

**AN OBSERVATIONAL STUDY ON DRUG UTILIZATION PATTERN IN CHRONIC KIDNEY DISEASE PATIENT USING ANTIHYPERTENSIVE DRUGS IN A TERTIARY CARE TEACHING HOSPITAL.****Dr. Vikneswari A.\*<sup>1</sup>, Safthar Ahammed P. P.<sup>2</sup>, Dr. Vishwas ATL<sup>3</sup> and Dr. Suresha B. S.<sup>4</sup>**<sup>1</sup>\*Professor and HOD, Department of Pharmacy Practice, Bharathi College of Pharmacy, Mandya.<sup>2</sup>Pharm D, Department of Pharmacy Practice, Bharathi College of Pharmacy, Mandya, Karnataka - 571422.<sup>3</sup>Assistant Professor, Department of Pharmacy Practice, Sree Siddaganga College of Pharmacy, Tumkur - 572102.<sup>4</sup>Professor and HOD, Department of Pharmacology, Bharathi College of Pharmacy, Mandya.**\*Corresponding Author: Dr. Vikneswari A.**

Professor and HOD, Department of Pharmacy Practice, Bharathi College of Pharmacy, Mandya.

Email Id: [saftharahammed@gmail.com](mailto:saftharahammed@gmail.com)

Article Received on 21/02/2023

Article Revised on 13/03/2023

Article Accepted on 02/04/2023

**ABSTRACT**

Chronic kidney disease (CKD) is a major public health issue and widely prevalent non-communicable disease in India. hypertension can be a cause or a consequence of chronic kidney disease. CKD patients require to take medications for a lifelong period, which makes it very important to study the prescribing trends on a regular basis, there is a strong relationship between Hypertension and CKD. **Methodology:** this is a prospective, cross-sectional study. **Result:** total of 110 patient records were analysed. Demographics shown males (60%) and females (40%) more patients were in the age group of 46-65 year (45%). CKD patients of stage 5 (87%), stage 4 patients (13%), and the patients in other stages were (0%). 146 anti-hypertensive drugs prescribed majority of patients prescribed CCB (43%). The co-morbidity, majority of patients were suffering anemia (76%). Among total study subject, 30 drug interaction are found and minor drug interactions are counted 18 (60%), moderate drug interaction counted 10 (33%), and major drug interactions counted 2 (7%). Maximum no of drugs was prescribed in generic name (90%). **Conclusion:** Clinical pharmacist plays an important role in the selection of drugs for treatment of CKD with hypertension otherwise leads to increase mortality and morbidity. Improving medication adherence, patient counselling and dietary recommendations helps the patient to increase good therapeutic outcomes.

**KEYWORDS:** Chronic kidney Disease, Antihypertensive, Drug Utilization Pattern.**INTRODUCTION**

Chronic kidney disease (CKD)—or chronic renal failure (CRF), as it was historically termed—is a term that encompasses all degrees of decreased kidney function, from damaged—at risk through mild, moderate, and severe chronic kidney failure. CKD is a worldwide public health problem. CKD is more prevalent in the elderly population. However, while younger patients with CKD typically experience progressive loss of kidney function, 30% of patients over 65 years of age with CKD have stable disease, and CKD is associated with an increased risk of cardiovascular disease and end-stage renal disease.<sup>[1]</sup>

The kidney mainly functions to filter waste products and fluids from the blood and consequently release them into the urine and regulating PH, salt, potassium levels in the body. risk factors of CKD are Hypertension, Diabetes, Obesity, elderly, family history of kidney diseases, low birth weight, smoking, alcohol consumption, cardiovascular diseases, hyperlipidaemia, metabolic syndrome, etc.<sup>[2]</sup>

According to the National Health and Nutrition Examination Survey (NHANES) study, the prevalence of CKD in stage 3 was rise to 24.5% from 18.8% during the year 2003-2006 from the year 1988-1994 respectively. Moreover, the overall prevalence of CKD in the SEEK (Screening and Early Evaluation of Kidney Diseases) study in India, the prevalence of the CKD stages 1,2,3,4, and 5 was 7%, 4.3%, 4.3%, 0.8%, and 0.8% respectively. On the other hand, the general population worldwide found a consistent estimated global CKD prevalence of 11-13%.<sup>[3]</sup>

