



**DRUG UTILIZATION PATTERN IN PREDIALYSIS AND DIALYSIS PATIENTS IN A
TERTIARY CARE TEACHING HOSPITAL.**

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ABSTRACT

Introduction: Chronic kidney disease is increasingly recognized as a global public health programme. Rational drug prescription is difficult in CKD patients due to a higher risk of drug related problems since they need complex therapeutic regimens and they require frequent monitoring and dosage adjustments. **Methodology:** Objective of the study was to compare the drug utilization pattern of predialysis and dialysis patients. **Study design & Settings:** Prospective observational study in the Department of Nephrology, Govt. Medical College, Thiruvananthapuram. **Study period & size:** Six months with 72 participants **Results and Discussion:** Majority of the study population were in the age range of 52.7 ± 11.3 years in predialysis and 53.1 ± 11.5 years in dialysis group. Male predominance was found in both groups. In our study, most of the patients were in the upper lower socioeconomic class and none of them from upper socioeconomic class. Hypertension and Diabetes Mellitus were the commonly observed comorbidity in both groups. Antihypertensives and Antianaemics were commonly used drug class in dialysis patients but in predialysis it was Antihypertensives and antidiabetics. **Conclusion:** In India, the common co-morbid conditions of ESRD are hypertension and diabetes mellitus so the early detection and treatment of these diseases plays a vital role in the prevention and progression of renal failure. A clinical pharmacist can help to prevent this progression of ESRD by providing patient counseling about lifestyle modification, rational drug use and educating the risk group for regular checkup and adhering to the treatment thus can reduce the economic burden of the patient.

KEYWORDS: Dialysis, Drugs, Drug utilization pattern, ESRD, Kidney, Patients, Predialysis.

INTRODUCTION

Chronic kidney disease (CKD) is widely prevalent non-communicable disease that is responsible for increasing morbidity in India. Chronic kidney disease is defined as a reduced glomerular filtration rate, increased urinary albumin excretion or both. Prevalence is estimated to be 8-16% worldwide. The prevalence of end stage renal disease continues to increase globally and most patients are treated with dialysis. Chronic kidney disease is characterized by multiple disorders affecting the morphology and function of kidneys. It is estimated on the basis of a decrease in the number of nephron which ultimately decreases the glomerular filtration rate (GFR) for a period more than three months. Diabetes mellitus, hypertension, recurrent infections along with an inappropriate prescription of drugs are the leading factors resulting in the increasing incidence of chronic kidney disease. Pharmacokinetics in renal compromised patients is altered and often results in drug accumulation and toxicity. Complication include increased cardiovascular

mortality, kidney disease progression, acute kidney injury, cognitive decline, anaemia, mineral and bone disorders and fractures^[7]

Patients with chronic kidney disease usually have multiple co-morbidities and therefore require multiple pills. The common co-morbidities are diabetes mellitus, hypertension, coronary artery disease and infections. The presence of these co-morbidities has a twofold impact- first it increases the cost of treatment and secondly it poses a challenge for the treatment of CKD patients. Because of the multiple medications, CKD patients are at higher risk of developing drug related problems. Drug utilization changes with time period, physician, disease conditions and population which makes it is important to study the drug utilization continuously over a period of time. Appropriate drug selection for patients with CKD is important to avoid unwanted drug effects and to ensure optimal patient outcomes.^[8]

Chronic kidney disease is increasingly recognized as a global public health programme. Rational drug prescription is difficult in CKD patients due to a higher risk of drug related problems since they need complex therapeutic regimens and they require frequent monitoring and dosage adjustments. Inappropriate use of medication can increase the adverse drug effects which may prolong hospital stays leading to increased health care utilization and costs. As CKD patients need to take medicines lifelong, it is very important to study the prescribing trend on a regular basis. Economic evaluation refers to the comparative analysis of alternative courses of action in terms of both their costs and outcomes. Strategies to reduce burden and costs related to CKD should be included in National programme for non-communicable diseases.^[8]

This study was done in the Nephrology Department, Govt. Medical College, Thiruvananthapuram. No similar studies were done in this study set up. In this current situation this study is mainly focused on drug utilization pattern among predialysis and dialysis patient.

METHODOLOGY

Objective: To compare the drug utilization pattern of predialysis and dialysis patients.

Study design & Study settings: Prospective observational study in the Department of Nephrology, Govt. Medical College, Thiruvananthapuram.

