Original Research Paper

Volume - 13 | Issue - 02 | February - 2023 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Medical Biochemistry

STUDY OF LIPID PROFILE IN PATIENTS OF FIRST THREE STAGES OF CHRONIC KIDNEY DISEASE

Ms. Deepa Rawat PhD student, Department of Biochemistry, LN Medical College, Bhopal

Dr. Jusmita Dutta* Professor and Head, Department of Biochemistry, LN Medical College, Bhopal*Corresponding Author

ABSTRACT **Introduction:** There is growing evidence that abnormalities in lipid metabolism may contribute to renal disease progression. Aim and Objective: This study was made to see relation between lipid profile and patients with chronic kidney disease. **Material and Method:** Total 300 patients of CKD and 100 healthy subjects served as control group were included to do the study. Lipid profile, urea and creatinine tests are done by automated Siemens dimension instrument. Result: The study revolves around the effect of lipid levels on the CKD progression. Comparisons drawn within the groups (amongst CKD 1, CKD 2 and CKD 3) and with control (Control vs CKD 1, CKD 2 and CKD 3) revealed that all the lipid profile parameters exhibited significant p values. **Conclusion:** One dystrophy which has become very common these days is hyperlipidemia. Hyperlipidemia leads to enhanced prognosis of kidney disease. An attempt will be made to see the correlation between different stages of CKD and lipid profile.

KEYWORDS : Chronic Kidney Diseases (CKD), Triglycerides (TG), High density Lipoprotein (HDL), Low density Lipoprotein (LDL), Very low density Lipoprotein (VLDL), Glomerular filtration rate (GFR)

INTRODUCTION:

Chronic kidney disease (CKD) is a type of kidney disorder which is characterized by gradual loss of kidney function over a period of months or years. Recent reports, suggest an abrupt rise in CKD cases in developing countries due to increase in concomitant diseases (1). Studies suggest that progression of CKD is associated with having a number of complications, including thyroid dysfunction, dyslipidemia and CVD (2). Dyslipidemia is defined as irregular concentration of lipids in blood with characteristic decrease in high density lipoprotein (HDL) and increased low density lipoprotein (LDL) has been established as a well-known traditional risk factor for macrovascular abnormalities in CKD. Several factors contribute to the development dyslipidemia associated with chronic renal impairment (3). Patients with CKD have a reduction in the activity of lipoprotein lipase and hepatic triglyceride lipase. This interferes with uptake of triglyceride rich, apolipoprotein B containing lipoproteins by the liver and in peripheral tissue, yielding increased circulation of these atherogenic lipoproteins (4). Progression of CKD is accompanied by the development of specific alterations of the lipoprotein metabolism (5). There is growing evidence that abnormalities in lipid metabolism may contribute to renal disease progression (6).

MATERIALS AND METHODS:

The present study was an observational study. This study was approved by institutional ethics committee. The total study sample size was 400 subjects. Out of this 100 normal control subjects and 300 diagnosed and known cases of CKD (stage 1 to stage 3) patients. Investigations for Lipid Profile, Serum Urea and Serum Creatinine were done on automated Siemens dimension instrument. The patients of the age-group between 40-60 years of age, both male and female were included in the study.

RESULTS:

The present study was conducted among patients of chronic kidney disease attending outpatient department (OPD) of Medicine department of L N Medical College and Research Center, Bhopal. A total of 300 diagnosed and known cases of CKD (stage 1 to stage 3) were included as study group. Simultaneously the same number of healthy subjects (n=100) served as control group. We performed this observational study relating the lipid profile with the prognosis of chronic kidney disease in all three stages patients.

Comparison drawn between the age distributions of all three groups reveals that the difference between the ages of participants was significant and the p value was found to be 0.037.

Table:- 1 Age wise distribution of control and different stages of CKD

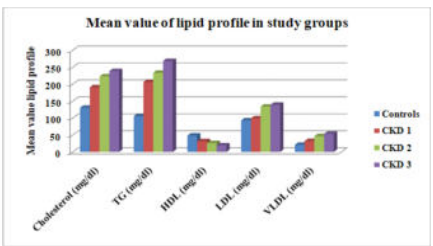
Parameters	Controls (n=100)	CKD 1 (n=100)	CKD 2 (n=100)	CKD 3 (n=100)	p = Value
Age (years)	56.12 ± 6.01	58.20 ± 8.06	57.38 ± 9.27	59.12 ± 6.51	0.037*

The study revolves around the effect of lipid levels on the CKD progression. Considering the complete lipid profile of the patients (in three stages of CKD) it was found that all the three groups were significantly different when compared with the Control group with a high significance value of p=0.0001.

