



Role of Lipid Panel in Patients of Chronic Renal Disease: Hospital Based Study

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Abstract

Chronic renal failure (CRF) is a state which results from a permanent and usually progressive reduction in renal function. Chronic renal failure (CRF) is also known as chronic kidney disease (CKD). Chronic kidney disease (CKD) is a long term condition caused by damage to both kidneys. Patients with chronic kidney disease (CKD) are at an increased risk for cardiovascular disease and have a higher prevalence of hyperlipidaemia. Most characteristic lipid abnormality are increased level of serum triglycerides, very low density lipoprotein (VLDL), and low levels of high density lipoprotein. A total of 50 patients having CKD was compared by the same no. Of control group individuals. Manual methods were used to detected the abnormalities in Lipid Panel. All the Parameter of Lipid Panel were significantly raised such as TG, Cholesterol, LDL-Cholesterol, etc. As compared with that of control group. Conclusion of the study that there is significant dyslipidemia, raised in chronic renal failure patients as compared to healthy controls. Higher urea, creatinine, uric acid correlates well with development of chronic renal failure. So, It gives us a clue regarding possible metabolic relation in chronic renal failure patient. Hence, this study has been a step forward to find relation of multiple metabolic factors with chronic renal failure and raises a fundamental issue of need of further research in this direction which can help in better understanding of this disease and in developing new therapeutic strategies in treatment of chronic renal failure patients.

Keywords: CKD, Cholesterol, TG, HDL, LDL.

Introduction

Chronic renal failure (CRF) is a state which results from a permanent and usually progressive reduction in renal function in a sufficient degree to have adverse consequences on other systems⁽¹⁾. Chronic kidney disease (CKD) is a long term condition caused by damage to both kidneys. There is no single cause and the damage is usually irreversible and can lead to ill health. The main signs of renal loss are blood hypertension and

anemia. There are also neurological signs (irritability and tremors), cardiovascular (pulmonary edema), endocrine (hyperglycemia and weight loss), and metabolic (weakness)⁽²⁾. Patients with chronic kidney disease (CKD) are at an increased risk for cardiovascular disease and have a higher prevalence of hyperlipidaemia or dyslipidaemias^(3,4) than the general population⁽⁵⁾. Most characteristic lipid abnormality is increased serum triglycerides, very low density lipoprotein

(VLDL), and low levels of high density lipoprotein (HDL)⁽⁶⁾. Serum uric acid inversely correlates with decreasing renal function. Serum creatinine concentration is widely used as an index of renal function so a higher serum creatinine and urea concentration is associated with a lower or reduced GFR⁽⁷⁾. Dyslipidemia is a very common complication of chronic renal failure (CRF) and actively participate in the deterioration of renal function^(8,9) demonstrated that plasma TG, VLDL-C were significantly higher while HDL-C was significantly lower in CRF patients.

Aim

Study of Total lipid profile in patients of Chronic renal failure.

Objectives

To estimate the levels of lipid profile (TG, Cholesterol, HDL, LDL, VLDL) Urea, Creatinine and Uric acid in chronic renal failure patients and comparable control group.

Materials & Methods

A Hospital based cross-sectional study was planned, including 50 patients of chronic renal failure against 50 healthy individuals having same aged grouped having both the gender which was matched with that of controls group coming to OPD/IPD Nephrology Department of SMS Hospital, Jaipur.

1. Estimation of Serum creatinine⁽¹⁰⁻¹³⁾

Methodology

Modified Jaffe's reaction

Reagent composition

Reagent 1: Picric acid Reagent

Picric acid 25.8mmol/L

Reagent 2: Sodium Hydroxide Reagent

Sodium Hydroxide 95mmol/L

Creatinine Standard

Creatinine Standard 2mg/dl(0.166mmol/L)

Assay procedure

Table 1: Assay Procedure

Pipette	Standard	Test
Working Reagent	1000µl	1000µl
Standard	100µl	-
Test	-	100 µl

Mix well and read initial absorbance (A₁)20 seconds after mixing and final absorbance (A₂)80 seconds after mixing at 505nm wavelength.