Study period & size: Six months with 72 participants (36 in each groups)

Study population: Patients those on maintenance HD and CKD stage IV and V reported at the Nephrology department during the study period.

Inclusion criteria

1. Patients willing to participate in the study.
2. Subjects who were undergoing maintenance haemodialysis for three or more months were included in the dialysis group and other CKD patients of stage four and five were in the predialysis group.

3. Age greater than 18 years were included in the study.

Exclusion criteria

Subjects with psychiatric problems or who died during hospitalization and critically ill subjects were excluded from the study.

Study Procedure

A detailed description regarding the study was given to the participants who met the inclusion criteria. Informed consent was collected from the participants. The patients were interviewed and data collected by using sociodemographic proforma and Modified Kuppaswamy's socioeconomic status scale. Data related to Drug utilization pattern were collected from the patient medical record.

Study variables: Socio economic variables:

Age, Gender, Diagnosis, Co-morbid condition and Number of medications per prescriptions.

Data collection tool: Sociodemographic proforma, Patient medical records and Modified Kuppaswamy's socioeconomic status scale

Data collection technique: Interview method.

Statistical analysis: Data obtained was entered in to Microsoft excel sheet. Data analysis was done using SPSS version 16. Continuous variables were expressed as mean±SD. The discrete variables were expressed as frequency and percentages. Chi-square test was used to test differences between discrete variables. Unpaired t test was used to compare differences between the continuous variables.

Ethical consideration

Study got approval from Human ethics committee of Government Medical College, Thiruvananthapuram (HEC.No.04/09/2018/MCT)

All data will be kept confidential and will be used for the purpose of this study only.

RESULTS

Table 1: Distribution Of Sample According To Age.

Age group	Frequency	AGE		t	p
		MEAN	SD		
Predialysis	36	52.7	11.3	0.134	0.893
Dialysis	36	53.1	11.5		

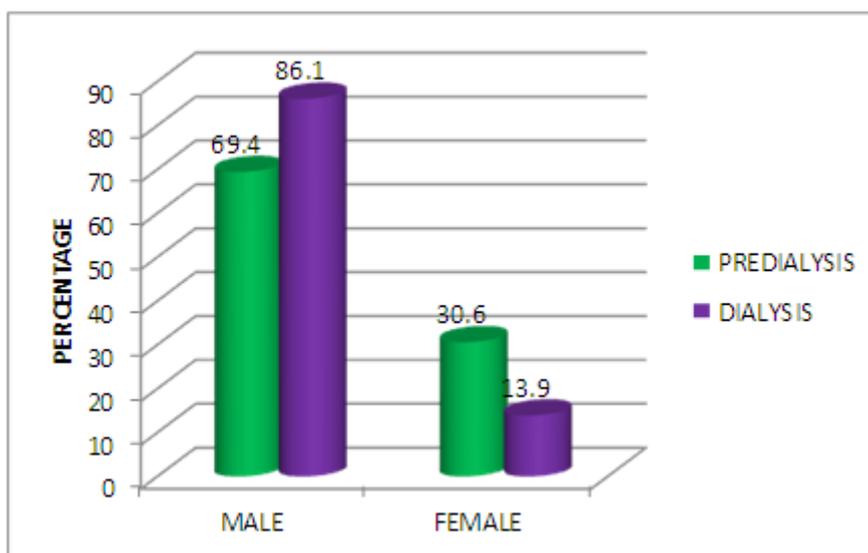


Figure 1: Distribution Of Sample According To Gender.

Table 2: Distribution Of Sample According To Socioeconomic Status.

Socioeconomic status	Predialysis		Dialysis		X ²	df	P
	Frequency	Percent	Frequency	Percent			
Upper middle	1	2.8	0	0	5.684	3	0.128
Lower middle	1	2.8	5	13.8			
Upper lower	28	77.7	29	80.6			
Lower	6	16.7	2	5.6			

