



Received on 31 December 2023; received in revised form, 17 January 2024; accepted, 05 April 2024; published 01 June 2024

## PHARMACOTHERAPY AND DRUG INTERACTIONS IN PATIENTS WITH CHRONIC KIDNEY DISEASE AT A TERTIARY CARE CENTRE– A CROSS-SECTIONAL STUDY

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### Keywords:

CKD, Polypharmacy, Drug-drug interaction, Pharmacotherapy, GFR

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**ABSTRACT: Background:** Chronic kidney disease (CKD) is defined as either kidney damage or a decreased glomerular filtration rate (GFR) of less than 60 mL/min/1.73m<sup>2</sup> for 3 or more months. The prevalence of CKD in India is 17.2% and it is substantially higher in hypertension, Diabetes, and vascular disease patients. Polypharmacy potentiates the risk of medication-related problems, such as drug-drug interactions and complex drug. **Objective:** To assess the pattern of prescription and drug interactions in chronic kidney disease patients. **Methodology:** It was a cross-sectional study done from November 2022 to April 2023. The study was conducted on 60 in patients diagnosed with CKD in the Department of General Medicine in Victoria Hospital attached to BMCRI. The pattern of prescription was assessed in addition drug interactions were assessed by using Medscape – an online drug interactions checker. **Results:** The data demonstrated that most of the patients who were diagnosed with CKD were males (60%) and in the age group of less than 60 years (88%). 50% of patients belong to CKD stage IV followed by stage III (40%) and II (10%). The most common comorbidity associated with CKD was hypertension (63%) and T2DM (42%). Drug interactions in patients were divided into Severe (3.33%), Moderate (60%), Mild (66.66%), and No interaction (33.33%). **Conclusion:** The problem in CKD is not only an increase in the burden but progressive nature of CKD. Rational drug prescription is a difficult task because these patients are at higher risk of drug-related problems since they need complex therapeutic regimens.

**INTRODUCTION:** Chronic kidney disease (CKD) is defined as either kidney damage or a decreased glomerular filtration rate (GFR) of less than 60 mL/min/1.73m<sup>2</sup> for 3 or more months <sup>1</sup>. It involves a spectrum of disorders that affect kidney function and result in a progressive decline in GFR <sup>2</sup>.

CKD prevalence in India is 17.2% and it is markedly increased in patients with hypertension, Diabetes, and vascular disease patients. The likelihood of developing CKD is increasing in developing countries like India driven by the surge in new cases, unfavourable outcomes, and financial burden of treatment <sup>3</sup>.

Adverse effects and drug interactions will be circumvented by the suitable selection of drugs in CKD patients <sup>4</sup>. Polypharmacy has been defined as the concomitant use of five or more drugs per day by a single person <sup>5</sup>. To decelerate the deterioration of kidney function or manage comorbidities, CKD

<p><b>QUICK RESPONSE CODE</b></p> 	<p><b>DOI:</b> 10.13040/IJPSR.0975-8232.15(6).1831-34</p> <p>This article can be accessed online on <a href="http://www.ijpsr.com">www.ijpsr.com</a></p> <p>DOI link: <a href="https://doi.org/10.13040/IJPSR.0975-8232.15(6).1831-34">https://doi.org/10.13040/IJPSR.0975-8232.15(6).1831-34</a></p>
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patients are usually treated with multiple medications. polypharmacy amplifies the likelihood of occurrence of medication-related problems (MRPs), such as drug-drug interactions (DDIs), complicated drug regimens, and higher medication costs which lead to medication non-adherence to treatment and compromise quality of life, and the risk increases as CKD progresses<sup>6</sup>. Rational drug prescription in CKD patients poses a significant challenge due to increased susceptibility to drug-related problems since they need complex therapeutic regimens that necessitate frequent monitoring and dosage adjustments<sup>7</sup>. Hence, the present study is undertaken to assess the pattern of prescription and drug interactions in CKD patients in our tertiary care centre. This study will add information about different pharmacotherapy prescribed in various stages of CKD and also classify the severity of drug interactions like mild, moderate, and severe reactions in each patient.

