Study on Prescription Pattern of Chronic Kidney Disease Patients in A Tertiary Care Teaching Hospital: A Retrospective Study

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ABSTRACT

Background: The prevalence of chronic kidney disease is enormously increasingly worldwide due to the gradual rise in hypertension, diabetes, cardiovascular diseases. As kidney is a major eliminating organ, its function decreases in CKD resulting in accumulation of drugs which leads to toxic effects. Use of poly pharmacy in co- morbid conditions results in drug - drug interactions and adverse effects which may cause serious and long term illness and decrease quality of life of patient. **Objective**: To assess the prescribing patterns of drugs in chronic kidney patients in a tertiary care teaching hospital. **Materials and Methods**: A retrospective observational study was conducted in a tertiary care teaching hospital. Details like socio-demographic and clinical characteristics, past medication history, co-morbidities and treatment chart were noted in self-pre-designed proforma. Collected data were analyzed using appropriate statistical tools. Patients diagnosed with CKD were included in the study and Pregnant women and children were excluded from the study. **Results**: The collected data showed that almost 6867.9(%) were male and 32(%) were female. Out of 100 patients, majority of the patients 37(37%) were between the ages of 51-60, followed by1 (1%) patient under age group 20-30. Among the 100 patients, a greater number of patients (27.9%) were with co-morbidities of which hypertension 28(27.9%) and diabetes mellitus 25(24.9%) was more common. Most of the patients 36(35.8%) showed CKD stage 5, 12(11.8%) showed stage 4 and 4 (4.1%) showed stage 1 CKD. Out of 100 patients, 28 patients were prescribed antihypertensives, among them the most common was diuretic i.e. 10 patients. Among the 100 prescriptions, minor interaction was more (61%), and major interaction was less (19%). **Conclusion**: Our study found that high number of medications were used in CKD patients which can increase the possibility of drug interactions. therefore, Continuous medical education of physicians and collaboration with clinical pharmacists is an important issue for quality improvement regarding renally impaired patients.

INTRODUCTION

Worldwide there has been an upward trend in the incidence and prevalence of chronic kidney disease (CKD) leading to increased cost of treatment with poor outcomes. Keeping with the worldwide trend, there has been an upsurge in the prevalence and incidence of CKD in Saudi Arabia during the last three decades. CKD is commonly present among hospitalized patients, nearly 40% of patients admitted to a large academic hospital were observed to have some level of CKD. CKD patients undergoing maintenance hemodialysis have associated comorbidities like hypertension, diabetes mellitus, anemia, acid base balance and electrolyte disturbances etc. The main Goals in CKD patients on maintenance hemodialysis are treatment of the complications and prevention of morbidity and mortality. The patients of CKD have one of the highest daily pill burdens. Inappropriate use of medications can increase adverse drug effects and cause excessive length of hospital stays, health care utilization, and costs.[1]

Kidney is the major organ for maintaining homeostasis of fluid and electrolytes and in particular, plays an important role in the disposition of many drugs. Chronic kidney disease affects renal drug elimination and other pharmacokinetic processes involved in drug disposition (e.g., absorption, drug distribution, nonrenal clearance [metabolism]). About half of all drugs or their metabolites are excreted by the kidneys, and 30% of all adverse effects of medication have a real cause or a renal effect.[2]

A decrease in the Glomerular Reduction Rate, urinary abnormalities, or anatomical abnormalities of the renal tract are all signs of chronic kidney disease. Chronic kidney disease (CKD) is widely prevalent non communicable disease that is responsible for increasing morbidity in India. Because of the multiple medications, CKD patients are at higher risk of developing drug-related problems. They need complex therapeutic regimen requiring frequent monitoring. Inappropriate use of drugs in these patients can lead to adverse drug reaction, increased hospital stay and increased cost of treatment. Drug utilization changes with time, physician, disease conditions and population, which makes it is important to study drug utilization continuously over some time.[3] Drug utilization studies in CKD patients help to understand and build evidence for the drug use. CKD patients need to take medicineslifelong, which makes it is very important to study the prescribing trend on a regular basis. There is very limited evidence from India on the prescribing trends in CKD patients.[4]

The glomerular filtration rate (GFR) lowers as a result, changing the kidney's

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pharmacokinetics and pharmacodynamics. To avoid toxicity and the progression of CKD, drug dose regimens had to be adjusted in patients with impaired renal function. Maintaining kidney function requires optimal medication therapy. The majority of investigations on renal function prescribing trends have been conducted on older people. Since CKD patients are more likely to experience medication therapy issues, they require frequent monitoring and dosage modifications.[5]