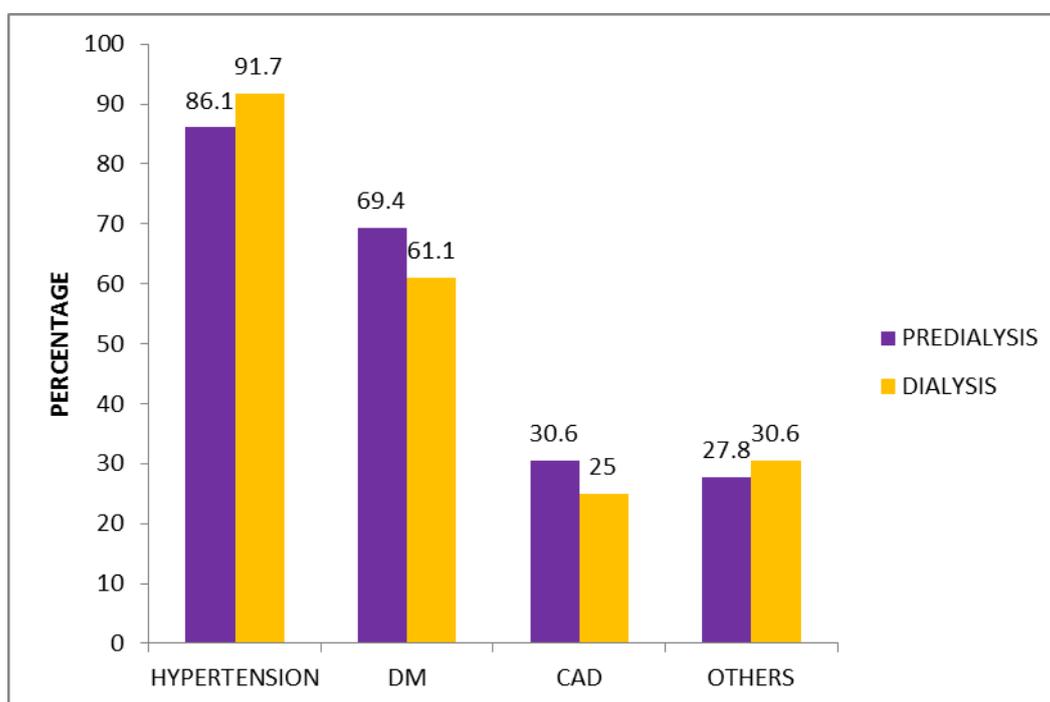


Figure 2: Distribution Of Sample According To Comorbidity.

Table 3: Distribution Of Sample According To Drug Class.

Drug class	Predialysis		Dialysis		X ²	df	P
	Frequency	Percent	Frequency	Percent			
Antihypertensives	36	100	36	100	-	-	-
Antidiabetics	25	69.4	18	50	2.829	1	0.093
Drugs for cad	8	22.2	10	27.8	0.296		0.586

Antianaemics	5	13.9	36	100	54.431	0.001
Phosphate binders	3	8.3	17	47.2	13.569	0.001
Antihyperkalemic Agents	15	41.7	3	8.3	10.667	0.001
Calcium Supplements	6	16.7	13	36.1	3.503	0.061
Antipruritics	0	-	3	8.3	3.130	0.077
Antiepileptics	5	13.9	2	5.6	1.424	0.233
Anti-infectives	1	2.8	7	19.4	5.063	0.024
Others	21	58.3	23	63.9	0.234	0.629

Table 4: Distribution Of Sample According To Number Of Drugs Prescribed In Brand Names.

Group	Frequency	Number of drugs prescribed in brand names		t	P
		MEAN	SD		
Predialysis	36	5.8	2.5	-1.171	0.246
Dialysis	36	6.5	2.7		

Table 5: Distribution Of Sample According To Number Of Drugs Prescribed In Generic Names.

Group	Frequency	Number of drugs prescribed in generic names		t	p
		MEAN	SD		
Predialysis	36	0.61	0.80	8.955	<0.001
Dialysis	36	2.69	1.14		

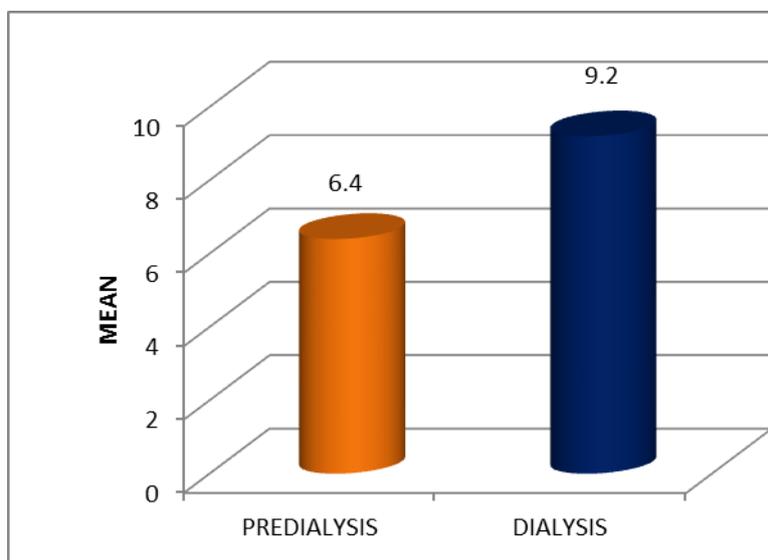


Figure 3: Distribution Of Sample According To Total Number Of Drugs Per Prescription.

