

Prescribing pattern of drugs in chronic kidney disease patients on hemodialysis at a tertiary care hospital

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ABSTRACT

Background: CKD (chronic kidney disease) is a general term for heterogeneous disorders affecting kidney structure and its function. It is defined as either kidney damage or a decreased glomerular filtration rate of less than 60 mL/min/1.73m² for 3 or more months. Objective of present work is to study the drug utilization pattern in chronic kidney disease patients undergoing hemodialysis.

Methods: After taking the clearance and approval from the institutional ethics committee, a cross sectional prospective observational study conducted on chronic kidney disease (CKD) patients undergoing hemodialysis, in the department of nephrology, of Rajarajeshwari Medical College and Hospital, Bangalore. The data was analyzed descriptively.

Results: Study included 52 patients, among them 41 males, 11 were females, with a mean age of 47.6yrs. In our study large number pt were suffering from hypertension (HTN) 88.46% (46), in them the calcium channel blocker (CCB) 08.48% (38) was most commonly prescribed anti hypertensive drug. Around 1/3 of pt suffering from diabetes mellitus (DM) 36.53% (19) most of these patients were treated with them treated with oral hypoglycemic agents (OHA), and less than half of pt treated with insulin 01.56% (07). Other drugs like phosphate binders (calcium carbonate & acetate) used in 11.16% (50), aspirin in 08.70% (39), statins in 10.04% (45) pt were being most commonly prescribed drugs. Totally 448 drugs were prescribed In 52 pts ie about 8.61 drugs / prescription, showing poly pharmacy.

Conclusions: Patients undergoing hemodialysis with CKD will be having multiple diseases associated, regular monitoring and counseling regarding these diseases and its complication may reduce the incidence of CKD and the mortality and morbidity associated. The poly pharmacy noted in the study found inevitable because of the multifactorial etiologies involved and needful multi-interventional approach towards it.

Keywords: CKD, Drug utilization, Hemodialysis

INTRODUCTION

CKD (chronic kidney disease) is a general term for heterogeneous disorders affecting kidney structure and its function. It is defined as either kidney damage or a decreased glomerular filtration rate of less than 60 mL/min/1.73 m² for 3 or more months.¹⁻³

CKD is a key determinant of poor health outcomes for major Non-communicable diseases (NCDs), and it is a worldwide threat to public health. Estimates of the global burden of the diseases report that kidney and urinary tract

diseases contribute 830000 deaths annually making them the 12th highest cause of death (1.4% of all deaths) and disability-adjusted life years (DALY) in 18867000, i.e. 17th cause of disability (1% of all DALY).⁴⁻⁷

Chronic kidney disease (CKD) is a global threat to health in general and for developing countries in particular because of its increasing incidence, poor outcome, and high cost of treatment.¹ The treatment in CKD patients includes renal transplantation and dialysis, it will be according to the stage of the disease and these are considered in later stages of CKD. The first step in the

treatment is to determine the underlying cause and treating it. Initiation of dialysis in advanced CKD along with the management of clinical manifestations due to it.^{7,8} In India, the prevalence of CKD was observed to be 17.2% with ~6% have CKD Stage 3 or worse (25) and it is more seen among males compared to females due to stress, alcoholism, hypertension, diabetes mellitus, smoking and cumulative risk factors of chronic vascular disease (CVD).^{4,7-9} Diabetes mellitus, hypertension, smoking, cardiovascular diseases (CVD), age, chronic use of non-steroidal anti-inflammatory drugs (NSAIDs) and obesity are being the major cause of CKD.¹⁰ CKD Patients do not have symptoms until the kidney function is severely impaired and as the disease advances, symptoms like loss of appetite, somnolence, uremia, nausea, vomiting, and confusion may develop. Patients also suffer from hypertension, electrolyte abnormalities like hyperkalemia, hypocalcaemia, hyperphosphatemia, anemia and renal osteodystrophy.^{7,8}