Hypertension is a chronic illness associated with high morbidity & mortality, with a rising number of patients with hypertension and chronic kidney disease, achieving blood pressure of less than 140/90 mm of Hg is challenging. Hence, there is a need for appropriate, safe, effective and economical study to find out the patterns of drug therapy. According to WHO, Hypertension is defined as a systolic blood pressure (SBP) of 140 mmHg or more, or a diastolic blood pressure (DBP) of 90 mmHg or more. Hypertension is a common disease that

is simply defined as persistently elevated arterial blood pressure (BP).<sup>[5]</sup>

In the 1990s, the World Health Organization (WHO) in collaboration with the International Network of Rational Use of Drugs (INRUD) developed a set of indicators to measure the effectiveness of drug-related health facilities of health care providers in a number of important lists related to the proper use of drugs. The indications are based on practices observed in a sample of clinical interactions occurring in intensive care units for acute chronic illness.<sup>[6]</sup>

## MATERIALS AND METHODS

**Study Design:** This is a cross sectional study conducted after getting ethical approval. The study population was recruited from both outpatient and inpatient of general medicine department. Our study included patients those who are having CKD with HTN and other co morbid conditions like Diabetes mellitus, and other associated cardiovascular diseases.

All the relevant data was obtained from the patients' medical records and through counselling the patients who visited the Out Patient Department (OPD) or In-Patient Department (IPD). Patient's medical records were checked and following information were noted in Patient Medical Record sheet: Patient's demographic details, Patient Medical History, Diagnosis of the patient

– CKD stages, age of onset of hypertension and chronic kidney disease and its duration, time since last hypertension and chronic kidney disease occur, family history of hypertension and chronic kidney disease and presence of other co-morbidities, Prescribed drugs including Anti- hypertensive (Frequency, Dose and Duration) was also collected, number of anti-hypertensives, doses were collected along with details of hypertension control on hypertensive, Lab investigations reports (which are already mentioned in patient medical records) were recorded to the Annexure 1 and patient consent (Annexure 2a & b).

## RESULTS

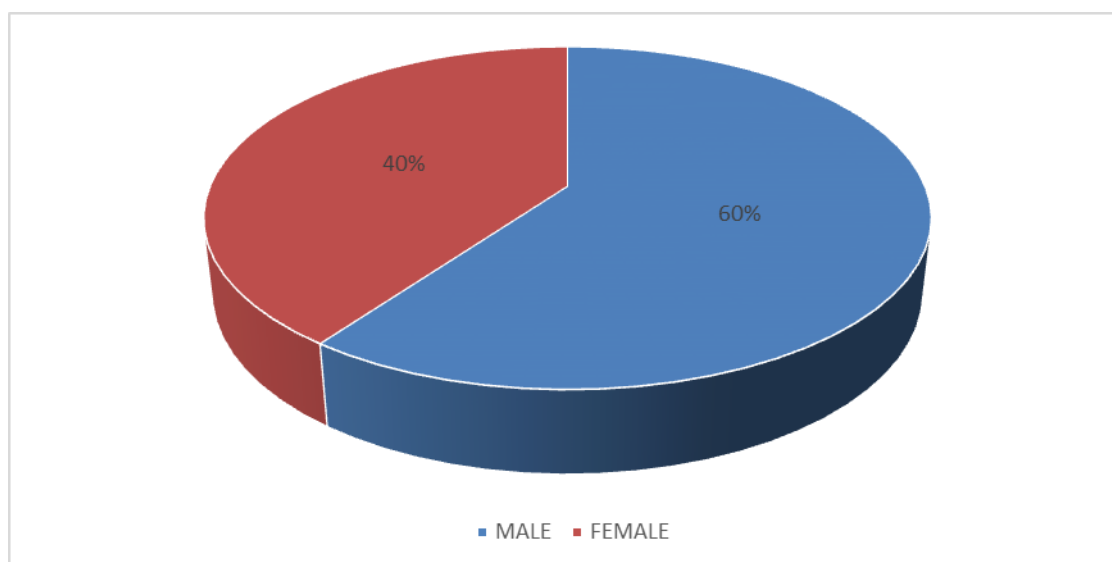
This is an observational study on the pattern of drug utilization in chronic kidney disease patients taking antihypertensive drugs conducted in the Department of General Medicine and Nephrology Division, Mandya Institute of Medical Science (MIMS), Mandya. as per the inclusion criteria. Patient demographic data such as age, sex, etc., laboratory findings and treatment details were documented in an appropriately designed patient profile form with the consent of the patients.

