

STUDY OF ABNORMAL LIPIDS AND APOLIPOPROTEIN-B COMPOSITION IN DIABETIC AND NONDIABETIC CHRONIC RENAL FAILURE PATIENTS

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ABSTRACT

The study was aimed to investigate the role of lipids and Apo-B lipoprotein composition in diabetic and non diabetic CRF patients. The study included 50 diabetic and 50 non diabetic renal failure patients receiving regular Hemodialysis, between the age group of 35 ± 20 years and 50 age and sex matched healthy controls. Heparinized blood samples were collected before Hemodialysis, and analyzed for Apo-B containing lipoproteins by immunoturbidimetric method. Serum Total cholesterol, Triglycerides, LDL and HDL were analyzed by using commercially available kits in Olympus auto analyzer. Apo lipoprotein-B, LDL cholesterol, total cholesterol and triglyceride levels were significantly elevated in Diabetic CRF patients. But HDL levels were characteristically reduced in all patients. Apo-B, LDL levels showed a significant decrease in non diabetic renal failure patients compared with diabetic CRF patients. CRF patients on Hemodialysis showed compositional and metabolic abnormalities of plasma lipoproteins. The study is aimed to investigate the abnormalities in the lipids and apolipoprotein-B concentration in diabetic and non diabetic CRF patients.

KEY WORDS

Apo lipoprotein B; Chronic renal failure; Hemodialysis; Lipoproteins;

INTRODUCTION

Renal disease is characterized by alteration of lipoprotein metabolism which appears as Nephrotic syndrome or renal insufficiency. The renal dyslipoproteinaemia may be manifested as elevated lipid concentration¹. Nephrotic syndrome results in increase concentration of both cholesterol and triglycerides rich Apo-B containing lipoprotein, while renal insufficiency is characterized by accumulation of partially metabolized triglyceride rich Apo-B containing lipoprotein². Nephrotic syndrome and progression of renal failure are accomplished by abnormalities of lipoprotein transport³. In our study we observed that dyslipoproteinemia is a condition present in diabetic as well as non diabetic CRF patients undergoing Hemodialysis⁴. The purpose of the study is to compare changes in lipoproteins and apo lipoprotein-B composition in diabetic and non diabetic CRF patients. Type-2 Diabetes mellitus is a known high risk factor for dyslipoproteinemia and renal loss. Dyslipidemia in diabetic patients is associated with increased risk of cardiovascular disease [5].

MATERIALS & METHODS

The study included 50 diabetic and 50 non diabetic renal failure patients (age 35±20 years) undergoing routine Hemodialysis at the dialysis unit of the Nephrology Department at the SRM Medical college Hospital and Research Center in Chennai. The mean duration of dialysis treatment was 4±2 years. All patients received 3 hour Hemodialysis sessions 3 times a week. Patients who had acute infection, liver disease and atherosclerotic cardiovascular disease were excluded. Patients with dyslipidemic renal failure, type-2 diabetes and hypertension were

included. All subjects signed informed consent statements. The study protocol was approved by the ethics in human research committee of our hospital. Blood samples were collected after an overnight fast of 12 hours in heparinized tubes by venipuncture, and analyzed for Apo-B containing lipoproteins by immunoturbidimetry method in (AU 400⁶). Olympus auto analyzer by using Spin react (German company) manufactured auto kit.

Total cholesterol, Triglycerides, LDL and HDL were analyzed by enzymatic kit (Auto pure manufactured kits) method by using Olympus auto-analyzer⁷.

All statistical data were analyzed by student's t-test to compare the significance between diabetic and non diabetic groups. Data were expressed as mean ± SD.

Correlation between lipoprotein variables have been analyzed by using Pearson's coefficient for pair wise comparison. P-value of less than 0.05 (P<0.05) was considered as statistically significant.

RESULT

Plasma triglyceride concentrations were significantly increased in both diabetic and non diabetic CRF patients compared to controls. Total and LDL cholesterol were elevated in both groups of CRF patients. CRF patients had higher total and LDL cholesterol levels than controls. In CRF patients the levels of Total cholesterol, Triglycerides, LDL and VLDL showed statistically significant (P<0.001) increase compared to controls. But in diabetic CRF patients the levels of Total cholesterol, Triglycerides, LDL and VLDL levels were significantly elevated than the non diabetic CRF patients. Non diabetic CRF

patients showed significant rise in Total cholesterol, Triglycerides, LDL and VLDL levels when compared to the controls.

Apo-B levels in diabetic CRF patients were significantly increased compared to nondiabetic CRF patients and healthy controls. The levels of Apo-B containing

lipoproteins were increased in both diabetic and non diabetic CRF patients compared to controls. There is a significant correlation between LDL cholesterol and Apo-B in all groups. The levels of Apo-B were high in the diabetic renal failure patients compared to non diabetic CRF patients [Table 1].

