDL, which removes cholesterol from the cells, thus having protective effect (Bhatnagar, 1997; Education Program, 1997). Measurement of Apo-A1, which provides further useful information, can be an alternative to the measurement of HDL-C. At the time of diagnosis of type-II Diabetes, more than 50% of the patients are found to have a preexisting cardiovascular disease. High triglyceride levels, low HDL-cholesterol levels, and other changes in the lipid profile increase the atherosclerotic plaque formation, accelerating atherosclerosis in diabetic subjects. Insulin resistance, hypertension, altered rate of fibrinolysis also render the dormant atherosclerotic plaque vulnerable to precipitate an early clinical event (Grundy *et al.*, 1989). American Heart Association and American Diabetic Association recommend that "Diabetes should be treated as a CAD equivalent". The present study evaluates the atherogenic lipid profile in Type 2 Diabetes mellitus patients with and without coronary artery disease with focus on apolipoprotein A1.

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MATERIALS AND METHODS

The present study was conducted on 60 patients of type 2 Diabetes mellitus. They were in patients who were admitted into King George Hospital. Their ages were ranging from 40 – 60 years. No specific reference was made with regard to sex of the patient. Inclusion criteria include Type 2 Diabetes mellitus patients with positive history of Coronary Heart disease. Coronary Heart disease was defined as positive history of myocardial infarction or acute episode of M.I in type 2 Diabetes mellitus patients and positive findings in the E C G, of type 2 Diabetes mellitus patients in the present study. Patients excluded were those diagnosed to have with hypothyroidism, recent cerebro-vascular accidents, Alcoholism and those associated with other complications of Diabetes mellitus such as Nephropathy, Retinopathy and Neuropathy. Out of the 60 patients in the present study, 38 patients with longer duration of Diabetes mellitus (more than 6years) had suffered an episode of MI., 22 patients were of shorter duration (less than 6years) without any complication. All the patients had fair to good metabolic control, of Diabetes. Samples of 30 healthy age and sex matched individuals served as controls. They do not have any evidence of heart disease or Diabetes. Venous blood sample was collected after an overnight fast of 12 hours and the serum was used for the estimation of fasting blood glucose (FBG) by (Nelson Somogyi method 1945, modified 1952)., total cholesterol (TC) by (Modified method

Zak's 1957, triglyceride (TG) by (- Glycerol -3- phosphate oxidase / N-ethyl-N-Sulfo prophy- Anisidine method (GPO/ESPAS 1973 189-191) and high density lipoprotein cholesterol (HDL-C) by direct enzymatic colorimetric method Burstein and Scholrick, 1970). LDL-C and VLDL-C were calculated using the Friedewald's formula (Friedewald, *et al.*, 1972). Glycosylated Hemoglobin (HbA1c) (Ion exchange Chromatography, Apo A1 were measured following the principle of antigen-antibody reaction by immunoturbidometric method (Rifai, *et al.*, 1986). The cases of type-II Diabetes mellitus were divided into 2 groups. Type 2 Diabetes mellitus of >6 years duration with CAD. Type 2 Diabetes mellitus of 0 – 6 years duration without CAD.

Table 1. Test and control groups categorization.

R. no	Variable	Mean	SD	SEM
1.	Apo-A1	134.03	8.30	1.51
2.	S.T.Cholesterol	197.8	8.67	1.58
3.	Triglycerides	144.36	5.01	0.91
4.	HDL-C	44.86	4.55	0.83
5.	LDL-C	124.12	21.65	3.95
6.	VLDL-C	28.75	1.081	0.19
7.	FBS	87.5	6.64	1.21
8.	Hb A _{1c}	4.47	0.59	0.10
9.	S.Creatinine	0.9	0.09	0.01

Table 2. Various parameter values, Mean, SD SEM, p values of control group

S. No	Types of cases	No of Persons
1.	Total no. of Patients.	60
2.	Controls`	30
3.	Type 2 Diabetes mellitus Patients without CAD.	22
4.	Type 2 Diabetes mellitus Patients with CAD	38

Table 3. Various parameter values mean, SD, SEM and P values of test groups

S.No	Variables	Mean	SD	SEM	P. Value
1.	Apo-A1	104.51	7.58	1.48	<.001
2.	S.total cholesterol	246.87	12.56	2.35	<.001
3.	S.Triglyceride	230.73	16.86	3.11	<.0001
4.	HDL-C	31.07	1.889	0.36	<.0001
5.	LDL-C	169.14	15.14	2.84	<.001
6.	VLDL-C	47.98	3.32	0.51	<.001
7.	FBS	132.1	4.06	0.76	<.001
8.	HbA _{1c}	9.25	0.57	0.10	<.001
9.	S.creatinine	1.13	0.11	0.02	<.05

Table 4. Mean, SD, SEM, P- values of Apo A1 in patients of type 2 Diabetes mellitus With CAD and without CAD

Variable	Mean	SD	SEM	p.value
Apo-A1 Cases C with CAD	93.08	6.33	1.04	<0.0001
Apo-A1 cases C without CAD	115.95	8.82	1.92	<0.0001
Apo-A1 control	134.03	8.30	1.51	

DISCUSSION

APO-A1 levels are found to be lower in type 2- Diabetes mellitus patients than those obtained in healthy individuals. 104.51; 7.58; 1.48 versus 134.03, 8.30, 1.54 [p.value<0.0001].

It is significantly decreased. Apo-A1 values related to duration of Diabetes mellitus are 0-5 years, 6-10 years, >10Years [116.31 ± 9.07 ± 2.13 versus 95.19 ± 8.63 ± 1.72 versus 87.8 ± 7.73 ± 1.8]. Very low levels of Apo-A1 were observed in type 1 Diabetes mellitus of >10 years duration with complication of CAD. Apo-A1 levels are decreased in-patients of type 2 Diabetes mellitus with and without CAD compared to controls, which is statically significant. [93.08 ± 6.33 ± 1.04 versus 115.95 ± 8.82 ± 1.92 versus 134.03 ± 8.30 ± 1.51; p value <0.0001].

Conclusion

Apo lipoprotein A1 (Apo A1) is the principal protein component of high density lipoprotein (HDL), which removes cholesterol from the cells and thus has an protective effect to atherosclerosis. Epidemiological studies have shown an inverse relationship between levels of HDL respectively Apo A1 and prevalence of coronary heart disease (CHD).⁵ While determination of total cholesterol and triglycerides is used for screening of coronary risk, measurement of Apo A1 beside lipoprotein (a) and apolipoprotein B provides further useful information in lipid disorders and can be an alternative to the measurement of HDL cholesterol. (Walldius and Jungner, 2004) Several studies indicate that increased concentrations of Apo B (> 1.50 g/l in women and > 1.55 g/l in men) and decreased concentrations of Apo A1 (<1.20 g/l in women and < 1.10 g/l in men) may be good predictors of risk of CHD. (Hua Xi Yietal, 2001)

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