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A PROSPECTIVE OBSERVATIONAL STUDY ON CLINICAL PATTERN OF HYPERLIPIDEMIA AND METABOLIC EFFECTS OF ANTIHYPERLIPIDEMIC DRUGS IN CHRONIC KIDNEY DISEASE PATIENTS-A PILOT STUDY

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Abstract: To study the clinical pattern of hyperlipidemia in non-dialysis patients with chronic kidney disease and analyze the prescription pattern, metabolic effect and drug adherence in these patients. A pilot study was carried out in 30 patients with chronic kidney disease (CKD) with hyperlipidemia not on hemodialysis, and those patients that are treated with antihyperlipidemic drugs. This study's findings show that hyperlipidemia is a prevalent complication among chronic kidney disease patients, particularly in the older population. Statin therapy remains the cornerstone of lipid management, with combined therapy necessary only in rare situations. The low incidence of myopathy and liver damage indicates that antihyperlipidemic medication was generally well tolerated. There is no association found between CKD stages and antihyperlipidemic medication use; treatment appears to be individualized according to patient needs rather than disease stage. Furthermore, the improvement in medication adherence following counselling emphasizes the importance of patient education in improving treatment outcomes and managing chronic kidney disease.

1. INTRODUCTION:

1.1 CHRONIC KIDNEY DISEASE: Chronic Kidney Disease (CKD) is a progressive condition characterized by abnormalities in kidney structure or function that persist for more than three months and have important implications for health. [1] Another crucial idea discussed is that CKD is more than just a lab abnormality; it is a progressive, chronic disease with significant health effects. [2] Glomerular filtration rate (GFR) is a measure of kidney function, calculated as the filtration rate of a single nephron multiplied by the total number of functioning nephrons in both kidneys. [3]

1.2 ETIOLOGY OF CKD:

o Diabetes mellitus type 2
o High blood pressure
o Primary glomerulonephritis
o Cystic or Hereditary Illness
o Renal insufficiency and proteinuria
o Sickle Cell Nephropathy [6]

1.3 DIAGNOSIS:

The National Kidney Foundation recommends a kidney health assessment that includes measurement of serum creatinine to estimate glomerular filtration rate (GFR) and urine albumin-to-creatinine ratio (ACR) to evaluate kidney function and detect kidney damage. [8]

• Imaging: Ultrasound, intravenous urography, CT kidneys, ureters, bladder
• Kidney biopsy: Ultrasound-guided percutaneous.
• Evaluation of GFR
• Elevated creatinine and urea levels.
• Albuminuria and Proteinuria. [9]

1.4 STAGES OF CHRONIC KIDNEY DISEASE

CKD STAGE		GFR (ml/min/1.73 m²)
1	NORMAL OR HIGH GFR	≥ 90
2	MILD DECREASE	60 – 89
3a	MILD TO MODERATE DECREASE	45 – 59
3b	MODERATE TO SEVERE DECREASE	30 – 44
4	SEVERE DECREASE	15 – 29
5	KIDNEY FAILURE	< 15 or dialysis

Figure 1: stages of chronic kidney disease

1.5 TREATMENT:

1.5.1 NON-PHARMACOLOGICAL TREATMENT: The Mediterranean diet is beneficial for controlling chronic kidney disease (CKD), according to recent research [10]

1.6 HYPERLIPIDEMIA:

1.7 ETIOLOGY: Overconsumption of alcohol, a sedentary lifestyle, and an excessive diet high in saturated fat, cholesterol, and trans-fats are the main causes of secondary hyperlipidemia. [12]

1.8 RISK FACTORS:

o Type 2 diabetes mellitus (T_2DM)
o Lifestyle choices
o Family history.
o Age: Risk increases with advancing age.
o Gender [13]

1.9 DIAGNOSIS:

Lipoprotein profile: TC, LDL-C, non-HDL-C, HDL-C, and TG

1.10 PATHOPHYSIOLOGY OF HYPERLIPIDAEMIA: Hyperlipidemia develops when there is an imbalance between the production and clearance of lipoproteins, resulting in elevated levels of cholesterol, triglycerides, or both in the bloodstream. At the same time, reduced activity of LDL receptors impairs the removal of LDL cholesterol from circulation, leading to its accumulation in the blood. The excess LDL particles undergo oxidation and penetrate the arterial wall, where they are taken up by macrophages to form foam cells. This initiates inflammation and the development of atherosclerotic plaques. In addition, reduced high-density lipoprotein (HDL) levels impair reverse cholesterol transport, decreasing the removal of cholesterol from peripheral tissues. These changes promote endothelial dysfunction, atherosclerosis, and increase the risk of cardiovascular diseases such as coronary artery disease, myocardial infarction, and stroke. (19)

1.11 PHARMACOLOGICAL TREATMENT

- 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase inhibitors (statins)
- Bile acid sequestrants
- Fibric acid derivatives(fibrates)
- Nicotinic acid derivatives(niacin)
- Selective cholesterol reabsorption inhibitor (ezetimibe). (14)