The Global Burden of Disease (GBD) study 2015 ranked chronic kidney disease as 17th among the cause of death globally (Age-standardized annual death rate of 19.2 deaths per 100,000 population). Although the exact incidence and prevalence rates are not available,it is estimated that one out of 10,000 people suffer from CKD in India and around 100 thousandnew patients develop End Stage Renal Disease (ESRD) in India annually.[6]

Prescription pattern studies are drug utilization studies which explain about prescribing, dispensing and administering of drugs. They explain about drug use, quality of drugs, trends and compliance with standard treatment guidelines, usage of drugs from essentialmedicine list and use of generic drugs.[7]

Thus, the purpose of this study was to obtain information about the prescription pattern in CKD patients and observe the variation among patients admitted at Navodaya Medical College Hospital & Research Center in north Karnataka, Raichur. In this context, the department of Pharmacy Practice has proposed the study entitled

"STUDY ON PRESCRIPTION PATTERN OF CHRONIC KIDNEY DISEASE PATIENTS IN A TERITIARY CARE TEACHING HOSPITAL: A RETROSPECTIVE STUDY".

MATERIALS ANE METHODS

Study site:

The study was conducted in Navodaya Medical College Hospital and research center, Raichur,Karnataka.

Study duration:

The study duration was 3 months (August 2023 to October 2023).

Study method and size

A retrospective observational study was conducted on 100 patients.

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Inclusion Criteria

Both genders - male and female were included in the study.

Exclusion Criteria

Pregnant women and children are excluded from the study.

Source of data

Data was collected from the medical records of all inpatients diagnosed with CKD admitted ingeneral medicine wards of NMCH & RC.

Methodology:

Data on demographic, clinical and laboratory, management from consecutive patients with diagnosis of CKD admitted to NMCH&RC was collected from MRD by using a well-designed data collection form.

Statistical Analysis:

Data from the questionnaire were analyzed using descriptive statistics namely total numbers, percentages and mean. Microsoft Word and excel have been used to generate graphs, tables.

RESULTS

A total of 100 samples were collected, from patients who visited NMCH & RC, Raichur. The datawas analyzed based on the following parameters.

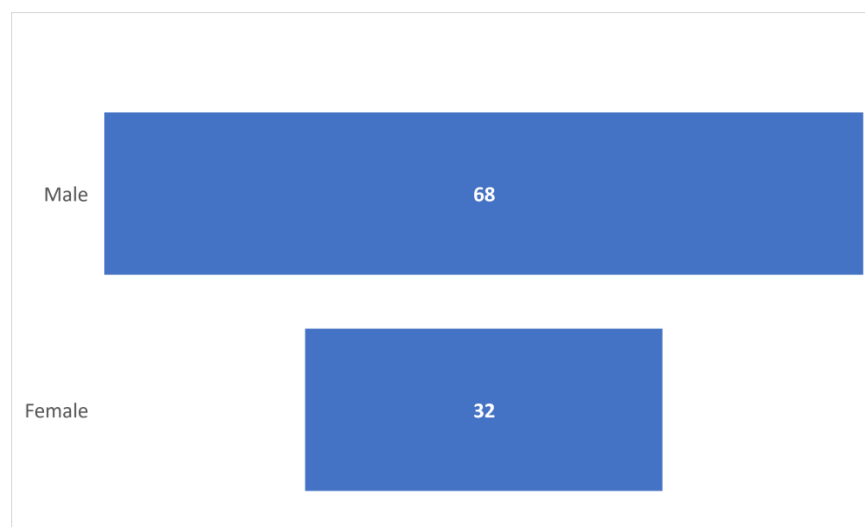**Distribution according to gender (n=100)**

Fig No.1

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Among 100 patients, 68 were male (67.9%), and female 32(32.1%).

Distribution according to age group (n=100)

Table No.1

Age	Female (n=32)	Male (n=68)	Total (n=100)	Percentage
20-30	0	1	1	1%
31-40	4	7	11	10.9%
41-50	9	18	27	26.9%
51-60	12	25	37	37%
61-70	5	9	14	14.2%
71-80	2	8	10	10%

Among the 100 patients, majority of patients (37%) were 51-60 age group, followed by (1%) patient under age group 20-30.