**MATERIALS AND METHODS:** It was a cross-sectional study done from November 2022 to April 2023. The study was conducted on 60 patients who were diagnosed with CKD and admitted to general medicine wards in Victoria Hospital attached to Bangalore Medical College and Research Institute. The sample size was calculated using the previous Indian study, the prevalence of CKD is 17.2%<sup>3</sup>. Assuming absolute precision of 10% and a Confidence Interval of 95%, the sample size is with missing data of about 10%, sample size is calculated to be 54.68, rounded off to 60. The following patients were included – patients of

either sex aged above 18 years, patients willing to give written informed consent, patients with chronic kidney disease who are consuming more than 5 medications (polypharmacy), and CKD patients with stages II, III, and IV. The exclusion criteria were patients diagnosed with acute renal failure. After obtaining approval and clearance from the institutional ethics committee, patients fulfilling the inclusion and exclusion criteria was enrolled in the study after obtaining informed consent. (Ethical committee approval was from the Institutional ethics committee attached to Bangalore Medical College and Research Institute and the approval number is BMCRI/PS/226/22-23). The information required was gathered from the patient's case sheets and the data was entered in case record form which includes demographic data like IP number, date of admission, age sex, address, occupation, education, marital status, and income followed by disease data which includes diagnosis, co-existing diseases, and past history of any major illness and finally drug data which includes the number of the drugs prescribed, a dose of the drug, generic names, frequency of administration, duration, route of administration. By using the data, the pattern of prescription and drug interactions was assessed by using Medscape – an online drug interactions checker.

**RESULTS:** A total of 60 patients were included in the study who were diagnosed with stage II, III, and IV CKD, and the pattern of prescription and drug interactions were analysed.

**TABLE 1: DEMOGRAPHIC CHARACTERISTICS (AGE AND SEX) OF CKD PATIENTS**

Parameters	Category	Number	Percentage
Age	Adult (18-60years)	53	88
	Elderly (>60 years)	7	12
Sex	Male	36	60
	Female	24	40

Table 1 shows most of the patients who were diagnosed with CKD were males (60%) and in the common age group of patients around 18-80 years (88%).

**TABLE 2: PERCENTAGE OF PATIENTS DIAGNOSED WITH DIFFERENT STAGES OF CKD**

Stages	Number of Patients	Percentage
Stage II	6	10
Stage III	24	40
Stage IV	30	50

Table 2 shows most common stage is stage IV followed by stage III and stage II of CKD.

**TABLE 3: PRESCRIPTION PATTERN OF CKD PATIENTS**

S. no.	Category of Drugs Prescribed	Number of Patients	Percentage
1	Calcium supplements	53	88

2	Anti-hypertensive drugs	38	63
3	Ferrous sulphate	36	60
4	Antidiabetic drugs	25	42
5	Hypolipidemic drugs	15	25
6	Anti thrombotic drugs	15	25
7	Pain killers	14	23
8	Drugs for gastritis	14	23
9	Anti-emetic drugs	12	20
10	Antibiotics	12	20

Table 3 shows different group of drugs prescribed in CKD patients. The most common group of drugs are calcium supplements, antihypertensive drugs, antidiabetic drugs and the least common drugs prescribed are antiemetic and antibiotics.

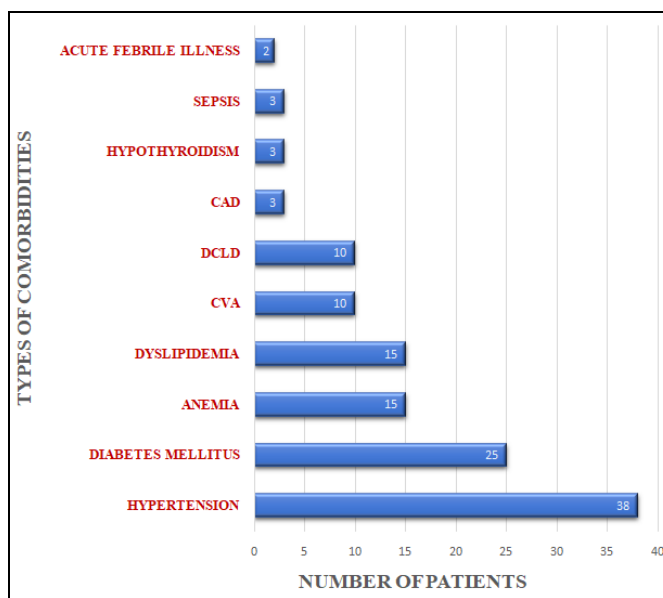


FIG. 1: SHOWS COMORBIDITIES ASSOCIATED WITH CKD PATIENTS

Among the different types of comorbidities associated with CKD patients hypertension (63.33%) and diabetes mellitus (41.66 %) were the most common comorbidities seen in the majority of the patients and the least common comorbidities were sepsis (5%) and acute febrile illness (3.33%).