1.12 PATHOPHYSIOLOGY OF HYPERLIPIDEMIA IN CKD: Hyperlipidemia is a common complication of CKD and is characterized by elevated triglycerides, reduced high-density lipoprotein (HDL) cholesterol levels, and abnormalities in low-density lipoprotein particles. These lipid abnormalities occur mainly because CKD impairs the metabolism and clearance of lipoproteins, leading to the accumulation of triglyceride-rich lipoproteins in the bloodstream. The reduced activity of lipoprotein lipase and hepatic lipase contributes to hypertriglyceridemia, while HDL particles become dysfunctional and less effective in reverse cholesterol transport. In addition, oxidative modification of LDL particles increases their atherogenic potential, promoting inflammation, endothelial dysfunction, and cardiovascular disease. Therefore, dyslipidemia significantly contributes to the high cardiovascular risk observed in patients with CKD. (7)

1.13 CLINICAL PATTERN OF HYPERLIPIDEMIA IN CKD: Chronic kidney disease is associated with characteristic lipoprotein abnormalities that contribute significantly to cardiovascular risk. The most common lipid abnormalities include elevated triglyceride levels, increased concentrations of very-low-density lipoproteins (VLDL) and intermediate-density lipoproteins (IDL)**,** and reduced levels of high-density lipoprotein (HDL) cholesterol. These changes occur primarily due to impaired metabolism and clearance of lipoproteins as kidney function declines. Hypertriglyceridemia is particularly common and results from reduced activity of enzymes involved in triglyceride breakdown. (15)

1.14 METABOLIC EFFECTS OF HYPERLIPIDEMIC DRUGS IN CKD: Statins are typically well-tolerated lipid-lowering medications, they are linked to several metabolic side effects, especially those that impact liver and skeletal muscle function. Statin-induced myopathy, is one of the most significant muscle-related side effects. Furthermore, statins can cause hepatotoxicity, resulting in moderate increases in liver enzymes such as alanine aminotransferase (ALT) and aspartate aminotransferase (AST), which indicate hepatic stress or injury. (17)

1.15 PRESCRIBING PATTERNS OF HYPERLIPIDEMIC DRUGS IN CKD: Statins are the most commonly prescribed antihyperlipidemic drugs in CKD patients and are considered the first-line treatment for reducing cardiovascular risk. When additional LDL cholesterol reduction is required, **ezetimibe** is commonly prescribed in combination with a statin. Fibrates, such as **f**enofibrate and gemfibrozil, are mainly used in patients with severe hypertriglyceridemia but require careful monitoring because of potential adverse effects in renal impairment. **(16)**

1. 16 MEDICATION ADHERENCE IN PATIENTS WITH CHRONIC KIDNEY DISEASE:
Medication adherence is a major challenge among patients with chronic kidney disease because they often require multiple medications to manage CKD and its associated comorbidities. Educational interventions, medication counselling, simplified dosing schedules, and regular follow-up were identified as effective strategies for improving adherence. [18]

2. METHODOLOGY

2.1STUDY POPULATION: A pilot study was conducted involving a total of 30 patients with chronic kidney disease (CKD) with hyperlipidemia not on hemodialysis, and those patients that are treated with antihyperlipidemic drugs. These patients were included in this prospective observational study conducted in a multi-specialty hospital in Thiruvananthapuram.

2.2 DATA SOURCE: All the relevant information needed for the study was collected from patients' case records and through direct patient/bystander interviews after obtaining informed consent. Data were collected using pre-designed data collection forms or proforma. The study was approved by the Institutional Ethics Committee of Cosmopolitan Hospital, Thiruvananthapuram, Kerala, India.

2.3 STATISTICAL ANALYSIS: Statistical analysis was performed using Microsoft Excel and SPSS. A paired t-test was used to assess patient adherence to medications before and after counselling. The Chi-square test was used to assess the metabolic effect and prescription pattern in CKD patients with hyperlipidemia undergoing hyperlipidemic drug therapy and lipid abnormality in patients with CKD and hyperlipidemia. A p-value of < 0.05 was considered statistically significant.

2.4 INCLUSION CRITERIA:

- ✓ CKD patients aged ≥18 years.
- ✓ Non-dialysis CKD patients.
- ✓ Patient receiving antihyperlipidemic drugs.
- ✓ Patient willing to provide informed consent.

2.5 EXCLUSION CRITERIA:

- ✓ Renal transplant recipients.
- ✓ Pregnant or lactating women.
- ✓ Patients with severe hepatic disease.

3. OBSERVATION AND RESULTS:

In this pilot study, 30 patients were enrolled according to the inclusion and exclusion criteria. The results are as follows:

3.1GENDER-WISE DISTRIBUTION:

Table 1: Gender Wise Distribution

GENDER	NUMBER(n=30)	PERCENTAGE (%)
FEMALE	13	43
MALE	17	57

- Out of 30 patients with chronic kidney disease (CKD) and hyperlipidemia, 17 (57%) were males, and 13 (43%) were females.