Distribution according to the co-morbidities (n=100)

Table No 2

Co-morbidities	No: of patients (n=100)	Percentage
Hypertension	28	27.9%
Diabetes mellitus	25	24.9%
Acute kidney injury	15	14.9%
Anaemia	15	15%
Ischemic heart disease	9	8.9%
Gastro enteritis	5	5.1%
Lower respiratory tract infection	3	3.2%

Among the 100 patients, a greater number of patients (27.9%) were with co-morbidities of whichhypertension was more common. **Table No 2**

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Distribution according to the CKD stages(n=100)

Table No 3

CKD	No:patients (n=100)	Percentage
Stage 1	4	4.1%
Stage 2	10	10.5%
Stage 3	9	8.9%
Stage 4	12	11.8%
Stage 5	36	35.8%
none	29	28.9%

Among 100 patients, 35.8% patient showed CKD stage 5, 11.8% showed stage 4 and 4.1% showed stage 1 CKD.

Representation of patients prescribed with anti-hypertensives (n=100)

Table No : 4

Classification of Anti-hypertensives	No:of patients
Diuretics	10
Calcium channel blockers	9
Vasodilators	5
Alpha adrenergic agonist	2
Beta blocker	1
ARB	1

Out of 100 patients, 28 patients were prescribed with antihypertensives, among them the mostcommon was diuretic10 patients were prescribed with it. **Table No: 4**

Distribution of anti- diabetic among CKD patients (n=100)

Table 5

Anti-diabetic	No: of patients
Metformin	17
Glimepride	16
Metformin + glimepride	9
Plain insulin	9
NPH insulin	8
Metformin + glimepride +NPH insulin	3
Metformin +glimepride +plain insulin	2

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Out of 100 patients, 25 patients were prescribed with Anti-diabetic drugs, among them the most common was metformin 17 patients were prescribed with it. **Table No: 5**

Distribution of proton pump inhibitor among CKD patients (n=100)

Table 6

Proton pump inhibitor	No: of patients
Pantoprazole	100
Omeprazole	12

Out of 100 patients, all the patients were prescribed with pantoprazole, among them 12 patients took omeprazole over the counter .**Table 6**

Representation of distribution of anemic drugs

Table 7

Drugs for anemia	No: of patients
Prescribed	15
Not prescribed	09

Out of 100 patients, 15 patients were prescribed with anti-anemic drug, among them 9 patients took over the counter drugs. **Table 7**

Representing distribution of diuretics

Table 8

Diuretics	No: of patients
Loop diuretics	7
Thiazides	7
Potassium sparing diuretics	5
Osmotic diuretics	2

Among the diuretics, loop diuretic and thiazide diuretics were most prescribed **Table 8.**

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Representing distribution of various other drugs

Table 9

Various another drug	No: of patients
Antipyretic	8
Antibiotics	12
Anti-coagulants	9
Vitamins and mineral	19

Out of 100 patients, 19 prescriptions was on vitamins and minerals, antipyretics was the least prescribed (8). **Table 9**

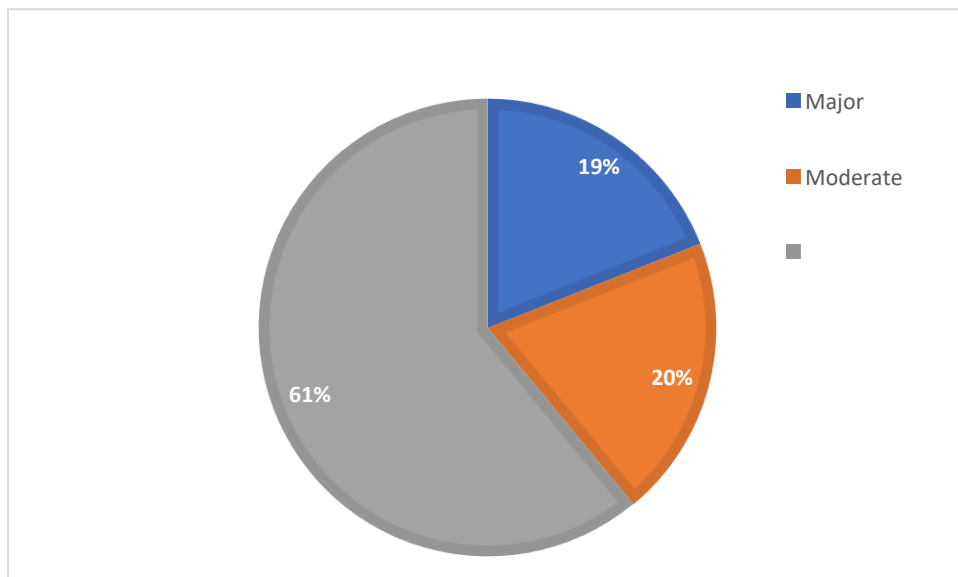**Possible drug-drug interaction in the study population**

Fig No 2

Among the 100 prescriptions minor interaction was more (61%), and major interaction was less(19%). **Fig No 2**

DISCUSSION

The study was carried out with the aim to assess the prescribing pattern of drugs in chronic kidney disease and to evaluate the comorbidities in a tertiary care hospital. The discussion is based on the data obtained from 100 patients which is included in the study.