Calculation

$$\Delta A = A_2 - A_1$$

$$\text{Creatinine (mg/dl)} = \frac{\Delta A \text{ of Test}}{\Delta A \text{ of Standard}} \times \text{Conc. of Standard}$$

2. Estimation of Serum Triglycerides^(14,15)

(GPO-PAP method)

Table 2: Reagent Composition

	Procedure for 1 ml		
	Blank	Standard	Test
Enzyme	1ml	1ml	1ml
Standard	-	10µl	-
Sample	-	-	10µl

Mix well and incubate for 10 minutes at 37°C. Final colour is stable for 30 min. Mix well and measure the absorbance of standard and sample against the reagent blank at 505 nm.

Calculation

$$\text{Conc. of Triglycerides (mg/dl)} = \frac{\text{Abs. of sample}}{\text{Abs. of Standard}} \times 200$$

3. Estimation Of Total Cholesterol:⁽¹⁶⁻¹⁹⁾

[Enzymatic method (CHOD-PAP)]

Reagent Composition

Buffer (PH 7.5), Cholesterol Oxidase, Cholesterol esterase, Peroxidase, Chromogen, Stabilizers, inactive ingredients and surface active agents.

Incubation

Incubate for 5 minutes at 37 °C or 10 minutes at R.T. (15-25°C). Thereafter measure the abs. against blank at 546 (505 – 505) nm. Final colour is stable for 2 hours if not exposed to direct light.

Calculation

$$\text{Total Cholesterol (mg/dl)} = \frac{\text{Abs. of sample}}{\text{Abs. of Standard}} \times 200$$

4. Estimation of Serum HDL-Cholesterol⁽²⁰⁾

Reagent Composition

Reagent 1: Good’s Buffer, Cholesterol oxidase, Peroxidase, Preservative, N,N-bis(4-sulphobutyl)-m toluidine disodium (DSBmT), Accelerator.

Reagent 2: Good’s Buffer, Cholesterol esterase, 4-AAP, Detergent, Restrainer, Preservative, Ascorbic acid oxidase.

5. Estimation of Serum VLDL-Cholesterol and LDL-Cholesterol

- VLDL was estimated by TG/5 based on the average ratio to cholesterol in VLDL

- Serum LDL was estimated from the Freidwald and Fredrickson’s (1972) formula, which is $LDL = Total\ Cholesterol - [HDL + VLDL]$

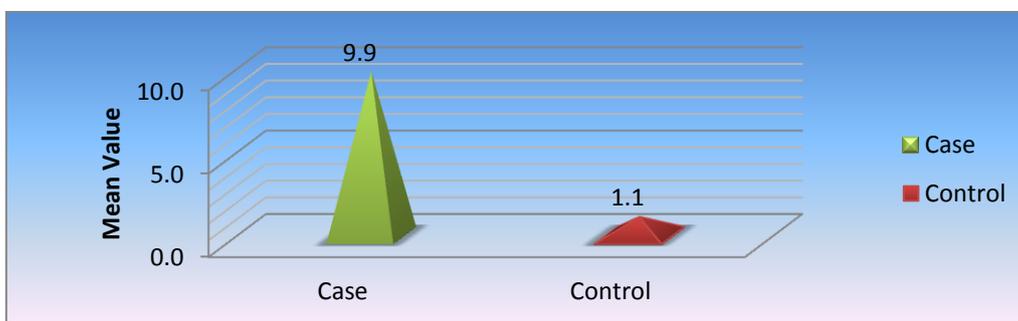
Observations & Results

Table 3: Level of Creatinine

	Control	Case	P-Value
Min	0.4	2.49	0.0000
Max	1.6	18.6	
Mean	1.1	9.9	
SD	0.4	3.3	

P<0.001 = Highly Significant

Figure 1: Level of Creatinine



In the above table & Figure, it’s shown that the level of Creatinine raised in the CKD patients i.e.,