### 1 Distribution of Patient Based on Gender

Based on our study of 110 patients and their records, 66 patients were male and 44 patients were female, their proportions being 60% and 40%, respectively.

**Table 1: Distribution of Patient Based on Gender.**

Gender	Number of Patients	Percentage
MALE	66	60%
FEMALE	44	40%



**Figure 1: Distribution of Patient Based on Gender.**

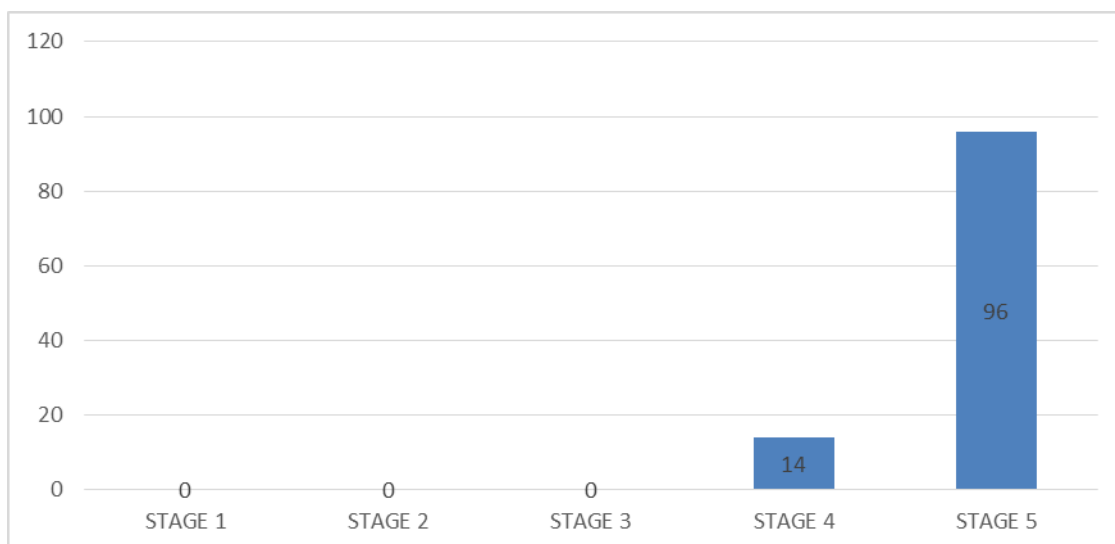
### 2 Distribution Based on Stage of CKD

According to the guidelines of KDIGO (2012), chronic kidney disease is classified into five stages based on the GFR value. In MIMS, Mandya, CKD patients are treated

in stage 5 and 4. The percentage of stage 5 patients was 87%, the percentage of stage 4 patients was 13%, and the percentage of patients in other stages were 0%.

**Table 2: Distribution Based on Stage of CKD.**

Stage of CKD	Number of Patients	Percentage
STAGE 1	0	0%
STAGE 2	0	0%
STAGE 3	0	0%
STAGE 4	14	13%
STAGE 5	96	87%