DISCUSSION

In our study, majority of the patients were in the mean age range 53.1 ± 11.5 years in dialysis group which was slightly higher than that of predialysis group (52.7 ± 11.3). The study findings were consistent with the study conducted by *UdayVenkatMatetiet al*^[8]. In their study mean age of predialysis population was 50.67 years and dialysis patient was 49.80 years. The result was consistent with the study done by *SouravChakraborty et al*^[7] and *NarayanaMurty BVet al*^[22] that dialysis patients were in the age more than 50 years and between 41-60 years respectively.

The data showed that the prevalence of CKD was more common in males than females. Non communicable diseases like HTN and DM were more common in males which cause damage to kidney over period of time leading to CKD; it may be the reason for male

predominance. The percentage of males (86.1%) in dialysis group was higher compared with predialysis group (69.4%). Female gender was more in predialysis group than dialysis. The studies carried by *SouravChakraborty et al*^[7] *DheepaNayagamBet al*^[15] and *NarayanaMurty BVet al*^[22] found out male predominance were seen in dialysis patients. The result was more consistent with study conducted by *UdayVenkatMatetiet al*^[8]

It was observed that 94.4% of the patients were married and 5.6% of the patients were unmarried in both predialysis and dialysis groups.

In this study, most of the patients (66.7%) in predialysis group coming from rural area compared with dialysis group (47.2%), because the study were done in Govt.

hospital. 52.8% of the dialysis patients coming from urban area rather than predialysis group.

Modified Kuppaswamy's socioeconomic status scale was used to classify the education of the patient. According to the scale, most of the patient had high school level of education in both predialysis and dialysis patients. It reflects the high literacy level in the state of Kerala. Primary level of education in dialysis group (25%) was somewhat higher than predialysis group (19.4%). The percentage of middle school and diploma level of education was equal for both groups. Graduates (11.1%) were more in dialysis group compared with predialysis group (2.8%). The result was not consistent with the study conducted by *ShaliniChawla et al*^[26].

The socioeconomic status of the patient was classified into upper, upper middle, lower middle, upper lower and lower socioeconomic class by Modified Kuppaswamy's socioeconomic status scale. None of the patient included in the upper class in our study. 2.8% of the predialysis patients were in the upper middle class and none of the dialysis patients were included. Most of the patient included in lower middle class compared with predialysis group. Majority of the patient in our study were included in the upper lower class in both groups so they were approached to the Public hospital for the treatment. 16.7% of patients in dialysis group were in the lower class compared with predialysis group. The study was not consistent with study conducted by *Suja A et al*^[16] *RajivAhlawat et al*^[5] and *Nandagopal Anita et al*^[8]. Majority of the patient in their study was in upper class and lower middle class respectively.

Hypertension was the most common co-morbid condition in predialysis and dialysis group. Among the two groups, the percentage of HTN was more in dialysis group (91.7%) compared with predialysis group (86.1%). Second most common comorbidity was DM in both groups. DM patients were higher in the predialysis group compared with dialysis group. 30.6% of the patients had CAD which is higher than that of dialysis group (25%). Other co-morbid conditions like SLE, Epilepsy, hypothyroidism, COPD and infections were more in dialysis group (30.6%) compared with predialysis group (27.8%). These co-morbid conditions may be the reason for increased number of drugs per prescription. The finding in our study was similar to study conducted by *DheepanNayagamBet al*^[15] and *Suja A et al*^[16] that HTN and DM were the most common comorbidities in dialysis patients. HTN and DM was the most common comorbidity in both the groups. The result was more consistent with the study conducted by *UdayVenkatMatetiet al.*^[8]

Most medications in this study were used to manage comorbidities and complications. Among all the prescribed drugs, Antihypertensive drugs were the most predominantly used drugs in both predialysis and dialysis groups. 69.4% patients in predialysis group were taken

Antidiabetic drugs which is greater than that of dialysis group (50%). Antianaemic drug use in dialysis patient was significantly higher compared to predialysis patients because iron was required for the formation of RBCs. Dialysis patient lack iron due to loss of small amounts of residual blood discarded in the dialyzer and tubings after each dialysis session. The utilization of drugs for CAD was higher in dialysis group compared with predialysis group.