Dialysis (from Greek meaning dissolution, dia means through, lysis means loosening or splitting) is a process for removing waste and excess water from the blood, and is used primarily as an artificial replacement for lost kidney function in people with renal failure. Hemodialysis, also called as an artificial kidney, has already been proven as an adjunct of life-saving therapy in case of acute renal failure and mainly chronic renal failure.¹¹⁻¹³ Anemia is the next major complication of CKD and patients are treated with erythropoietin or iron supplements. Other drugs given for CKD patients include diuretics and potassium binding resin for hyperkalemia. Calcium salts or phosphate binders to treat hyperphosphatemia, sodium bicarbonate to manage metabolic acidosis, calcium and vitamin D supplementation for renal osteodystrophy and drugs for other co-morbidities.^{7,8}

Appropriate drug selection for patients with chronic kidney disease (CKD) is important in order to avoid unwanted drug effects and to ensure optimal patient outcomes. Rational drug prescription is a difficult task in CKD patients. These patients are at higher risk of drug-related problems since they need complex therapeutic regimens that require frequent monitoring and dosage adjustments. In addition, they usually have other co morbidities.^{6,14-19} Inappropriate use of medications can increase adverse drug effects, which can be reflected by excessive length of hospital stays, excessive health care utilization, and costs.^{14,20-22} As CKD progresses, the drugs that are given for these patients also increases and the prevalence of drug related problems also increases. Patients with CKD and on maintenance hemodialysis are prescribed with an average of 12 medications per patient and are at a higher risk of developing drug related problems thus leading to untoward effects.^{7,8} Dialysis patients require special consideration regarding the drugs used because of their altered pharmacokinetic and pharmacodynamics profiles and they have increased potential for adverse reactions.

METHODS

This is a prospective, observational study conducted on CKD patients undergoing hemodialysis (includes both the inpatient and outpatients), in the Department of Nephrology, of Rajarajeshwari Medical College and hospital, Bangalore. After taking the clearance and approval from institutional ethical committee the study will be undertaken for a period of 6 months. Relevant data will be collected on a Proforma which is designed according to the protocol of the study which includes mainly about the drugs.

- Dose, dosage, duration, timing of administration, route of administration of the prescribed drugs.
- Change of drugs during the treatment to any reason will also be noted.
- Investigations done and its reports, which are relevant to the study will be noted.

Inclusion criteria

All CKD patients undergoing hemodialysis aged above 18 years.

Exclusion criteria

- Patients on hemodialysis for ARF (acute renal failure).
- Patients not willing to give consent.

Statistical analysis

The data collected will be analyzed statistically using descriptive statistics. Wherever necessary, the results depicted in the form of percentages and graphs.

RESULTS

The study involved 52 CKD patients undergoing hemodialysis. Among these 79% (41) male and 21% (11) was female with a mean age of 47.6 years (Figure 1, Table 1).

Table 1: Prescription analysis.

Details of prescription	Number
Male	41
Female	11
Mean average age	47.6 years
Prescription analyzed	52
Total no drugs prescribed	448
No FDC observed	40
No of drugs prescribed by generic names	0
Number of drugs from WHO essential drug list	178 (39.73%)

Totally 448 drugs, as 8.61 drugs/ prescription prescribed in the study showing poly pharmacy, and in these drugs

about 178 (39.75%) drugs only prescribed from WHO essential drug list and 40 FDC were prescribed in our study (Table 1).

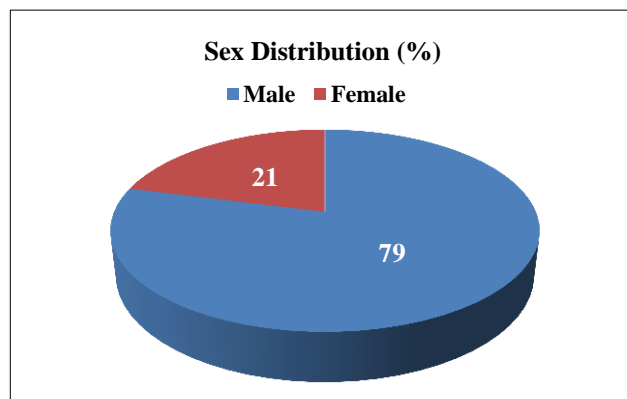


Figure 1: Sex ratio in CKD patients.