The prevalence of CKD cases are enormously increasingly worldwide due to gradual rise in

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hypertension, diabetes, cardiovascular diseases and also inappropriate drug use and polypharmacy make people prone to drug induced renal disease in India. Most of drugs are extensively excreted by kidneys, in renal failure condition the drugs are accumulated and causes toxic or adverse effects.

The total of 100 patients were included in our study. Among total study population 68 patients were male and 32 patients are female. This explains that majority of a male's population over females. These findings are similar to that of **Tamilselvan T, Veerapandiyan AK *et al*.** study.

In the study, more number of patients are seen between age of 51 - 60 years (37patients, 37%), followed by 41-50 years (27 patients, 26.9%) , 61-70 years (14 patients,14.2%),31-40 years (11 patients,10.9%),71-80 year (10 patients,10%),and least was age between 20-30 only one patient . Age may be also one of risk factor for development of CKD, which is similar to **Tamilselvan T, Veerapandiyan AK., *et al*.** study.

The kidney plays a major role in the control of blood pressure by regulating sodium retention, extracellular fluid volume, and the renin-angiotensin system. Alteration in these mechanisms leads to hypertension in CKD. Hypertension (28 patients, 27.9%) was the major co-morbidity in this study population, followed by diabetes mellitus (25 patients,24.9%), followed by anaemia (15 patients, 15%) and acute kidney injury (15 patients, 15%) , Ischemic heart disease (9 patients 8.9%), gastroenteritis(5 patients, 5.1%), and Lower respiratory tract infection (3 patients, 3.2%).

The study population with stage 5 (36 patients, 35.8%) were higher followed, by stage 4 (12 patients, 11.5%), stage 2 (10 patients, 10.5%), stage 3(9 patients, 8.9%),and least was stage 1(4 patients, 4%), .these finding reveals that most of study population are with end stage renal disease.

Multiple drug therapy was usually followed by CKD patients due to their comorbid conditions such as hypertension, diabetes, cardiovascular disorders, anaemia, thyroid disorders, etc. Hence along with antihypertensive and antidiabetic drugs the patients have to take other drugs based their comorbidity such as, vitamins, mineral supplements, antiplatelets etc.

Majority antihypertensives prescribed were diuretics (10 patients) followed by calcium channel blockers (9 patients), vasodilators (5patients), alpha adrenergic agonist (2 patients),

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beta blocker and ARB (1 patient). In **Alwyn P Saju, Ankur C Edakkarayil** *et al.* CCBs are majorly prescribed drugs followed by diuretics.

Drug -drug interactions were found. Major interactions were (48.90%), followed by 117 (41.40%) moderate drug interactions, and followed by 27 (9.57%) minor interactions were found. This is due to polypharmacy in many prescriptions. In **Alessandra Batista Marquito**, **Natalia Maria da Silva Fernande** study majority are moderate drug interactions 76.9%, followed by major drug interactions 16.8% and minor drug interactions were 5.9%. [6]

LIMITATIONS OF STUDY:

The study was carried out in a single hospital, multicentered study can be conducted to compare the prescribing pattern of drugs in chronic kidney disease patients.

STRENGTH OF STUDY METHOD:

The method chosen to undertake the study gives a nearly accurate view about the prescribingpattern of medications in CKD patients.

FUTURE OUTLOOK OF THE STUDY:

• A follow-up can be conducted to know the improvement regarding prescribing pattern ofmedications in CKD patients.

• Our study results can be useful in educating and creating awareness among HealthcareProfessionals to enhance management strategies and patient quality of life.

• Frequent training programs and workshops on prescribing pattern on medications atthe institutional level need to be organized.

CONCLUSION

The study concluded that t polypharmacy was very high in patients with CKD. Diuretics, anti-hypertensives, oral hypoglycemic drugs were more frequently used in CKD patients because of high prevalence of co morbidities. Medication prescribing patterns suggest a high number of medications used in CKD patients with an increased possibility of drug interactions. Continuous medical education of physicians and collaboration with clinical pharmacists is an important issue for quality improvement regarding renal impaired patients.

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the completion of the project.

CONFLICT OF INTEREST

The authors declare that no conflict of interest exists.

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