3.2 AGE-WISE DISTRIBUTION:

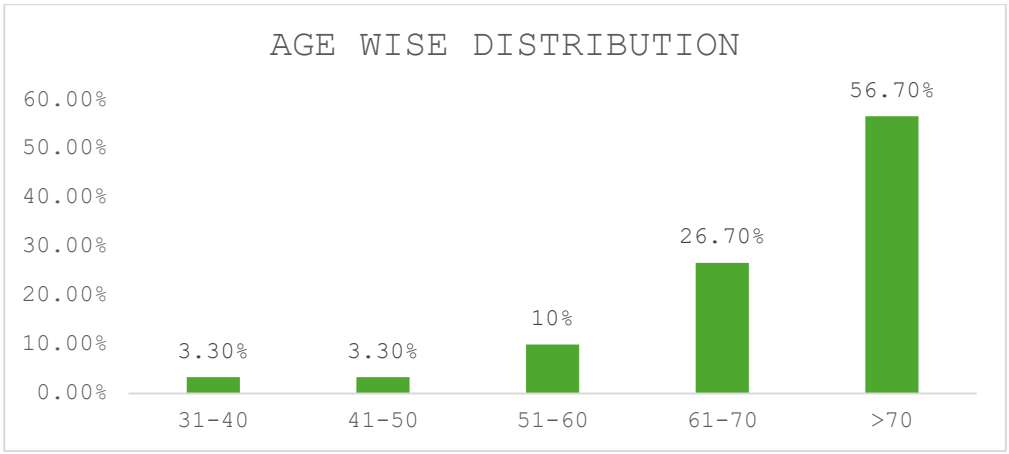

Figure 2: Age-wise distribution

- Out of 30 patients with CKD and hyperlipidemia, 1 (3.3%) patient belonged to the 31–40 years age group, 1 (3.3%) to the 41–50 years age group, 3 (10%) to the 51–60 years age group, 8 (26.7%) to the 61–70 years age group, and 17 (56.7%) to the >70 years age group.

3.3 CKD STAGE-WISE DISTRIBUTION:

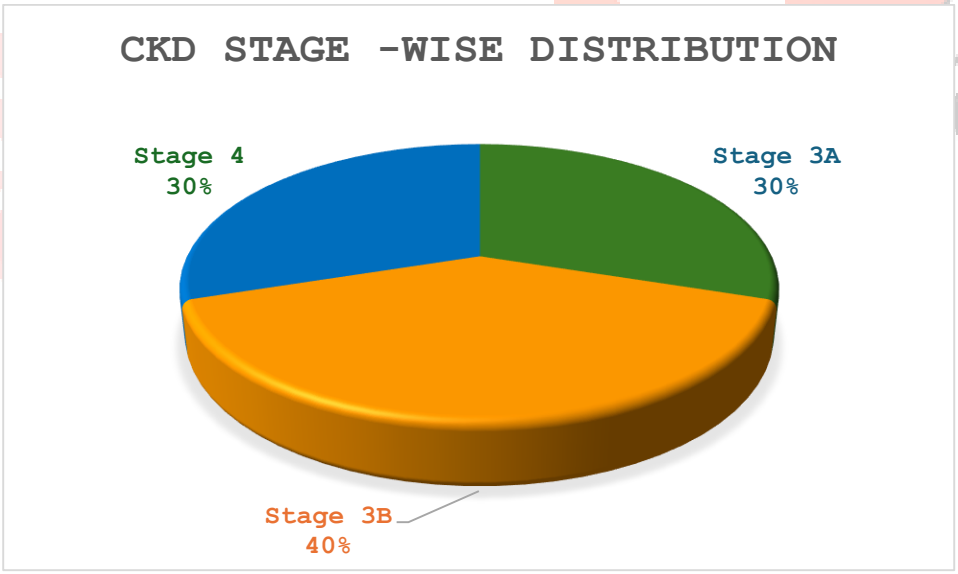

Figure 3: CKD stage-wise distribution

- Out of 30 patients with CKD and hyperlipidemia, 9 (30%) patients were in Stage 3A CKD, 12 (40%) patients were in Stage 3B CKD, and 9 (30%) patients were in Stage 4 CKD.