The risk and co morbidities associated with these pts was hypertension 88.46% (46), smoking 75% (39), alcoholics 53.84% (28), diabetes mellitus 36.53% (19), anemia 36.53% (19), coronary artery disease 36.53% (19), and thyroid disorder 5.76% (03) (Table 2).

Table 2: Risk and co morbidities associated with CKD.

Risk and co-morbidities	No and % of patients
HTN	46 (88.46)
Smoking	39 (75.00)
Alcohol	28 (53.84)
DM	19 (36.53)
Anemia	19 (36.53)
CAD	19 (36.53)
Thyroid	03 (05.76)

In diabetes mellitus 17 (89%) patients were suffering from type 2 and 2 (11%) of type 1 (Figure 2). The drugs prescribed to these pts with above co morbidities and risk factors are summarized in (Table 3).

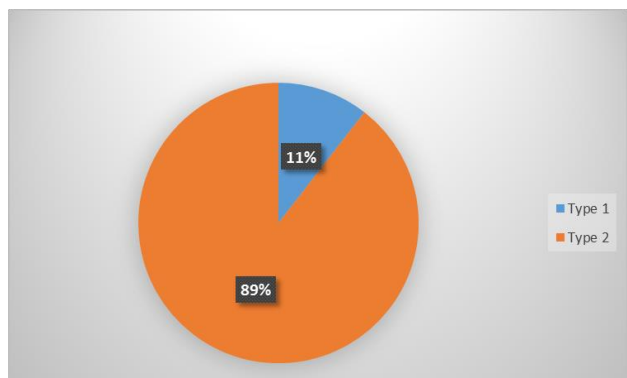


Figure 2: Percentage of patients in type 1 and 2 DM.

Cardiovascular drugs were most commonly used drugs 42%, followed by hematopoietic 15%, phosphate binders

11%, gastro intestinal tract 10.9%, multivitamins 10.9%, DM 09%.

Table 3: Percentage of drug classes used in different systems.

Drug Class	No of drugs	% of drugs
CVS	189	42.18
DM	40	08.92
GIT	49	10.93
Phosphate binders	50	11.16
Hematopoietic	68	15.17
Multi vitamins	49	10.93
Thyroid	03	00.66
Total	448	

The five most commonly prescribed drugs are statins 10.04%, diuretics 9.15%, aspirin 8.70%, calcium channel blockers 8.48%, OHA 7.36% (Table 4).

Table 4: Percentage of different drugs used.

Drugs	Numbers	Percentage
CVS	189	42.18
CCB	38	08.48
ACE	20	04.46
ARB	12	02.67
Alpha 2 agonists	25	05.58
Beta blockers	04	01.33
Diuretic	41	09.15
Others	49	10.93
GIT	49	10.93
H2 blockers	09	02.00
PPI	40	08.92
DM	40	08.92
OHAs	33	07.36
Insulin	07	01.56
Phosphate binders	50	11.16
Calcium carbonate	28	06.25
Calcium acetate	22	04.91
Multi vitamins	49	10.93
Hematopoietic	68	15.17
Thyroid	03	00.66

DISCUSSION

Modernization and changing life style in developing countries like India has enormously increased the statistical figures of alcohol use, smoking and also non-communicable diseases like diabetes mellitus, hypertension, obesity, cardiovascular disease, and its complications like, myocardial infarction, stroke, retinopathy, chronic kidney disease. These are due to lack of awareness about the disease and its management. In present study on CKD points undergoing hemodialysis, revealed majority of patients were males 78.84% (41) showing the similar gender distribution in earlier studies

done by Bajait et al and Chakraborty et al, most of these patients aged between 41-60 years with a mean age of 48 yrs and the lowest was 24 yr old patient with type 1 DM.

Several risk factors and comorbidities were found to be associated among these CKD pts, which is similar to the studies conducted earlier, and they are.

