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Research Paper

Lipid Profile of Diabetic Kidney Disease Patients In Rural Goa, India

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ABSTRACT : *A potential Diabetic Kidney Disease (DKD) epidemic is predicted in India. Hyperinsulinemia worsens blood pressure levels by several mechanisms including unfavourable lipid profile whose role in kidney disease is studied. A case series study of Lipid profile in 241 DKD patients was conducted at the Rural Diabetes clinic of the Goa medical College in 2013. DKD was diagnosed by positive microalbuminuria with retinopathy. Lipid profile was tested in all patients and their levels in DKD patients were assessed. Fisher's exact and t tests were used for analysis.*

DKD was present in 17.4% patients. Of those with total cholesterol /HDL ratio of 5 and above, 40.8% had DKD as compared to 7.6% with a cholesterol /HDL ratio of less than 5. DKD patients had a mean total cholesterol of 243.12mg/dl (SD±65.64), mean LDL of 167.69 mg/dl (SD±59.73), mean triglycerides 166.57 mg/dl (SD± 56.75), while the diabetics without kidney disease had mean cholesterol of 188.97mg/dl (SD±40.07), mean LDL of 117.87 mg/dl (SD±38.12) and mean triglycerides of 133.05 mg/dl (SD±53.96). All were statistically significant (p=0.0001)

Screening, monitoring and stabilizing of lipid profile in every diabetic in rural India will reduce its renal progression and cardiac consequences.

Keywords:- *Diabetic Kidney Disease, Lipid Profile, Rural Goa*

I. INTRODUCTION

Diabetes leading to End Stage Renal Disease and death due to cardiovascular events is a devastating medical calamity of wide ranging magnitude. India with a huge burden of diabetes has more vulnerability to complications like kidney disease. Hyperinsulinemia aggravates hypertension in many ways including lipoprotein abnormality.[1] There is evidence that lipid reduction might preserve Glomerular Filtration Rate, decrease proteinuria reducing the rate of major vascular events. [2] Hypertension is one of the important risk factors for cardiovascular mortality in diabetic patients.[3]

JNC 7 recognized the risk of cardiovascular events in individuals with diabetes and chronic kidney disease.[4] Cardiovascular Disease is the most common cause of death in individuals with Chronic Kidney Disease (CKD).[5] It is thus meaningful to evaluate the role of lipid parameters in Diabetic Kidney Disease. Although it is difficult to discriminate the hazardous renal effects of a combination of factors like obesity, altered lipid profile, raised blood pressure and raised blood sugar from those of established diabetes or hypertension, altered lipid levels may favour independently the development of renal abnormalities and may be considered risk factors for CKD.

This study will help provide a rationale for intervention studies that aim to verify whether treating the many components of lipoprotein abnormality can effectively prevent the development and progression of renal damage.

II. MATERIAL AND METHODS

This study was an outpatient clinic based Case series conducted at the Medical College Rural Diabetes clinic in Goa, India in 2013. All diabetic patients availing treatment at the clinic (total 241) were the study subjects. Approval of Ethics Committee of Goa medical College was obtained for the study in October 2012.

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Patients were diagnosed as Diabetic Kidney Disease based on American Diabetic Association Criteria including Positive microalbuminuria and Retinopathy. Urine albumin creatinine ratio of 30mcg/mg of creatinine or more was considered positive for microalbuminuria (National Kidney Foundation- Kidney Disease Outcome Quality Initiative Guidelines) and Early diagnosis and treatment of Retinopathy study classification was used for classification of retinopathy

After informed consent, every patient was then subjected to the following investigations: Total serum cholesterol, LDL-Cholesterol, HDL-Cholesterol and serum triglycerides. The subjects were assessed for dyslipidemia (American Association of Clinical Endocrinologists, ATPIII guidelines).

Statistical tests were done using SPSS version 22 software. Data was expressed in means and proportion. Nonparametric test used to compare means of continuous variables and Fisher's exact test was used to compare proportions.

III. RESULTS & DISCUSSION

The participants in this study included 241 diabetic patients attending treatment at a rural diabetes clinic at the Medical College, Goa, India of which 42 diabetic patients (17.4%) were diagnosed as Diabetic Kidney disease with positive microalbuminuria and retinopathy. Of the 241 diabetics, 226 patients (93.7 %) had dyslipidemia by the ATP III criteria.

The mean Total cholesterol of Diabetic kidney disease patients in this study is 243.12mg/dl (SD±65.64) while the diabetics without kidney disease had mean cholesterol 188.97mg/dl (SD±40.07) .The association of total serum cholesterol levels and Diabetic kidney disease was statistically significant (p=0.0001). The risk of progression to chronic kidney disease was significantly higher in the upper quartile of the distribution of total cholesterol and LDL-C than for those patients in the lower quartile. [6]