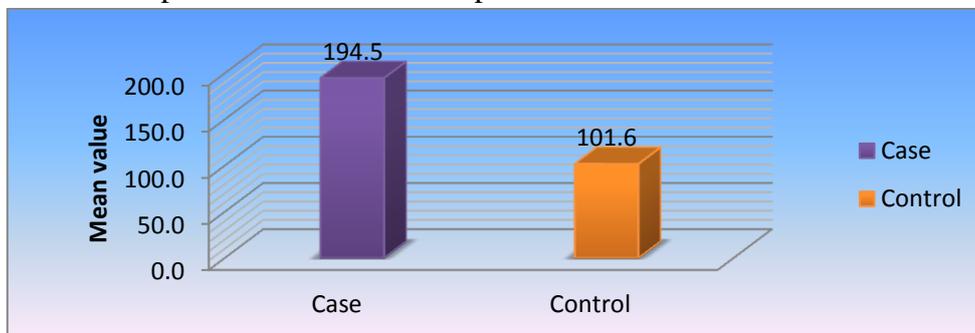
9.9mg/dl whereas the level of creatinine in control group is 1.1mg/dl.

Table 5: TG level in CKD patients & Control Group

	Control	Case	P-Value
Min	45	165	0.0000
Max	165	345	
Mean	101.6	194.5	
SD	39.6	32.8	

P<0.001 = Highly Significant

Figure 2: TG level in CKD patients & Control Group



In the above table and figure, it’s showed that the mean level of TG in CKD patients and control

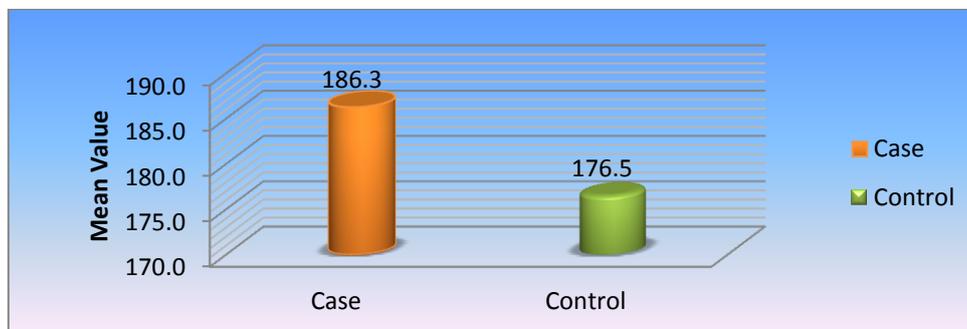
group are 194.5mg/dl and 101.6mg/dl respectively and p value is 0.

Table 6: Level of Cholesterol

	Control	Case	P-Value
Min	150	139	0.0200
Max	197	251	
Mean	176.5	186.3	
SD	12.7	18.5	

P<0.05 = Significant

Figure 3: Level of Cholesterol



In the above table and figure, it's showed that the mean level of Cholesterol in CKD patients and

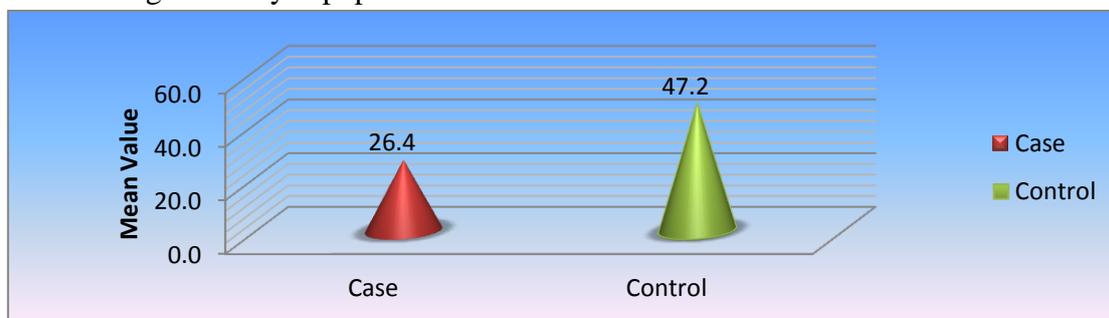
control group are 186.3mg/dl and 176.5mg/dl respectively and p value is 0.02.