3.4.CO-MORBIDITIES

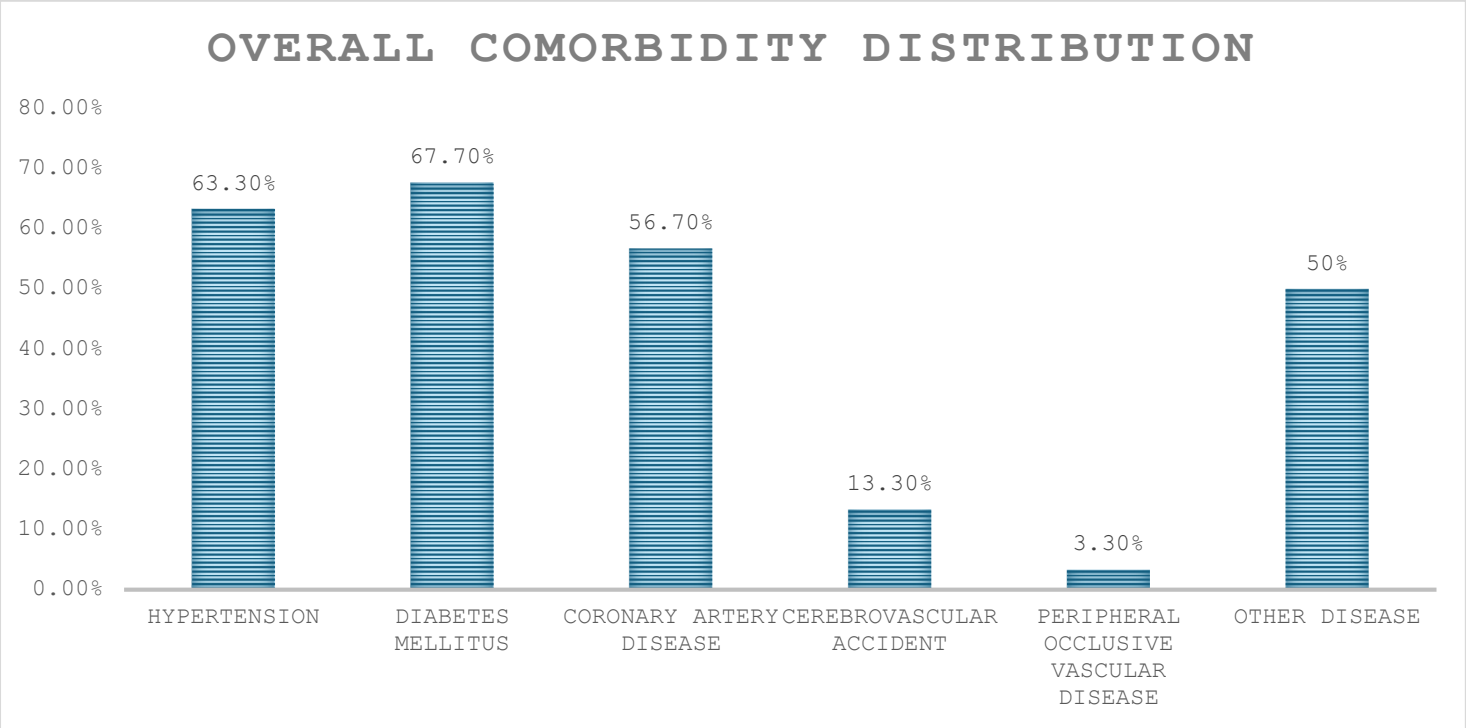

Figure 4: Overall comorbidities distribution

- Out of 30 patients with CKD and hyperlipidemia, 19 (63.3%) had hypertension, 20 (66.7%) had diabetes mellitus, 17 (56.7%) had coronary artery disease (CAD), 4 (13.3%) had a cerebrovascular accident (CVA), 1 (3.3%) had peripheral vascular disease (PVD), and a few patients had other comorbid conditions, mainly lower respiratory tract infection (LRTI) and benign prostatic hyperplasia (BPH).

3.5 CLINICAL PATTERN OF HYPERLIPIDEMIA IN CKD PATIENTS:

LIPID ABNORMALITIES IN CKD PATIENTS:

Table 2: Lipid abnormalities in CKD patients

LIPID ABNORMALITIES	CKD STAGES	NUMBER(n=30)	PERCENTAGE(%)
PRESENT	STAGE 3A	3	10
	STAGE 3B	10	33.33
	STAGE 4	9	30
ABSENT	STAGE 3A	6	20
	STAGE 3B	2	6.67
	STAGE 4	0	0
P=0.0036			

- Among the 30 patients, 3 (10%) patients with lipid abnormalities belonged to Stage 3A CKD, while 6 (20%) patients in Stage 3A did not have lipid abnormalities.
- Among the 30 patients, 10 (33.33%) patients with lipid abnormalities belonged to Stage 3B CKD, while 2 (6.67%) patients in Stage 3B did not have lipid abnormalities.
- Among the 30 patients, 9 (30%) patients with lipid abnormalities belonged to Stage 4 CKD, while no patients in Stage 4 were without lipid abnormalities.

The p-value of 0.0036 suggests a statistically significant difference in lipid profile parameters among the different stages of CKD.

3.5.1 HIGH DENSITY CHOLESTEROL:

Table 3: HDL variation in CKD patients

HDL STATUS	CKD STAGE	NUMBER(n=30_)	PERCENTAGE (%)
NORMAL	STAGE 3A	8	26.67
	STAGE 3B	6	20
	STAGE 4	2	6.67
REDUCED	STAGE 3A	1	3.33
	STAGE 3B	6	20
	STAGE 4	7	23.33
P=0.017			

- Among the 30 patients, 1 (3.33%) patient with reduced HDL belonged to Stage 3A CKD, while 8 (26.67%) patients in Stage 3A had normal HDL.
- Among the 30 patients, 6 (20%) patients with reduced HDL belonged to Stage 3B CKD, while 6 (20%) patients in Stage 3B had normal HDL.
- Among the 30 patients, 7 (23.33%) patients with reduced HDL belonged to Stage 4 CKD, while 2 (6.67%) patients in Stage 4 had normal HDL.

The p-value of 0.017 shows that HDL levels differ significantly across the different stages of CKD.

3.5.2 TRIGLYCERIDES:

Table 4: Triglycerides variation in CKD patients

TRIGLYCERIDES STATUS	CKD STAGES	NUMBER(n=30)	PERCENTAGE (%)
NORMAL	STAGE 3A	7	23.33
	STAGE 3B	4	13.33
	STAGE 4	1	3.33
ELEVATED	STAGE 3A	2	6.67
	STAGE 3B	8	26.67
	STAGE 4	8	26.67
P=0.013			

- Among the 30 patients, 2 (6.67%) patients with elevated triglycerides belonged to Stage 3A CKD, while 7 (23.33%) patients in Stage 3A had normal triglyceride levels.
- Among the 30 patients, 8 (26.67%) patients with elevated triglycerides belonged to Stage 3B CKD, while 4 (13.33%) patients in Stage 3B had normal triglyceride levels.
- Among the 30 patients, 8 (26.67%) patients with elevated triglycerides belonged to Stage 4 CKD, while 1 (3.33%) patient in Stage 4 had normal triglyceride levels.

The p-value of 0.013 suggests that triglyceride levels differ significantly among the different stages of CKD.