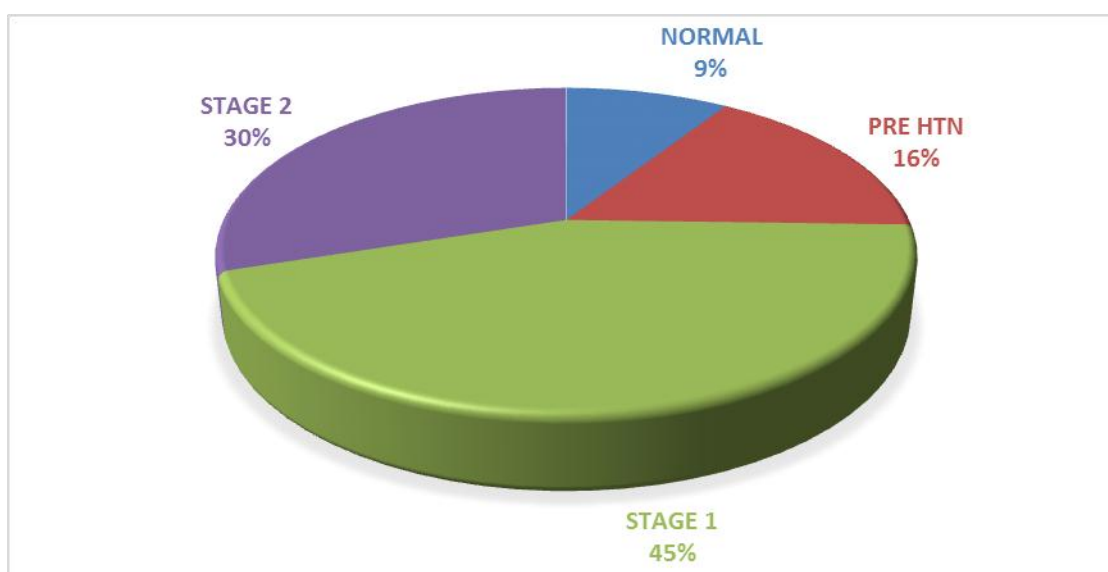
**Figure 2: Distribution Based on Stage of CKD.****3 Distribution based on Hypertension Stage**

In our study, patients were classified on the basis of hypertension with medication history on anti-

hypertensive drugs. Majority of patients falls under the group of stage 1, about 45% and least were in the group of normal which is about 9% of collected data.

**Table 3: Distribution based on Hypertension Stage.**

Stage	Number of Prescription	Percentage
NORMAL	10	9%
PRE HTN	18	16%
STAGE 1	49	45%
STAGE 2	33	30%

**Figure 3: Distribution based on Hypertension Stage.**

#### 4 Details on disease clinical Parameters

In our study, as considering the clinical parameters of chronic kidney disease. The mean value of the various

investigations is found to be creatinine 7.29mg/dl, urea 76.82 mg/dl, sodium 135-147 mmol/l, potassium 5.133 mmol/l and haemoglobin 8.15gm/dl respectively.

**Table 4: Clinical Parameters.**

Clinical Parameter	Normal value	Observed Mean value
Creatinine	0.74 – 1.35 mg/dl	7.29 mg/dl
Urea	20 – 40 mg/dl	76.82 mg/dl
Sodium	135 – 147 mmol/l	136.51 mmol/l
Potassium	3.6 – 5.2 mmol/l	5.133 mmol/l
Haemoglobin	12 -18 gm/dl	8.15 gm/dl

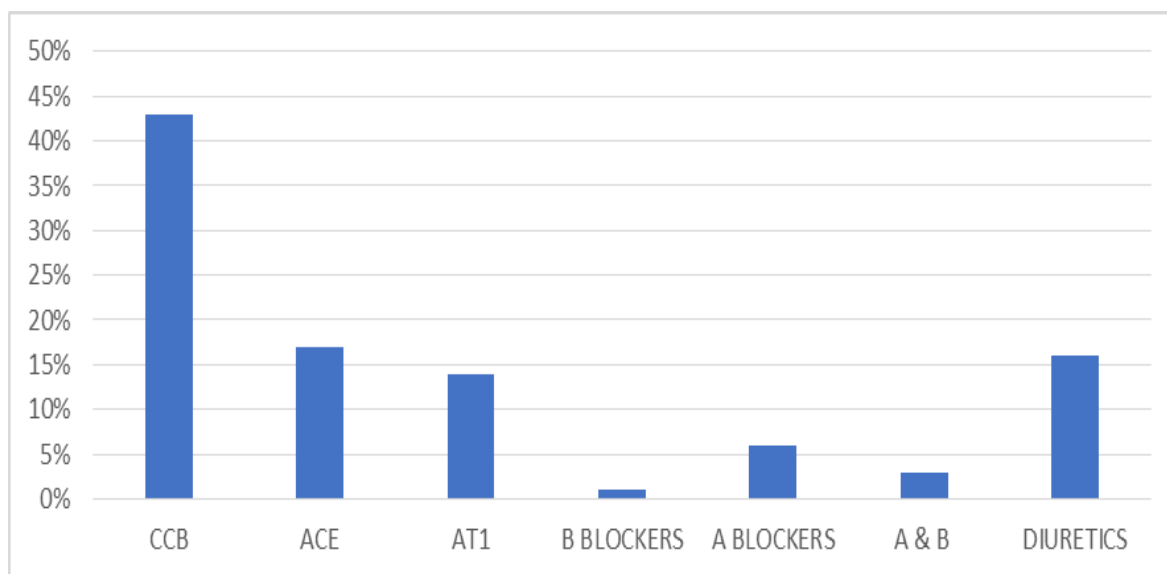
#### 5 Class of Drug Prescribing Pattern of Anti-Hypertensive Agents