Table 7: Level of High Density Lipoprotein

	Control	Case	P-Value
Min	40	21	0.0000
Max	60	33	
Mean	47.2	26.4	
SD	6.7	3.3	

P<0.001 = Highly Significant

Figure 4: Level of High Density Lipoprotein



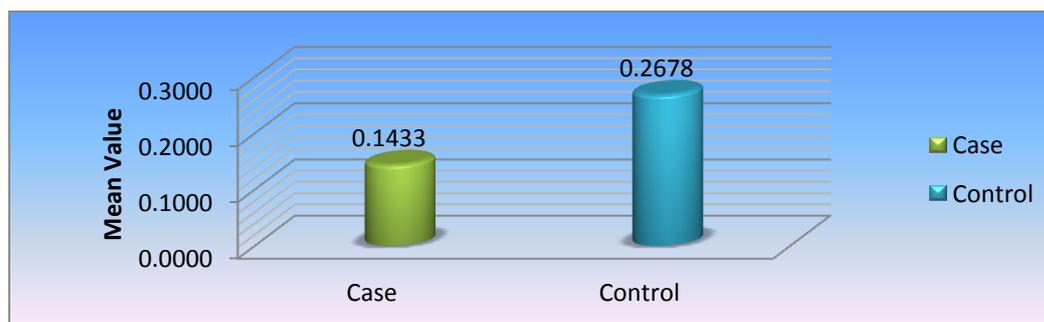
In the above table and figure, it's showed that the mean level of HDL in CKD patients and control

group are 47.2mg/dl and 26.4mg/dl respectively and p value is 0

Table 8: HDL:CHOL Level

	Control	Case	P-Value
Min	0.2169	0.0837	0.0000
Max	0.3412	0.1842	
Mean	0.2678	0.1433	
SD	0.0346	0.0225	

Figure 5: HDL:CHOL Level



In the above table and figure, it's showed that the mean level of HDL-Cholesterol ratio in CKD

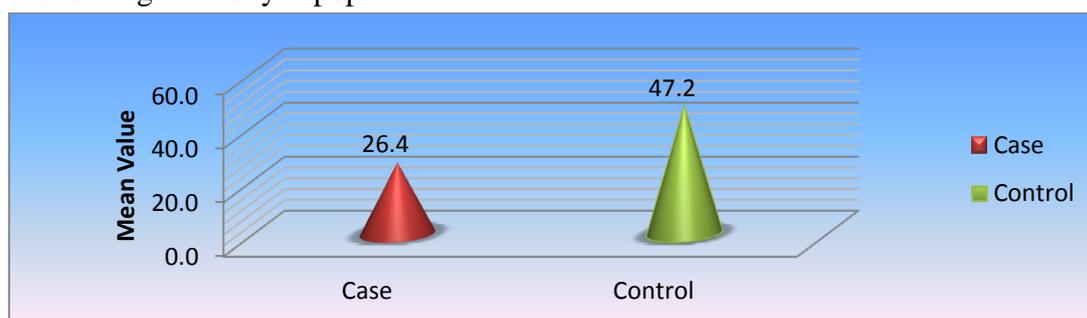
patients and control group are 0.14mg/dl and 0.26mg/dl respectively and p value is 0.