The percentage of Calcium supplement and Antipruritic drug use was high in dialysis group compared with predialysis group. Dialysis patients were at a high risk of infection compared with predialysis group, so the uses of anti-infectives were significantly higher in dialysis patients.

Utilization of Phosphate binders in dialysis group was significantly higher than predialysis groups. Antiepileptic drug use was higher in predialysis group compared with dialysis group. Other drug class (drugs for SLE, GI disturbances, hypothyroidism, COPD and corticosteroids) usage in dialysis group compared with predialysis group was high. Antihyperkalemic agent use was significantly higher in predialysis patients compared with dialysis patients. The use of anti-infectives in dialysis patient was not consistent with the study conducted by *Rajeshwari et al*^[10] and the use of Antihypertensives in predialysis group was consistent with the study conducted by *ShaliniChawla et al.*^[26]

The drug utilization pattern of predialysis patients was Antihypertensives, Antidiabetics, Other drugs, Antihyperkalemic agents, drugs for CAD, Calcium supplements, Antianaemics, Antiepileptics, Phosphate binders and Anti-infectives.

The dialysis patients were used drug in the order of Antihypertensives and Antianaemics followed by other drugs, Antidiabetics, Phosphate binders, Calcium supplements, drugs for CAD, Anti-infectives, Antihyperkalemic agents, Antipruritics and Antiepileptics.

The average number of brand names prescribed in predialysis patients (5.8 ± 2.5) was less compared with dialysis patients (6.5 ± 2.7) in our study. Non availability of generic drugs in hospital pharmacy and physician trust in the quality of branded drugs, it might be the reason for prescribing high number of brand names. It increases total cost of the treatment. The result was consistent with study conducted by *Rajeshwari et al.*^[10]

The mean number of generic name prescribed in dialysis group (2.69%) was significantly higher than predialysis group (0.61%). The result was consistent with study conducted by *Rajeshwari et al.*^[10] Prescribing drugs in generic names may decrease the economic burden of the patient.

The average number of drugs per prescription was significantly higher in dialysis patients (9.2 ± 2.3) compared with predialysis patients (6.4 ± 2.2). Difference in the average number of medicines per prescription may be due to difference in comorbidities and physician's prescribing behaviour. Patient receiving more than 6 drugs had an increased risk of mortality and medication related problems. The average number of drugs per prescription in dialysis patient was slightly higher in our study compared with study conducted by *DheepanNayagam B et al* [15] and *Rajeshwari et al* [10]. Total number of drugs per prescription in predialysis patient was more consistent with the study conducted by *ShaliniChawla et al.* [26]

Summary

The study result was summarized below;

- Majority of the study population were in the age range of 52.7 ± 11.3 years in predialysis and 53.1 ± 11.5 years in dialysis group.
- Male predominance was found in both groups.
- Most of the patients were married in both groups.
- Majority of the patients in predialysis group was coming from rural area and in dialysis group it was from urban area.
- The percentage of high school level of education was high in both groups.
- In our study, most of the patients were in the upper lower socioeconomic class and none of them from upper socioeconomic class.
- Hypertension and Diabetes Mellitus were the commonly observed comorbidity in both groups.
- Antihypertensives and Antianaemics were commonly used drug class in dialysis patients but in predialysis it was Antihypertensives and antidiabetics.
- The Antihypertensive drug class CCBs and Beta blockers were commonly used in dialysis and predialysis group.
- In the present study, Insulin was the only Antidiabetic drug used in dialysis patients. In predialysis group Sulfonyl urea were used to manage Diabetes.
- All the patients in dialysis group were received Erythropoietin and i.v. iron as Antianaemic agent. Only 13.8% were received oral iron in predialysis group as Antianaemic agent.
- Pattern of prescribing drug in brand name was high in (6.5 ± 2.7) dialysis group compared to predialysis group.
- Total number of drugs per prescription was higher in dialysis group (9.2 ± 2.3).

CONCLUSION

In India, the common co-morbid conditions of ESRD are hypertension and diabetes mellitus so the early detection and treatment of these diseases plays a vital role in the prevention and progression of renal failure. A clinical

pharmacist can help to prevent this progression of ESRD by providing patient counseling about lifestyle modification, rational drug use and educating the risk group for regular checkup and adhering to the treatment thus can reduce the economic burden of the patient.

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