In our study, out of 589 prescribed drugs are found, from that 146 drugs were prescribed as anti-hypertensive

drugs. In that 43% patients were prescribed with CCB, followed by 17% of ACE inhibitor and Diuretics of 16%. The least were prescribed with beta adrenergic blockers which about 1% respectively.

**Table 5: Drug Prescribing Pattern of Anti-Hypertensive class.**

Class of Anti-Hypertensive	Total Number of Prescription	Percentage
CCB	63	43%
ACE INHIBITORS	24	17%
AT <sub>1</sub> RECEPTOR BLOCKERS	21	14%
BETA ADRENERGIC BLOCKERS	2	1%
ALPHA ADRENERGIC BLOCKERS	9	6%
A & B ADRENERGIC BLOCKERS	4	3%
DIURETICS	23	16%



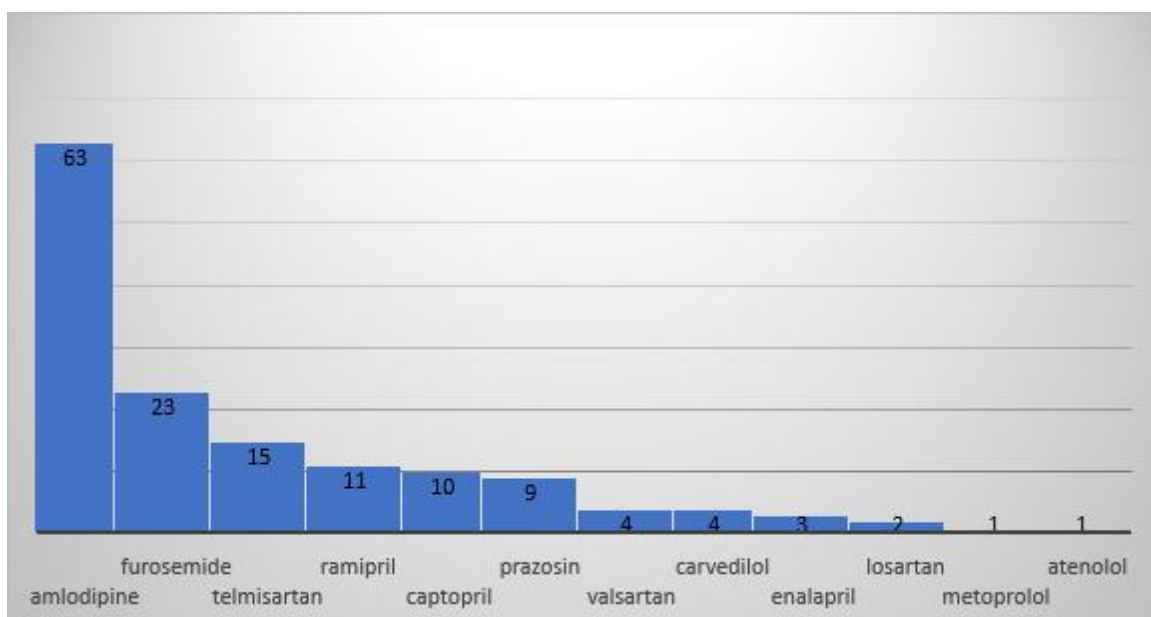
**Figure 4: Class of Drug Prescribing Pattern of Anti-Hypertensive Agents.**

#### 6 Drug prescribing pattern of Anti-hypertensive agents.

In our study, 146 antihypertensive drugs were prescribed. About 43% of patients received amlodipine, followed by losartan, metoprolol, and atenolol, which was the least prescribed drug of about 1%.