Table 9: Level of High Density Lipoprotein

	Control	Case	P-Value
Min	40	21	0.0000
Max	60	33	
Mean	47.2	26.4	
SD	6.7	3.3	

P<0.001 = Highly Significant

Figure 6: Level of High Density Lipoprotein



In the above table and figure, it's showed that the mean level of HDL in CKD patients and control

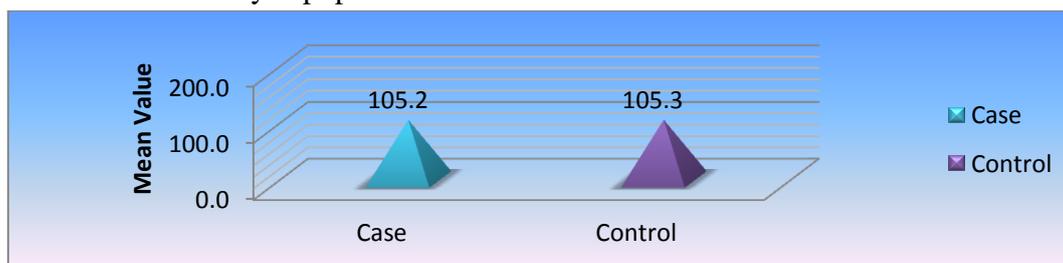
group are 26.4mg/dl and 47.2mg/dl respectively and p value is 0.

Table 10: Level of Low Density Lipoprotein

	Control	Case	P-Value
Min	80	81	0.9689
Max	142	140	
Mean	105.3	105.2	
SD	10.1	12.2	

P>0.05 = Non Significant

Figure 7: Level of Low Density Lipoprotein



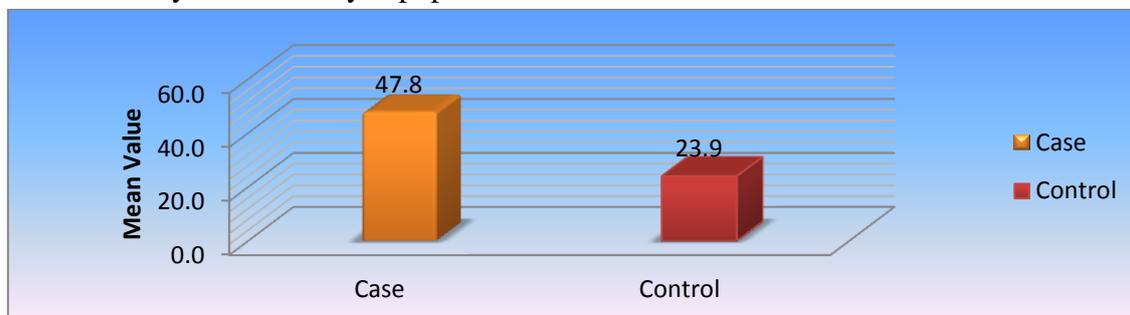
In the above table and figure, it's showed that the mean level of LDL in CKD patients and control

group are 105.2mg/dl and 105.3mg/dl respectively and p value is 0.97.

Table 11: Level of Very Low Density Lipoprotein

	Control	Case	P-Value
Min	20	14	0.0001
Max	35	169	
Mean	23.9	47.8	
SD	4.5	29.7	

P<0.05 = Highly Significant

Figure 8: Level of Very Low Density Lipoprotein

In the above table and figure, it's showed that the mean level of VLDL in CKD patients and control group are 47.8mg/dl and 23.9mg/dl respectively and p value is 0.0001.

Discussion & Conclusion

Creatinine which is the marker for the detection of renal failure highly raised in the case of CKD patients. The mean level and standard deviation of TG, Cholesterol & VLDL were found to be higher in CKD patients that of control group whereas the level of HDL-Cholesterol ratio was low in CKD patients than control individuals. The mean level and standard deviation of LDL-Cholesterol was found to be similar in both the cases. In this study, we concluded that there is significant dyslipidemia, raised in chronic renal failure patients as compared to healthy controls. Some prevention or awareness for renal failure patients are Lipid-lowering therapy has been shown to reduce the risk of progression of chronic renal failure, Consider adding fibrate, statin for non-proliferative renal failure, healthy, balanced diet and exercise should be discussed with the patient and Smoking cessation.

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