The mean HDL concentration among the subjects with DKD was 40.52 mg/dl (SD±7.16) while the diabetics without kidney disease had a mean level of 42.96 mg/dl (SD±8.27). HDL-C levels in diabetic patients with and without kidney disease was not statistically significant. (p=0.077). Chang Sheng Sheng also found that microalbuminuria was not significantly associated with serum HDL (p= 0.1). [7] Among the diabetics 40.8% of those with total cholesterol (TC)/HDL ratio 5 or more had DKD as compared to 7.6% with a TC/HDL ratio of less than 5 (p=0.0001).Total cholesterol /HDL ratio of 5 or more was significantly associated with DKD as seen in other studies too. There is enough evidence in literature to show that Cholesterol/ HDL ratio predicts high risk regardless of the absolute LDL-C and HDL-C. This is explained by the fact that it is a relevant cumulative marker of the cluster of metabolic abnormalities found in individuals with high TG, low HDL-C dyslipidemia.[8,9] A study in Bangalore, India showed statistically significant association between microalbuminuria and TC/HDL ratio.[10] Elke S. Schaeffner et al in Boston also concluded that high ratio of cholesterol/HDL was significantly associated with an increased risk of developing renal dysfunction in men with an initial creatinine less than1.5mg/dl.[11]

The mean LDL was 167.69 mg/dl (SD±59.73) in Diabetic kidney disease patients while in diabetics without kidney disease it was 117.87 mg/dl (SD±38.12). The association of LDL-C with Diabetic kidney disease was found to be statistically significant. The role of high LDL particle concentration and a shift from larger toward smaller LDL-C particles which were associated with chronic kidney disease was explained by Jenkins AJ et al.[12]

Of the 226 diabetics with dyslipidemia, 18.1% had Diabetic kidney disease while only 6.7% without dyslipidemia had DKD. (p=0.226) However in this study statistical analysis did not show significant association. Even though dyslipidemia is an established risk factor for kidney disease in diabetics the negative association in this study may possibly be due to the stringent criteria used for dyslipidemia and the probable effect of statins. Further apolipoprotein B and small non-cardioprotective HDL C particles associated with CKD [12] could not be estimated in this rural setup. However, observational studies have reported that dyslipidemia is associated with decreased kidney function in patients with chronic kidney disease as extensively reviewed in the NKF –KDOQI clinical practice guidelines for managing dyslipidemia in CKD. [13]

Mean triglycerides level was 166.57 mg/dl (SD±56.75) in Diabetic kidney disease patients as compared to the non-nephropathy diabetics whose mean levels were 133.05mg/dl (SD±53.96) and the difference was statistically significant. (p=0.0001).

Serum triglyceride level was found to be significantly associated with kidney disease among diabetics. Such a finding was also confirmed by the DCCT/ EDIC (Diabetes control and complications trial/ Epidemiology of Diabetes Interventions and complications trial) cohort of patients with diabetes demonstrated a profile in DKD characterized by high triglyceride levels. [12]

Higher levels of Total cholesterol, LDL, triglycerides and cholesterol/HDL ratio of 5 or more was found to be significantly associated with Diabetic kidney disease.

IV: TABLE

Table 1. Factors associated with Diabetic Kidney disease (DKD)

Serial No	Characteristics of the study subjects	DKD present	DKD absent	Test	p value
1.	Mean Total cholesterol (mg/dl)	243.12 (SD±65.64)	188.97 (SD±40.07)	t test	0.0001
2.	Mean Triglycerides (mg/dl)	166.57 (SD±56.75)	133.05 (SD±53.96)	t test	0.0001
3.	Mean HDL (mg/dl)	40.52 (SD±7.16)	42.96 (SD±8.27)	t test	0.077
4.	Mean LDL (mg/dl)	167.69 (SD±59.73)	117.87 (SD±38.12)	t test	0.0001
5.	**Dyslipidemia**				
	Dyslipidemia present	41 (18.1%)	185 (81.9%)	Fisher's test	0.226
	Dyslipidemia absent	01 (6.7%)	14 (93.3%)		
	Total	42 (17.4%)	199 (82.6%)		
6.	**Total cholesterol/ HDL ratio**				
	TC/HDL < 5	13 (7.6%)	157 (92.4%)	Fisher's test	0.0001
	TC/HDL ≥ 5	29 (40.8%)	42 (59.2%)		
	Total	42 (17.4%)	199 (82.6%)		

IV CONCLUSION

The factors significantly associated with Diabetic kidney disease in this study are raised total serum cholesterol level, raised LDL cholesterol level, raised triglycerides level and total cholesterol/ HDL ratio of 5 or more.

HDL was not found to be significantly associated with DKD. Dyslipidemia at the criteria and levels selected for diagnosis was not found to be significantly associated with DKD probably because of the stringent levels used to classify dyslipidemia, the probable effect statins and further apolipoprotein B and small non cardioprotective HDL-C particles associated with chronic kidney disease could not be estimated.

The above lipid profile correlates associated with Diabetic Kidney disease are also well known potentially modifiable risk factors of cardiovascular disease. Diabetic Kidney Disease is also considered an independent risk factor for cardiovascular disease and altered lipid levels will increase the risk. Baseline lipid profile during screening programmes for Diabetes and monitoring their levels is beneficial.

Appropriate nutrition, exercise and pharmacological interventions for hyperlipidemia implemented for diabetics can prevent or delay its renal manifestations. Applied also to those diabetics who have shown evidence of microalbuminuria, to stabilize lipid levels, with anticipated decline in the kidney and cardiovascular disease epidemic among diabetics in rural India where necessary tertiary care is scarce and cost prohibitive.

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