3.6 METABOLIC EFFECTS OF ANTIHYPERLIPIDEMIC DRUGS:

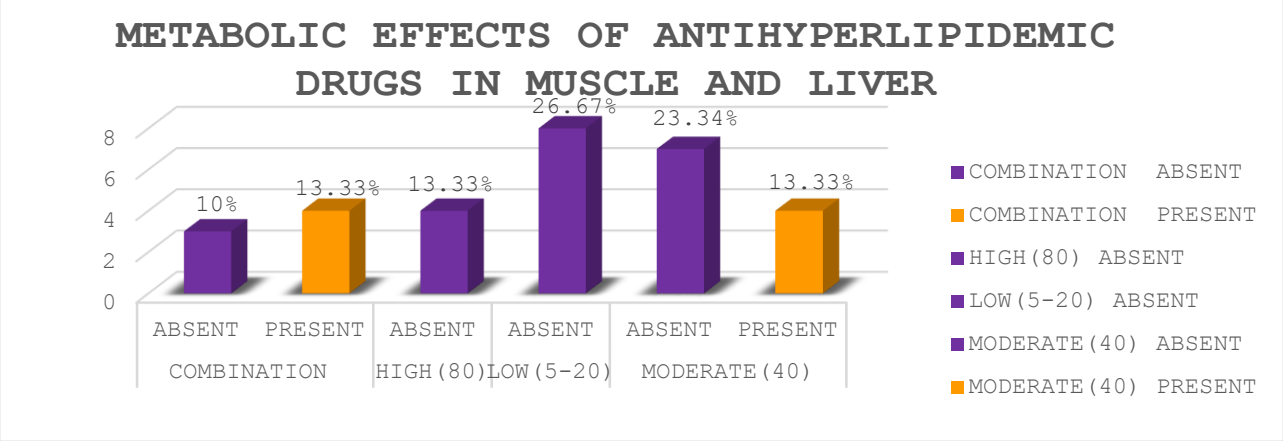

Figure 5: Metabolic effects of antihyperlipidemic drugs in muscle and liver

- Out of 30 patients, 4 (13.33%) patients receiving combination therapy experienced metabolic effects, while 3 (10%) patients receiving combination therapy did not experience metabolic effects.
- Out of 30 patients, 4 (13.33%) patients receiving high-dose therapy did not experience metabolic effects.
- Out of 30 patients, 4 (13.33%) patients receiving moderate-dose therapy experienced metabolic effects, while 7 (23.33%) patients receiving moderate-dose therapy did not experience metabolic effects.
- Out of 30 patients, 8 (26.67%) patients receiving low-dose therapy did not experience metabolic effects.

3.6.1 LIVER INJURY:

Table 5: Liver injury in CKD patients receiving Combination antihyperlipidemic drugs

TYPES OF THERAPY	LIVER INJURY (SGOT AND SGPT)	NUMBER(n=7)	PERCENTAGE (%)
COMBINATION THERAPY	PRESENT	4	57.14
	ABSENT	3	42.86

Out of 7 patients receiving combination therapy, liver injury was present in 4(57.14%) patients and absent in 3(42.86%) patients.

Table 6: Liver injury in CKD patients receiving low-dose antihyperlipidemic drugs

TYPES OF THERAPY	LIVER INJURY (SGOT AND SGPT)	NUMBER(n=8)	PERCENTAGE (%)
LOW DOSE THERAPY	PRESENT	0	0
	ABSENT	8	100

Out of 8 patients receiving low-dose therapy, none of the patients developed liver injury.

Table 7: Liver injury in CKD patients receiving moderate-dose antihyperlipidemic drugs

TYPES OF THERAPY	LIVER INJURY (SGOT AND SGPT)	NUMBER(n=11)	PERCENTAGE (%)
MODERATE DOSE THERAPY	PRESENT	1	9.1
	ABSENT	10	90.9

Out of 11 patients receiving moderate dose therapy, liver injury was present in 1(9.1%) patient and absent in 10(90.9%) patients.

Table 8: Liver injury in CKD patients receiving high-dose antihyperlipidemic drugs

TYPES OF THERAPY	LIVER INJURY (SGOT AND SGPT)	NUMBER(n=4)	PERCENTAGE (%)
HIGH DOSE THERAPY	PRESENT	0	0
	ABSENT	4	100

Out of 4 patients receiving high-dose therapy, none of the patients developed liver injury.

3.6.2 MYOPATHY:

Table 9: Myopathy in CKD patients receiving combination antihyperlipidemic drugs

TYPES OF THERAPY	MYOPATHY	NUMBER(n=7)	PERCENTAGE (%)
COMBINATION THERAPY	PRESENT	0	0
	ABSENT	7	100

Out of 7 patients receiving combination therapy, none of the patients developed myopathy.

Table 10: Myopathy in CKD patients receiving low-dose antihyperlipidemic drugs

TYPES OF THERAPY	MYOPATHY	NUMBER(n=8)	PERCENTAGE (%)
LOW DOSE THERAPY	PRESENT	0	0
	ABSENT	8	100

Out of 8 patients receiving low-dose therapy, none of the patients developed myopathy.

Table 11: Myopathy in CKD patients receiving moderate-dose antihyperlipidemic drugs

TYPES OF THERAPY	MYOPATHY	NUMBER(n=11)	PERCENTAGE (%)
MODERATE DOSE THERAPY	PRESENT	4	36.36
	ABSENT	7	63.64

Out of 11 patients receiving moderate dose therapy, myopathy was present in 4(36.36%) patients and absent in 7(63.64%) patients.

