Original Research Article

Comparative Observational Study of Serum Lipid Abnormalities in Type 2 Diabetes Mellitus Patients with or Without Diabetic Nephropathy

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ABSTRACT

Objective: The main objective of the study was comparatively evaluation of serum lipid abnormalities in type 2 diabetes mellitus patients with or without diabetic nephropathy.

Methods & materials: This is an observational study to explore the lipid abnormalities in diabetic patients with or without diabetic nephropathy. After taking patients consent demographic details like weight, height, age, weight were documented in a predesigned proforma and serological test was performed to identify , glycemic parameters like fasting blood glucose (FBG) , post prandial blood glucose (PPBG), glycated haemoglobin and serum lipid parameters like total cholesterol(TC), serum triglycerides (TG), Low Density Lipoprotein (LDL) and High Density Lipoprotein (HDL).

Results: It was observed that both with and without nephropathy group had almost similar age group which was 52.7±9.79 and 53.4±9.35 years respectively. Between two groups there was no statistically significant difference (p value=0.823) as per age is concern. There were significant statistical differences in glycemic parameters and serial lipid parameters in-between the two groups. With nephropathy group, 70% of T2DM patients and without nephropathy group 44% of T2DM patients had dyslipidemia. Atherogenic dyslipidemia was observed 7% in diabetes with nephropathy group and 11% in without nephropathy group. In nephropathy group there were a higher percentage of subjects with dyslipidemia (p value=0.02).

Conclusion: In the management of diabetes an important therapeutic target identified as dyslipidemia. Abnormal lipoprotein metabolism accelerates diabetic nephropathy which causes cardiovascular disease as well as the progression of diabetic nephropathy.

Keywords: serum lipid abnormalities, type 2 diabetes mellitus, diabetic nephropathy

INTRODUCTION

Diabetic nephropathy is clinically defined by the presence of persistent proteinuria of > 500 mg/day in a diabetic patients who has concomitant diabetic retinopathy and hypertension and in the absence of clinical or laboratory evidence of other kidney or renal tract disease [1,2]. The presence of diabetic retinopathy is an important pre-requisite because in its absence, albuminuria in a type 2 diabetic patients may be due to diabetic or non-diabetic glomerulosclerosis and the chances for both are equal [3]. Diabetic nephropathy is the leading cause of chronic renal failure worldwide.

Racial differences in the prevalence of diabetic renal disease between the people of Asian ethnic origin and White Caucasians have been reported in the United Kingdom. According to few studies Asian Indians had 40 times greater risk of developing end stage diabetic nephropathy (ESRD) when compared with the Caucasians [4]. Thus with India leading the rest of the world in claiming highest diabetic populations and diabetes mellitus leading the rest of the disease in being one of the commonest cause of end-stage renal disease and chronic renal failure, it becomes imperative for us in this country to evolve definite guidelines for evaluation of diabetic nephropathy and

suggest practicable clinical recommendations to combat it [5].

In insulin-resistant patients atherogenic dyslipidemia was mimics by a secondary form of dyslipidemia in all patients with chronic disease. Elevated small dense LDL particles and VLDL, along with increase in serum triglycerides and low HDL cholesterol were the main characteristics of this condition. When GFR is normal or elevated, at a very early stage of albuminuria an unfavorable lipid profile is present in both type 1 and type 2 diabetes [6-8]. In patients with type 1 diabetes with increasing albumin excretion rate there were a rise of the concentration of triglycerides, LDL cholesterol, VLDL and total cholesterol. In addition, the plasma triglycerides concentrations correlates with atherogenic small dense LDL particles and increase in LDL mass [9]. Similarly, microalbuminuria has similar lipid abnormalities in the nondiabetic population [10].

METHODS & MATERIALS

This is an observational study to explore the lipid abnormalities in diabetic patients with or without diabetic nephropathy. After taking patients consent demographic details like weight, height, age, weight were documented in a predesigned pro forma and serological test was performed to identify, glycemic parameters like fasting blood glucose (FBG), post prandial blood glucose (PPBG), glycated haemoglobin and serum lipid parameters like total cholesterol(TC), serum triglycerides (TG), Low Density Lipoprotein (LDL) and High Density Lipoprotein (HDL).

After taking the informed consent and purpose of the study explain to all patients, study data was collected. Data was captured in Microsoft's MS Excel sheet and SPSS software trial version 21 were used to carry out statistical analysis. Between the two means to find out the significance of difference unpaired T test was done. For statistically significant considered P value <0.05.

RESULT

Table 1 demonstrated the demographic parameters of the participants. It was observed that both with and without nephropathy group had almost similar age group which was 52.7±9.79 and 53.4±9.35 years respectively. Between two groups there was no statistically significant difference (p value=0.823) as per age is concern.

There were a statistically significant difference found in between two groups of sex distribution (Male and female, p value=0.789 and 848, respectively).