**Table 6: Drug prescribing pattern of Anti-hypertensive,**

Name of Drug	No of Prescription	Percentage
Amlodipine	63	43%
Captopril	10	7%
Enalapril	3	2%
Ramipril	11	7%
Valsartan	4	3%
Telmisartan	15	10%
Losartan	2	1%
Metoprolol	1	1%
Atenolol	1	1%
Prazosin	9	6%
Carvedilol	4	3%
Furosemide	23	16%
Total	146	100%

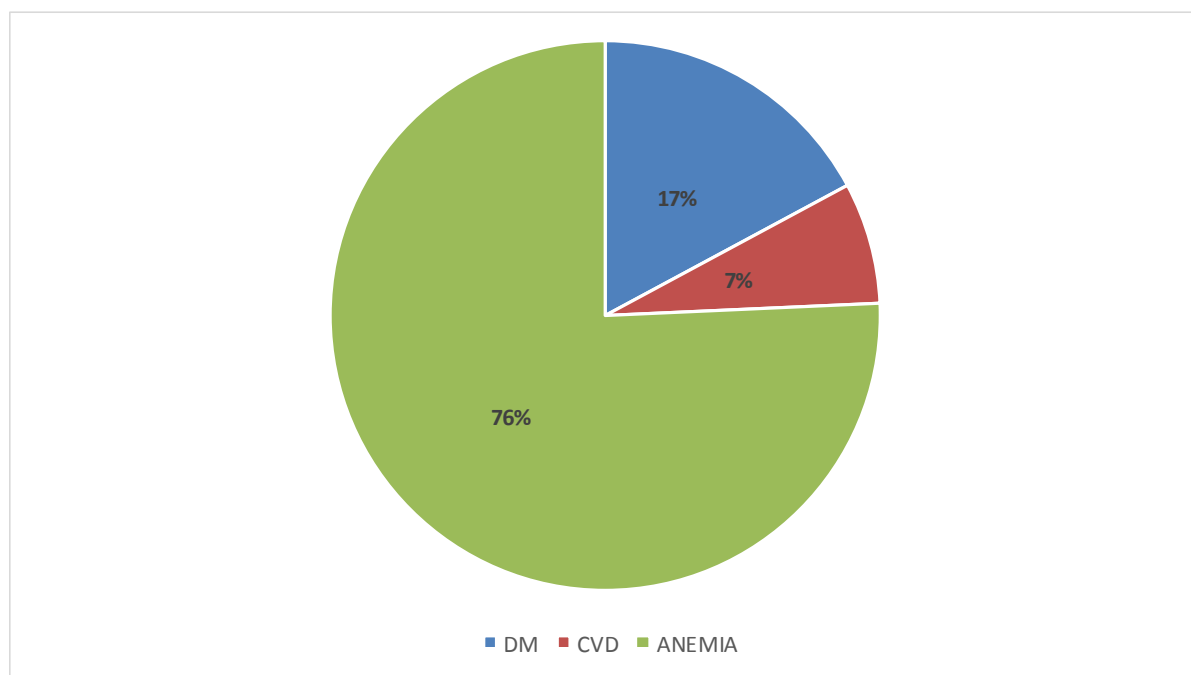
**Figure 5: Drug Prescribing pattern of Anti-hypertensive Drugs (number of prescriptions were descending order).****7 Distribution based on Co-Morbidity**

In our study, the patients with CKD with HTN were suffering from anemia of about 76%, followed by DM of

about 17% and lesser number people suffered from CVD of about 7%.