Table 12: Myopathy in CKD patients receiving high-dose antihyperlipidemic drugs

TYPES OF THERAPY	MYOPATHY	NUMBER(n=4)	PERCENTAGE (%)
HIGH DOSE THERAPY	PRESENT	0	0
	ABSENT	4	100

Out of 4 patients receiving high-dose therapy, none of the patients developed myopathy.

3.7ANTIHYPERLIPIDEMIC TREATMENT:

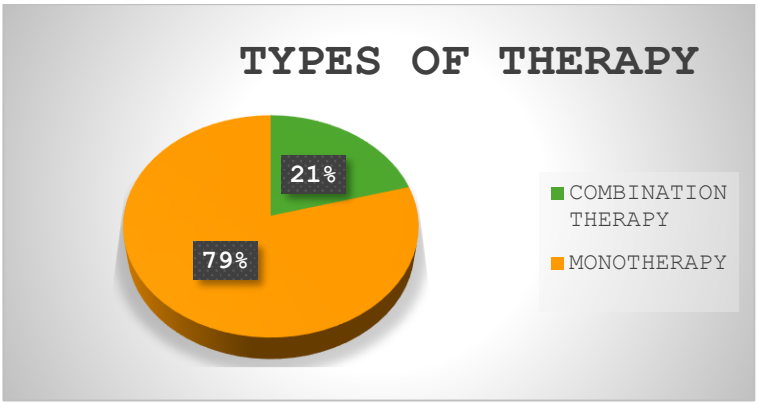

Figure 6: Types of antihyperlipidemic therapy

- Among the 30 patients, 24 (79%) received monotherapy with antihyperlipidemic drugs.
- Among the 30 patients, 6 (21%) received combination therapy with antihyperlipidemic drugs.

3.7.1 ANTIHYPERLIPIDEMIC DRUGS:

Table 13: Antihyperlipidemic drugs

ANTIHYPERLIPIDEMIC CLASS	ANTIHYPERLIPIDEMIC DRUGS	DOSE	NUMBER(n=30)	PERCENTAGE (%)
HMG COA REDUCTASE INHIBITORS(STATINS)	ATORVASTATIN	5 mg	1	3.33
		10 mg	5	16.68
		20 mg	1	3.33
		40 mg	9	30
		80 mg	4	13.33
	ROSUVASTATIN	10 mg	1	3.33
		40 mg	2	6.68
HMG COA REDUCTASE INHIBITORS(STATINS) + CHOLESTEROL ABSORPTION INHIBITOR	ATORVASTATIN+EZETIMIBE	10 mg + 10 mg	1	3.33
		20 mg+ 10 mg	1	3.33
		40 mg+ 10 mg	1	3.33
	ROSUVASTATIN+EZETIMIBE	20 mg+ 10 mg	1	3.33
		40 mg+ 10mg	3	10

Among the 30 patients, 1 (3.33%) received atorvastatin 5 mg, 5 (16.67%) received atorvastatin 10 mg, 1 (3.33%) received atorvastatin 20 mg, 9 (30%) received atorvastatin 40 mg, 4 (13.33%) received atorvastatin 80 mg, 1 (3.33%) received rosuvastatin 10 mg, 2 (6.67%) received rosuvastatin 40 mg,1 (3.33%) received atorvastatin 10 mg + ezetimibe 10 mg, 1 (3.33%) received atorvastatin 20 mg + ezetimibe 10 mg, 1 (3.33%) received atorvastatin 40 mg + ezetimibe 10 mg, 1 (3.33%) received rosuvastatin 20 mg + ezetimibe 10 mg and 3 (10%) received rosuvastatin 40 mg+ezetimibe10mg.Fibrates were not prescribed in CKD patients due to safety concerns about kidney safety and side effects.

3.7.2 STAGE WISE THERAPY:

Table 14: CKD Stage-wise combination antihyperlipidemic therapy

TYPES OF THERAPY	CKD STAGES	NUMBER(n=7)	PERCENTAGE (%)
COMBINATION THERAPY	STAGE 3A	0	0
	STAGE 3B	4	57.14
	STAGE 4	3	42.86

Among the 7 patients receiving combination antihyperlipidemic therapy, the majority belonged to CKD stage 3B (57.14%), followed by stage 4(42.86%), while no patients in stage 3A received combination therapy.

Table 15: CKD Stage-wise low-dose antihyperlipidemic therapy

TYPES OF THERAPY	CKD STAGES	NUMBER(n=8)	PERCENTAGE (%)
LOW DOSE THERAPY	STAGE 3A	2	25
	STAGE 3B	4	50
	STAGE 4	2	25

Among the 8 patients receiving low-dose antihyperlipidemic therapy, the majority belonged to CKD stage 3B (50%), followed by stage 3A (25%) and stage 4(25%).

Table 16: CKD Stage-wise moderate dose antihyperlipidemic therapy

TYPES OF THERAPY	CKD STAGES	NUMBER(n=11)	PERCENTAGE (%)
MODERATE DOSE THERAPY	STAGE 3A	4	36.36
	STAGE 3B	4	36.36
	STAGE 4	3	27.28

Among the 11 patients receiving moderate-dose antihyperlipidemic therapy, the majority belonged to CKD stage 3B (36.36%) and stage 3A (36.36%), followed by stage 4(27.28%)

Table 17: CKD Stage-wise high-dose antihyperlipidemic therapy

TYPES OF THERAPY	CKD STAGES	NUMBER(n=4)	PERCENTAGE (%)
HIGH DOSE THERAPY	STAGE 3A	3	75
	STAGE 3B	0	0
	STAGE 4	1	25

Among the 4 patients receiving high-dose antihyperlipidemic therapy, the majority belonged to CKD stage 3A (75%), followed by stage 4(25%), while no patients in stage 3B received high-dose therapy.