Table:- 2 Lipid Profile distribution of control and different stages of CKD

Parameters	Controls (n=100)	CKD 1 (n=100)	CKD 2 (n=100)	CKD 3 (n=100)	p = Value
Cholesterol (mg/dl)	130.62 ± 20.57	190.93 ± 24.61	222.98 ± 23.87	238.81 ± 34.53	< 0.001***
TG (mg/dl)	105.78 ± 17.36	206.7 ± 32.95	233.74 ± 42.60	268.53 ± 33.49	< 0.001***
HDL (mg/dl)	48.45 ± 6.50	31.86 ± 10.20	26.57 ± 7.45	19.84 ± 5.67	< 0.001***
LDL (mg/dl)	93.19 ± 17.26	99.20 ± 11.45	134.04 ± 29.15	139.29 ± 26.04	< 0.001***
VLDL (mg/dl)	21.15 ± 3.49	32.54 ± 20.08	46.74 ± 8.56	53.65 ± 6.71	< 0.001***

Figure:- 1. Lipid Profile distribution of control and different stages of CKD



Comparisons drawn within the groups and with control revealed that all the lipid profile parameters exhibited significant p values except one. Values for first lipid profile parameter i.e. Cholesterol (mg/dl) was found to be highly significant with a p value of 0.001 both ways (amongst the groups and within the group). Second lipid profile Triglycerides (mg/dl) was also found to be highly significant when compared with control and when compared amongst each other ($p<0.001$). The values for HDL (mg/dl) were found to be significantly different when all the three groups (CKD 1, CKD 2 and CKD 3) were compared with a p value of 0.001. Similar results were found for HDL analyses for Control vs CKD 1, CKD 2 and CKD 3 with p value of 0.001. For Low density lipoproteins (mg/dl) we found p valued of 0.002 when compared Control and Group I. All other groups (amongst each other and vs control) showed a p value of 0.001. LDL was not found to be significantly different when we compared CKD 2 and CKD 3 groups as the p value was found to be 0.09. For next lipid profile parameter, i.e. VLDL, we found a high value of significance with p

<0.001 when compared three test groups with control as well as when the test groups were compared amongst each other.

Table:- 3 Lipid Profile Comparison of control and different stages of CKD

Parameters	Control vs CKD 1	Control vs CKD 2	Control vs CKD 3	CKD 1 vs CKD 2	CKD 1 vs CKD 3	CKD 2 vs CKD 3
Cholesterol (mg/dl)	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***
TG (mg/dl)	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***
HDL (mg/dl)	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***
LDL (mg/dl)	0.002 **	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***	0.09
VLDL (mg/dl)	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***

The Kidney profile when tested for significance revealed a very similar trend like Lipid profile. Both the Kidney related indices i.e. Serum urea (mg/dl) and Serum creatinine (mg/dl) were found to be significantly different for Control vs CKD 1, CKD 2 and CKD 3 with a p value of 0.001. On a similar note, when tested amongst each other the three groups were also found to be significantly different with p value 0.001.

Table:- 4 Kidney Profile distribution of control and different stages of CKD

Parameters	Controls (n=100)	CKD 1 (n=100)	CKD 2 (n=100)	CKD 3 (n=100)	p = Value
Serum Urea (mg/dl)	29.01 ± 6.59	90.56 ± 31.97	130.51 ± 33.34	166.46 ± 42.45	< 0.001 ***
Serum Creatinine (mg/dl)	0.90 ± 0.24	2.95 ± 0.67	4.62 ± 0.87	7.51 ± 0.97	< 0.001 ***

When we compared the test of significance for individual groups we found that each individual group revealed a p value of 0.001 when compared to control. On the other hand, when group I patients were compared to the other two groups (Group II and III) the results were the same with a p value of 0.001. When compared the remaining two groups (CKD 2 and CKD 3) were found to be significantly different with a p value of 0.001.

Table:- 5 Kidney Profile Comparison of control and different stages of CKD

Parameters	Control vs CKD 1	Control vs CKD 2	Control vs CKD 3	CKD 1 vs CKD 2	CKD 1 vs CKD 3	CKD 2 vs CKD 3
Serum Urea (mg/dl)	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***
Serum Creatinine (mg/dl)	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***	< 0.001 ***

DISCUSSION:

Lipid levels are usually overlooked and people do not take dyslipidemia seriously. Here we tried to correlate it with chronic kidney disease and tried to come up with the notion that the type as well as the content of fat in diet is directly correlated with development of CKD.