**Table 7: Distribution based on Co-Morbidity.**

Disease	Number of Prescription	Percentage
DM	12	17%
CVD	5	7%
ANEMIA	53	76%



**Figure 6: Distribution based on Co-Morbidity.**

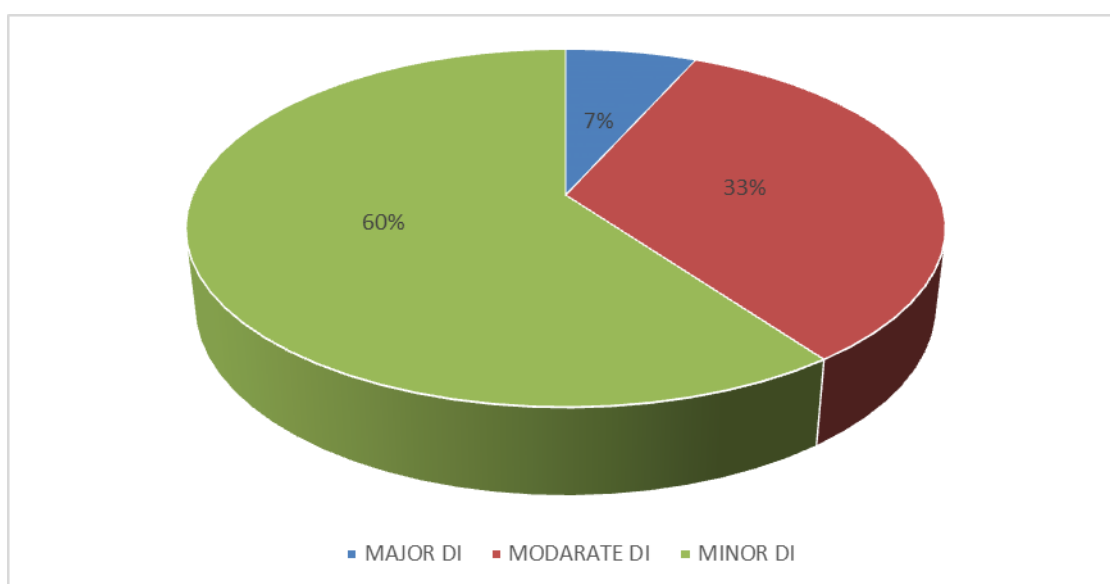
### 8 Drug Interaction Evaluation

In our study, among 110 subjects. It is found that 18 of them suffered from minor drug interaction, which count

for 60% of total data collected and 7% of identified drug interaction were major drug interaction.

**Table 8: Drug Interaction Evaluation.**

Type of Drug Interactions	Number of DI	Percentage
MAJOR DI	2	7%
MODARATE DI	10	33%
MINOR DI	18	60%
Total	30	100%



**Figure 7: Drug Interaction Evaluation.**

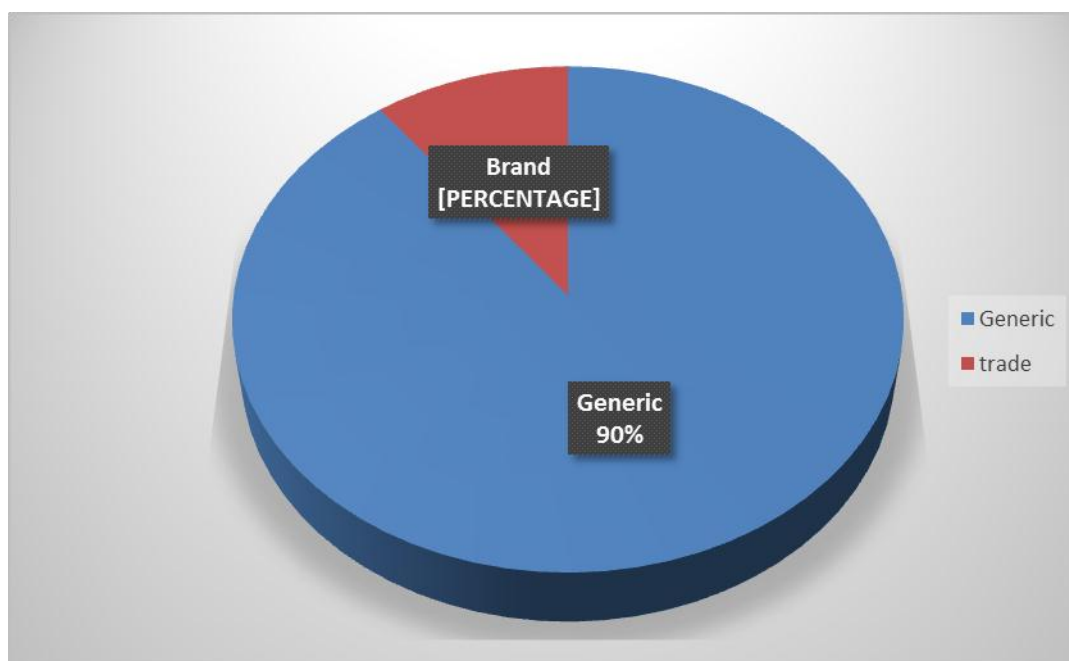
### 9 Generic and Brand Name Distribution

In our study, comparing the prescribing drugs as generic and brand. Maximum no of drugs was prescribing in

generic name of about 90% and 10% of prescribed drug were in brand name.