3.8 MEDICATION ADHERENCE:

3.8.1 BEFORE COUNSELLING:

Table 18: Medication Adherence Before Counselling

ADHERENCE	NUMBER(n=30)	PERCENTAGE (%)
POOR ADHERENCE	14	46.67
MODERATE ADHERENCE	16	53.33

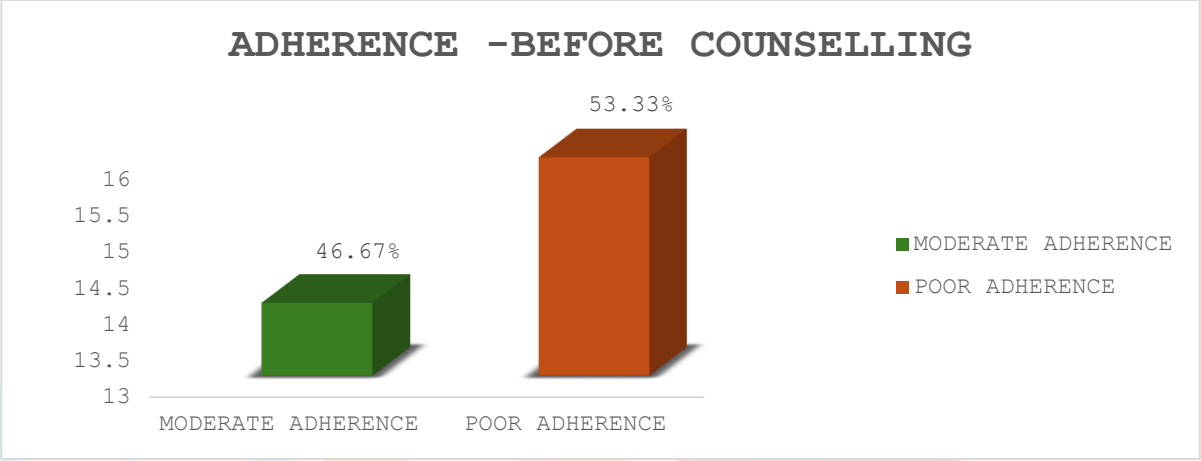

Figure 7: Medication Adherence Before Counselling

- Out of 30 patients, 14 (46.67%) had poor medication adherence before counselling
- Out of 30 patients, 16 (53.33%) had moderate medication adherence before counselling

3.8.2 MEDICATION ADHERENCE-AFTER COUNSELLING:

Table 19: Medication adherence after counselling

ADHERENCE	NUMBER(n=30)	PERCENTAGE (%)
GOOD AHERENCE	24	79
MODERATE ADHERENCE	6	21

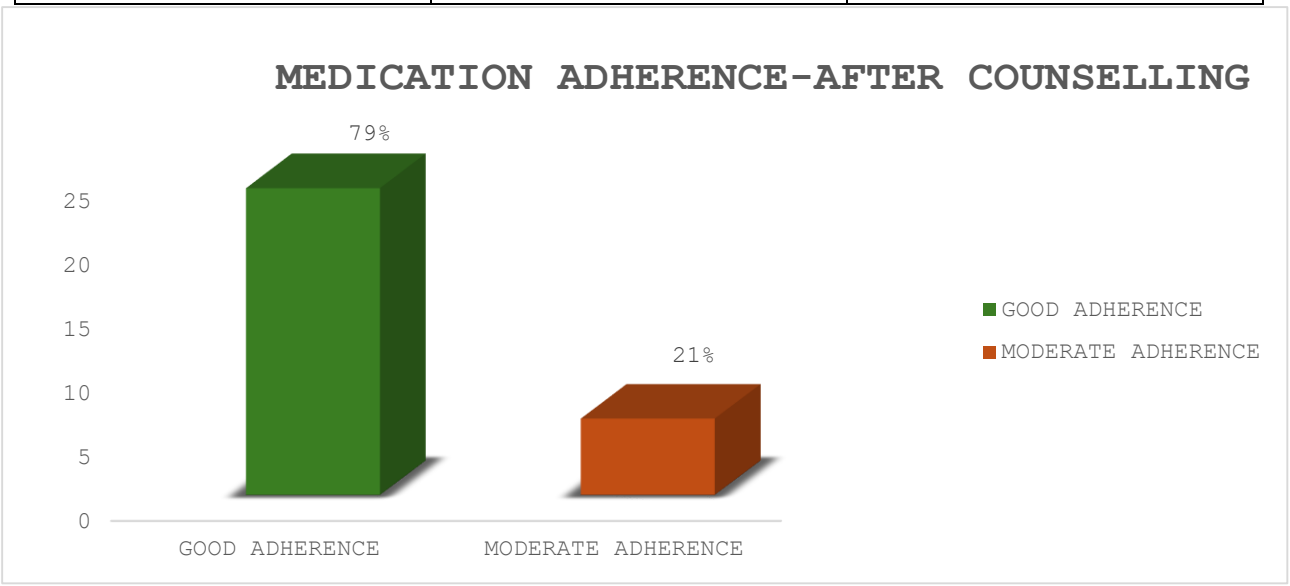

Figure 8: Medication adherence after counselling

- Out of 30 patients, 24 (79%) demonstrated good medication adherence after counselling.
- Out of 30 patients, 6 (21%) demonstrated moderate medication adherence after

These findings indicate that patient counselling was effective in improving adherence to antihyperlipidemic therapy, emphasizing the importance of continuous patient education and regular follow-up to achieve better treatment outcomes in patients with chronic kidney disease and hyperlipidemia.