divided into Severe, Moderate, Minor, and No interactions. Totally 40 patients have the probability of developing drug interactions and no interaction between the drugs in 20 patients. All 40 patients (66.6%) have the probability of developing minor interactions followed by moderate (60%), severe (3%), and only minor (3%) which was demonstrated in Fig. 2.

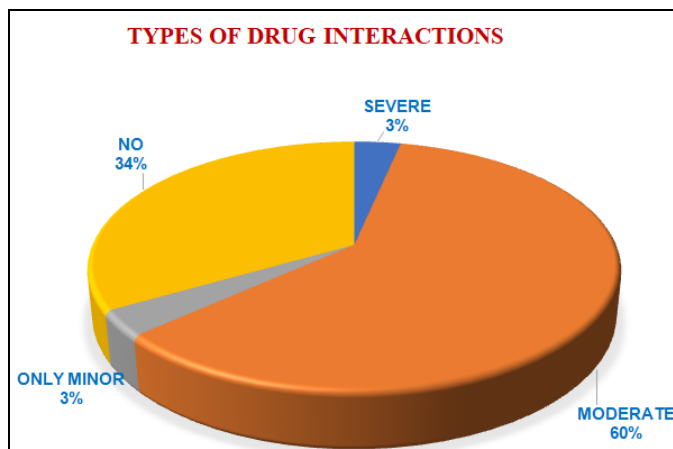


FIG. 2: SHOWS TYPES OF DRUG INTERACTIONS DISTRIBUTED AMONG CKD PATIENTS

Drug interactions were assessed by using Medscape – an online drug interactions checker and it is

**DISCUSSION:** CKD is a progressive disease, diagnosis in the early stage will reduce the progression and complications of the disease. The data of sixty patients admitted with a diagnosis of CKD were analyzed. In the present study, prevalence of CKD was higher in males (60%) than females which is similar to the study done by Ramani RA<sup>8</sup> probably due to the difference in hormonal levels seen in males. The most common age group suffering from CKD was seen in less than 60 years of age which is similar to the study done by Chakraborty S<sup>9</sup>. Stage IV CKD patients were more common followed by stage III and II in the present study.

In pharmacotherapy of CKD, Vitamin supplements like Calcium were more commonly prescribed, perhaps as the disease progresses hypocalcemia occurs due to diminished renal production of 1,25 - Dihydroxy vitamin D and hyper-phosphatemia results from low GFR of phosphate. In the present study, the most common comorbidities were hypertension and cardiovascular events, thereby the second most prescribed drugs were aimed to treat the above conditions which were similar to the prescription pattern study done by Bajait CS<sup>10</sup>. And the least commonly prescribed drugs were antiemetics and antibiotic drugs in CKD patients. Drug interactions are divided into minor, moderate, and severe by using the Medscape drug-drug interaction checker. In this study minor interactions were more common followed by moderate and severe interactions which was dissimilar to the study done by Yameen MA where moderate interactions were more common<sup>11</sup>.

**CONCLUSION:** The problem in CKD and its progressive nature have led to an increase in the burden. The major risk factor is multimorbidity and polypharmacy. Rational drug prescription is a difficult task in CKD patients because these patients are at higher risk of drug-related problems. To minimize this event in CKD patients, proactive medication review is important for positive health outcomes.

**ACKNOWLEDGMENT:** Nil

**CONFLICTS OF INTEREST:** Nil

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### How to cite this article:

Yuvarani R, Mamatha KR, Purushotham VS, Mamatha K, Raghav MV and Prasanth DM: Pharmacotherapy and drug interactions in patients with chronic kidney disease at a tertiary care centre – a cross-sectional study. *Int J Pharm Sci & Res* 2024; 15(6): 1831-34. doi: 10.13040/IJPSR.0975-8232.15(6).1831-34.

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