Table 1: Demographic parameters of the participants

Parameters	Diabetes with nephropathy (n=70)	Diabetes without nephropathy (n=70)	P value
Age (Years)	52.7±9.79	53.4±9.35	0.852
Gender			
Male	46 (68%)	41 (59%)	0.789
Female	24 (32%)	29 (41%)	0.848
FBG (mg/dl)	212.22 ±21.84	185.62 ±19.42	<0.001
PPBG (mg/dl)	421.48 ±51.38	329.85 ±28.63	<0.001
HbA1c (%)	9.2 ±1.6	8.2 ±1.1	<0.001
Urea (mg/dl)	55.32 ±10.1	50.26 ±14.78	<0.001
Creatinine (mg/dl)	2.09 ±0.53	1.1 ±0.28	<0.001
Microalbumin (mg/l)	423.2 ± 195.32	19.11 ±6.74	<0.001
eGFR (ml/min/1.73 m2)	36.87 ±12.93	67.45 ±28.75	<0.001
Total Cholesterol (mg/dl)	271.34 ± 41.26	229.76 ± 49.68	<0.001
Triglycerides (mg/dl)	224.52 ±47.95	168.54 ±39.86	<0.001
HDL (mg/dl)	26.78 ± 5.89	33.6 ± 6.12	<0.001
LDL (mg/dl)	168.71 ± 28.64	121.32 ± 24.63	<0.001

There were significant statistical differences in glycemic parameters in-between the two groups. HbA1c in with and without diabetes group was 9.2 ±1.6% and 8.2 ±1.1%, (p<0.001) respectively whereas fasting blood glucose (FBG) was 212.22 ±21.84 mg/dl and 185.62 ±19.42 mg/dl respectively (p<0.001) and postprandial

blood glucose (PPBG) was 421.48 ±51.38 mg/dl and 329.85 ±28.63 mg/dl respectively (p<0.001).

It was observed on comparing the two groups the mean level of eGFR, microalbumin, creatinine and urea were significantly different between the two groups.

There were significant statistical differences in serum lipid parameters in-between the two groups. Total Cholesterol in with and without diabetes group was 271.34 ± 41.26 mg/dl and 229.76 ± 49.68 mg/dl, (p<0.001) respectively whereas Triglycerides (mg/dl) was 224.52 ±47.95 mg/dl and 168.54 ±39.86 mg/dl respectively (p<0.001) and LDL Cholesterol (mg/dl) was 168.71 ± 28.64 mg/dl and 121.32 ± 24.63 mg/dl respectively (p<0.001).

Table 2: Comparison of the occurrence of Dyslipidemia

Variables	Diabetes with nephropathy (n=70)	Diabetes without nephropathy (n=70)	P value
Dyslipidemia	49 (70%)	31 (44%)	0.02
Atherogenic dyslipidemia	10 (7%)	8 (11%)	0.51

According to their respective group among study participants table 2 shows the comparison of occurrence of dyslipidemia. With nephropathy group, 70% of T2DM patients and without nephropathy group 44% of T2DM patients had dyslipidemia. Atherogenic dyslipidemia was observed 7% in diabetes with nephropathy group and 11% in without nephropathy group. In nephropathy group there were a higher percentage of subjects with dyslipidemia (p value=0.02).

DISCUSSION

Diabetes mellitus is a global epidemic affecting more than 150 million persons and it is expected that this number is likely to double by 2025 [11]. Diabetic nephropathy is the leading cause of chronic kidney disease in patients starting renal replacement therapy and is associated with increased cardiovascular mortality [12].

Although natural history of diabetic nephropathy has been better described in type 2 diabetes mellitus, the classification of nephropathy by Morgensen into several distinct phases in general, can be applied to both forms of diabetes. Microalbuminuria is defined by urinary albumin excretion rate of 20-200 µg/minute in the absence of urinary tract infection, exercise, malignant hypertension and left ventricular failure [13]. Its predictive of overt proteinuria particularly in Type 2 diabetes mellitus. Prospective studies have shown that blood pressure slowly rises during the transition of the patient from normoalbuminuria to microalbuminuria. It predicts development of nephropathy and ultimately renal failure, especially in type 2 diabetes mellitus. However, in type 2 diabetes mellitus microalbuminuria may be associated with many other conditions [14]. It is a good maker for development of cardiovascular disease and left ventricular diastolic function. Microangiopathy such as diabetic retinopathy, endothelial dysfunction, dyslipidemia, elevated apolipoprotein B, low HDL, insulin resistance and smoking may also be associated with microalbuminuria [15].

In our study we found that among the nephropathy patients LDL-C, TG, TC levels were significantly higher. A similar study among related South Indian patients between diabetic and diabetic nephropathy patient's LDL-C, HDL-C, TC and TG were significantly different [16]. Total Cholesterol in with and without diabetes group was 271.34 ± 41.26 mg/dl and 229.76 ± 49.68 mg/dl, (p<0.001) respectively whereas Triglycerides (mg/dl) was 224.52 ±47.95 mg/dl and 168.54 ±39.86 mg/dl respectively (p<0.001) and LDL Cholesterol (mg/dl) was 168.71 ± 28.64 mg/dl and 121.32 ± 24.63 mg/dl respectively (p<0.001).

There is also increasing evidence in both diabetic and nondiabetic patient's occurrence and progression of renal disease and the association of dyslipidemia. dyslipidemia by which could lead to

diabetic nephropathy through several mechanisms.

CONCLUSION

In the management of diabetes an important therapeutic target identified as dyslipidemia. Abnormal lipoprotein metabolism accelerates diabetic nephropathy which causes cardiovascular disease as well as the progression of diabetic nephropathy.

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