- Hypertension 88.46% (46)
- Smoking 75% (39)
- Alcoholics 53.84% (28)
- Diabetes mellitus 36.53% (19)
- Anemia 36.53% (19)
- Coronary artery disease 36.53% (19) and
- Thyroid disorder 5.76% (03)

In the present study 448 drugs are prescribed, no drugs were prescribed by generic names, showing that prescribing by brand name is the norm, which needs to be discouraged. Encouraging writing of prescription by generic names is always recommended by various national and international bodies to promote rational use of medicines. 40% of the prescribed drugs were from the WHO essential medicines list. Showing similarity with the study done by Bajait et al.

Making the other drugs which are used in the treatment of these pts as freely available in public health facilities is advised because of the increasing incidence and high cost involved in the treatment of the disease. The average number of drugs prescribed for these pts is 8.61 drugs / prescription, showing the polypharmacy. Patients undergoing hemodialysis will have many risk, co morbidities and complications, like DM, HTN, CVD, anemia, salt and water retention, electrolyte imbalance, phosphate retention, secondary hyper para-thyroidism. The treatment of all these medical problems includes fluid restriction, multiple dietary restrictions, and drugs like phosphate binders, vitamin D preparations, antihypertensive, hypo-glycemics, diuretics, vitamins, iron supplements, and a variety of other medications. Considering all these heterogeneous disorders affecting these patients the poly pharmacy noted in the study is acceptable. Many of the studies done earlier shows using of more than 9 drugs Bajait, et al and Chakraborty et al, and even upto 12 drug.²³

The most commonly used medications in this study were based on these co morbidities and complications involved in treating these patients. Hypertension is the most commonly associated co morbidity seen with these patients.²⁴ Diuretics were the most commonly used drug in these patients next to this were CCB. Among the drugs used to treat HTN were CCB's (amlodipine, nifedipine) 08.48%, and ACE 4.46%/ ARB's 2.67% (enalapril and telmesartan). Monotherapy is rarely seen among these, most of the anti HTN drugs were prescribed with diuretics, diuretics prescribed in 09.15% of pts, like thiazide diuretics were used more in our study which is combined with ACE/ARB's (FDC). Because of its renal

protective, reduction of sympathetic over activity and reduction of complication like edema and pulmonary edema.

In present study, Diabetes was the 2nd common co morbidity associated in 36.53% (19) pts, among these most of them were suffering from type 2 DM and only 3.84% (2) were of type among anti-diabetic medications OHAs have been used in majority of patients and also insulin in few pts 1.56% (7). Among the hypoglycemic agents used were more of glibenclamide, glimepiride, glipizide, acarbose and metformin (FDC), use of metformin is very less when compared to other OHA because as it may cause lactic acidosis in renal failure patients. In diabetes also FDC and poly therapy was seen using at least two OHA's together and using inj Insulin and OHA's together but these were seen more in treating HTN pts. Anemia is the most common complication seen among these patients due to reduced erythropoietin secretion. In our study, also 36% (19) pts had anemia and were treated with hematinic and vitamin supplements. As hematinic, iron supplements 15% (like livogen, folic acid, iron sucrose) and multivitamins in 11%, were prescribed among vitamins methyl cobalamine used more in the diabetics. In present study calcium carbonate and calcium acetate are used as phosphate binders (11.9%) and also as calcium supplement as it is affordable because of its low cost by many patients when compared to sevelamer hydrochloride and lanthanum carbonate, which is also similar to the other studies done by Bajait, et al and Chakraborty et al.

Heart burns, nausea and belching will be seen in these patients because of using many drugs, stress and also poor food intake. Proton pump inhibitors like esomeprazole, pantoprazole was used in most of the pts to reduce these symptoms than H2 blockers, even though the cost for these drugs are high when compared to H2 blockers. Similar results were also noted in studies done by Bajait et al and Chakraborty et al.¹⁷

CONCLUSION

Inclusion of new drugs like ARBs, sevelamer hydrochloride, lanthanum carbonate in the treatment of these pts certainly reduces the mortality and morbidity, but these drugs are costly when compared to old ones so there by increases the treatment cost because already pt are using many drugs and also need them to be consumed for longer periods. We think counselling on needful life style modification and good health education about the disease, management, its complications in the early stage of the disease, certainly reduces the incidence of these diseases and also reduces the cost, mortality and morbidity due to these.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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