Table 1

Plasma lipids and apolipoprotein-B concentrations, in Diabetic and Non diabetic CRF patients

Parameter	Healthy Controls (n=50)	Diabetic CRF patients on Hemodialysis (n=50)	Non Diabetic CRF patients on Hemodialysis (n=50)
Total Cholesterol (mg/dl)	171 ± 7	208 ± 9 ^{a**}	197 ± 11 ^{b*}
Triglycerides (mg/dl)	138 ± 8	175 ± 10 ^{a**}	163 ± 8 ^{b*}
LDL (mg/dl)	98 ± 4	136 ± 11 ^{a**}	125 ± 11 ^{b*}
VLDL (mg/dl)	28 ± 3	36 ± 6	35 ± 2
HDL (mg/dl)	45 ± 3	39 ± 5	37 ± 4
APO-B (mg/dl)	88 ± 9	119 ± 9 ^{a***}	102 ± 7 ^{b* *}

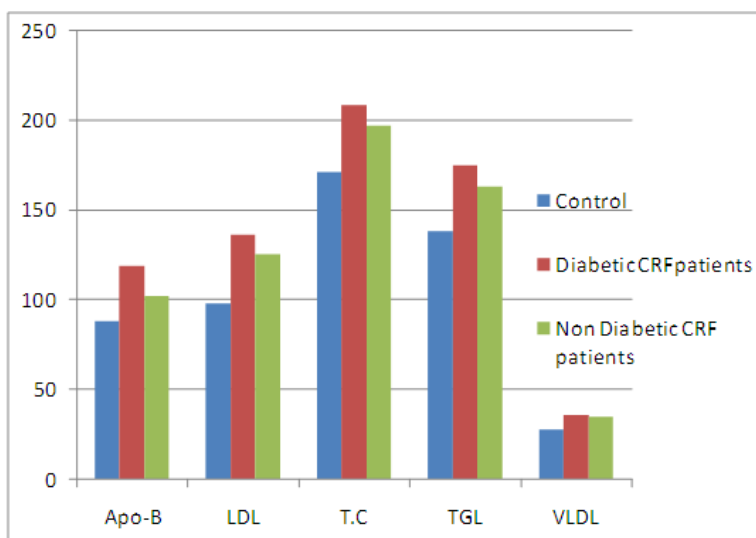
The values represent the Mean ± SD.

a: Comparison between diabetic CRF patients with healthy controls

b: Comparison between non diabetic CRF patients with healthy controls

**significance was defined as p<0.05 compared with controls.*

Concentrations of Apo-B and lipoprotein levels Diabetic, Non diabetic and control subjects



DISCUSSION

The present study shows that elevated levels of Apolipoprotein B containing lipoproteins seem to be of prognostic importance in patients with progressive chronic renal insufficiency. Patients with impaired renal function exhibit significant alterations in lipoprotein metabolism, which in their most advanced form may result in the development of severe dyslipidemia⁸. Most studies in human progressive chronic renal disease have focused on the prognostic impact of elevated plasma lipids, i.e. of hypercholesterolaemia. However, the present findings confirm that dyslipoproteinaemia is predominantly reflected as abnormal Apo lipoprotein rather than lipid profile⁹. Therefore it is necessary to analyze the specific lipoprotein abnormalities not only in terms of lipid but also in terms of Apo lipoprotein profiles when the role of renal dyslipidemia is investigated. The importance of Apo lipoprotein profiling is based on the notion that Apo lipoproteins are the essential constituents responsible for the functional properties and structural stability of circulating lipoprotein particles¹⁰. However, LDL cholesterol levels were significantly associated with a higher rate of progression in CRF patients. Hence, these associations indicate that increased concentration of Apo-B containing lipoproteins in the LDL, VLDL range may play an important role in the progression of primary renal disease¹¹. One of the main characteristics of renal dyslipoproteinemia is the accumulation of intact and partially metabolized Apo-B containing lipoproteins. The findings in the present study shows that increased

concentrations of Apo-B containing lipoproteins may be associated with more rapid progression of renal insufficiency. Partially degraded triglyceride rich Apo-B containing lipoproteins are strongly associated with the development of small coronary atherosclerotic lesions¹². Specifically, elevated levels of certain Apo-B containing lipoproteins may promote further progression of renal failure. Abnormal lipid, lipoprotein and Apo lipoprotein pattern in diabetic CRF patients shows significantly high levels of total cholesterol, triglycerides, LDL cholesterol and Apo B compared with nondiabetic CRF patients and controls¹³.

Poor glycemic control, hypertension, and dyslipidemia are known risk factors for the development of diabetic renal failure. So the altered lipid profile and apolipoprotein composition in case of diabetic CRF patients leads to an increased risk in the development of atherogenic cardio vascular disorders compared to non diabetic renal failure patients. The estimation of Apo-B is a better marker than the estimation of LDL to assess early cardiac problems particularly in dyslipidemic renal failure patients.

CONCLUSION

In conclusion the significantly increased concentrations of abnormal Apo-B containing lipoproteins is mainly due to elevated triglyceride rich lipoprotein and not due to cholesterol rich lipoprotein. The prognostic significance of these metabolic abnormalities and their effect on progression of vascular manifestations remain to be explored.

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