Impaired cholesterol metabolism is a characteristic feature of CKD and these disrupted readings elevate as the disease progresses (7). We observed that when compared amongst each other the patients at the third stage of this renal disease shows highest cholesterol levels. This can be easily explained as a directly proportional relation between inflammation and cholesterol levels. We evaluated a rise in LDL values as the disease progresses from stage 1 to stage 3. Unlike other lipid profile parameters, HDL levels have demonstrated a little inconsistency. To answer this a 9 year long US based study was performed on veterans by Bowe et al (8). This classic cohort based cross sectional study demonstrated that there are median levels of HDL which determines the progression of CKD.

We observed a direct correlation between the prognostic values of CKD (from stage 1, 2 and 3) with elevated values of serum urea and serum creatinine. The lipid profile of CKD patients revealed their inclination towards a state of hyperlipidemia. In overall it is now well established that elevated levels of lipid create a state of inflammation in the biological system (9). The inflammation slowly creates a backlog of fats to be filtered by kidneys. In lack of filtration these small lipo-proteins starts getting accumulated in the arteries attributing to increased inflammation.

CONCLUSION:

Chronic kidney disease (CKD) is a leading cause of morbidity and mortality. In this disorder there is a gradual loss of glomerular function ultimately leading towards the deteriorated health of the patient. We observed that there is a direct correlation between the prognostic values of CKD (from stage 1, 2 and 3) with elevated values of serum urea and serum creatinine. Considering lipid profile, it becomes clear that in case of kidney disease progression free lipid levels in the patients would increase. Hyperlipidemia lead to enhanced prognosis of kidney disease. With a better insight into these contributing factors and the cause, clinicians may have a better diagnostic approach towards to chronic kidney disease. It can be suggested that with better life style choices a person can a have a better outlook towards these disorders.

REFERENCES:

1. Tsukamoto Y, Wang H, Becker G, Chen HC, Han DS, Harris D, et al. Report of the Asian Forum of Chronic Kidney Disease Initiative (AFCKDI) 2007. "Current status and perspective of CKD in Asia": Diversity and specificity among Asian countries. Clin Exp Nephrol. 2009;13(3):249–56.
2. Thomas R, Kanso A, Sedor JR. Chronic kidney disease and its complications. Prim Care. 2008;35(2):329–44.
3. S. K. Tripathy, N. Dhal , M. Kanungo , S. Das , S. K. Mishra , Sai Swaroop , M. R. Behera , M. Panigrahi. Study of thyroid dysfunction and dyslipidemia in chronic kidney diseases, International Journal of Research in Medical Sciences 2018 Jan;6(1):110-116 .
4. Mustafa C. Bulbul, Tuncay Dagel, Baris Afsar, Nuray N. Ulusu, Masanari Kuwabara, Adrian Covic, Mehmet Kanbay. Disorders of Lipid Metabolism in Chronic Kidney Disease. Blood Purif 2018;46:144–152.
5. Ruchitha Vinayak, Dr. Rajeshwari.A, Dr. N. Asha Rani, Mr Somashekar G N, Dr. Namitha D. Correlation of Thyroid Dysfunction and Dyslipidemia in Chronic Kidney Disease: A Cross-Sectional Study from Rural South India. International Journal of Biotechnology and Biochemistry ISSN 0973-2691 Volume 14, Number 3 (2018) pp. 205-215.
6. Joana Mesquita, Ana Varela, J.L.. José Luís Medina. Dyslipidemia in renal disease: Causes, consequences and treatment. Elsevier. Vol. 57, Num, 9.
7. Reiss AB, Voloshyna I, De Leon J, Miyawaki N, Mattana J. Cholesterol metabolism in CKD. American Journal of Kidney Diseases. 2015;66(6):1071-82.
8. Bowe B, Xie Y, Xian H, Balasubramanian S, Al-Aly Z. Low levels of high-density lipoprotein cholesterol increase the risk of incident kidney disease and its progression. Kidney international. 2016;89(4):886-96.
9. Shen W, Gaskins HR, McIntosh MK. Influence of dietary fat on intestinal microbes, inflammation, barrier function and metabolic outcomes. The Journal of nutritional biochemistry. 2014;25(3):270-80.