3.8.3 COMPARISON OF MEDICATION ADHERENCE (BEFORE Vs AFTER):

Table 20: Comparison of medication adherence before and after patient counselling

NUMBER(n=30)	BEFORE COUNSELLING	AFTER COUNSELLING
MEAN SCORE	24.067	15.233
SD	3.97	2.48
P=0.0001		

- Before counselling, the mean medication adherence score was 24.067 ± 3.97.
- After counselling, the mean medication adherence score decreased to 15.233 ± 2.48.

It was observed that the mean medication adherence score decreased from 24.067 ± 3.97 before counselling to 15.233 ± 2.48 after counselling. The reduction in the mean adherence score indicates a marked improvement in patients' medication adherence following counselling. The p-value of 0.0001 indicates a highly statistically significant difference. This suggests that counselling had a strong and measurable effect on the studied outcome

4. DISCUSSION:

This study was conducted to evaluate the clinical pattern of hyperlipidemia and the metabolic effects of antihyperlipidemic drugs among patients with chronic kidney disease (CKD). A total of 30 patients were included in the study.

In our study, a higher proportion of patients were males (56.67%) compared to females (43.33%). It was found that most patients belonged to the elderly age group, particularly those above 70 years. The stage-wise analysis of CKD patients revealed that Stage 3B was the most frequently observed stage, followed by Stage 3A and Stage 4. Our study demonstrated a high prevalence of comorbid conditions among CKD patients, with diabetes mellitus being the most common, followed closely by hypertension and coronary artery disease. In our study, lipid profile evaluation showed that a majority of CKD patients had lipid abnormalities, particularly elevated triglycerides, increased LDL cholesterol, and reduced HDL cholesterol. In contrast, total cholesterol levels were relatively normal in most patients. The study revealed that monotherapy was the most commonly prescribed treatment, with atorvastatin being the preferred drug, particularly the 40 mg dose. Combination therapy with ezetimibe was used less frequently and was generally reserved for patients requiring additional lipid-lowering effect. In our study, there was no association between CKD stages and therapy intensity. In our study, metabolic adverse effects revealed that most patients did not experience significant complications such as liver injury or myopathy during treatment. Only a small proportion of patients developed these adverse effects, and combined toxicity was rare. Medication adherence improved significantly following pharmacist-led counselling.

5. SUMMARY:

This study was carried out among 30 patients with chronic kidney disease and hyperlipidemia to evaluate the clinical pattern of dyslipidemia, associated comorbidities, utilization of antihyperlipidemic drugs, metabolic effects, and medication adherence. Among the study participants, 17 (56.67%) were males, and 13 (43.33%) were females, with the majority belonging to the elderly age group (>70 years). Stage 3B CKD (40%) was the most frequently observed stage, followed by Stage 3A (30%) and Stage 4 (30%). The most common comorbidities were diabetes mellitus (66.67%), hypertension (63.33%), and coronary artery disease (56.67%). Cerebrovascular accident and peripheral vascular occlusive disease were less frequently observed, while other associated diseases, such as lower respiratory tract infection and benign prostatic hyperplasia, were also present in a significant proportion of patients.

Lipid profile assessment showed that 73.33% of patients had lipid abnormalities. Elevated triglycerides and reduced HDL cholesterol were common findings, whereas total cholesterol remained within the normal range in most patients. Regarding drug utilization, monotherapy was prescribed in 79% of patients, while 21% received combination therapy. Atorvastatin, especially the 40 mg dose, was the most commonly prescribed antihyperlipidemic drug. The incidence of metabolic adverse effects, including liver injury and myopathy, was low. Most patients tolerated antihyperlipidemic therapy well, suggesting that statin therapy is relatively safe when appropriately monitored.

Medication adherence improved significantly following pharmacist counselling. Good adherence increased to 79% after counselling, and the mean adherence score improved from 24.067 ± 3.97 before counselling to 15.233 ± 2.48 after counselling, demonstrating the beneficial impact of patient education.

5. CONCLUSION

This study concludes that hyperlipidemia is highly prevalent among patients with chronic kidney disease and is commonly associated with diabetes mellitus, hypertension, and coronary artery disease. Elderly individuals and male patients constituted the majority of the study population, with Stage 3B CKD being the most frequently encountered stage. Most patients exhibited significant lipid abnormalities, particularly elevated triglycerides, elevated LDL cholesterol, and reduced HDL cholesterol, emphasizing the increased cardiovascular risk associated with CKD. Atorvastatin, particularly the 40 mg dose, was the most frequently prescribed antihyperlipidemic medication, and monotherapy was the preferred treatment approach. The study also demonstrated that antihyperlipidemic therapy was generally safe and well-tolerated, with only a small proportion of patients developing liver injury or myopathy. Regular clinical and laboratory monitoring remains important to detect adverse effects at an early stage.

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