**Table 9: Generic and Brand wise Distribution.**

Drug	No of Prescription	Percentage
Generic	564	90%
Brand	65	10%

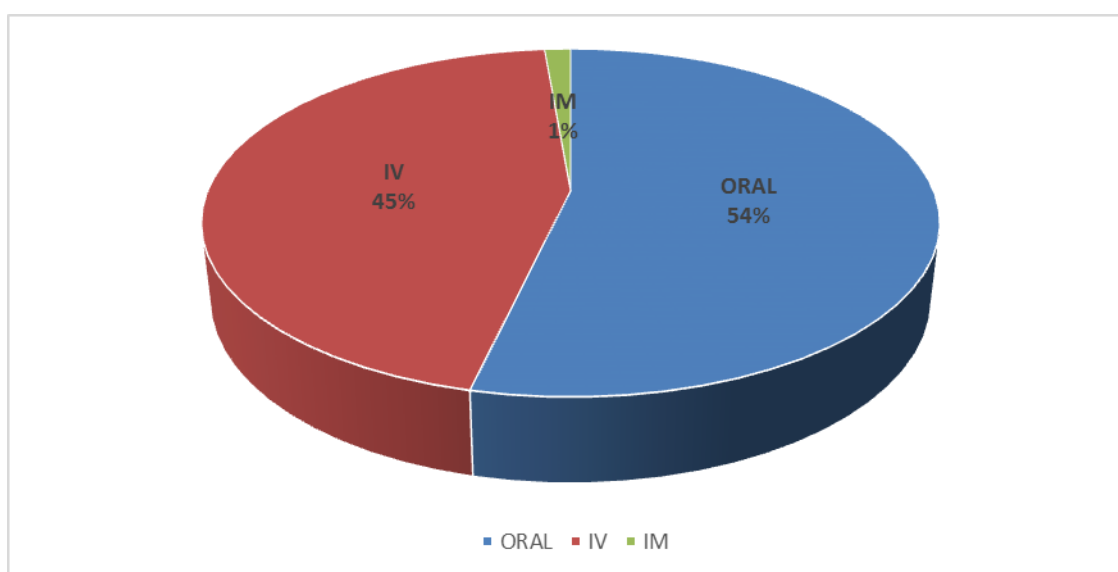
**Figure 8: Generic and Brand Wise Distribution.****10 Distribution based on Route of Administration**

In our study, a total of 589 drugs were prescribed, in which 316 drugs which count 54% were per oral

followed by IV which counts for 45% and followed in IM of about 1% respectively.

**Table 10: Distribution based on Route of Administration.**

Route	Number of Prescription	Percentage
Per oral	316	54%
Intravenous	265	45%
Intramuscular	8	1%
Total	589	100%

**Figure 9: Distribution based on Route of Administration.**



## DISCUSSION

The prospective study was carried out on the drug utilization pattern of the 110 patients, and they were included in the study based on inclusion and exclusion criteria. collected their data and submitted it on the prepared and IEC approved case report form with patient consent. from the department of general medicine and the nephrology division of MIMS, Mandya.

The gender distribution of chronic kidney disease with hypertension patients is 66 males and 44 females, with a percentage of 60% and 40%, respectively. It is similar to the study conducted by Rajesh Hadia and Shana Sherin C.

Categorization of Patients Based on Age, our study shows that, more CKD patients with HTN are in the age group of 46–65 years; approximately 45% of patients are in this age group, followed by the age group mentioned above. 33% of patients are found in the age group of 31–45 years; 11% of patients are in the age group of 65–90 years; and 18–30 years is similar to the study conducted by Amish Uprety.

Chronic kidney disease is classified into five stages based on the GFR value. In our study stage 5 and stage 4 CKD patients were more. Stage 5 patients account for 87%, stage 4 patients account for 13%, and other stage patients account for 0%; this is not related to other studies; it differs from other studies due to a lack of stage 1, stage 2, and stage 3 patients in our hospital.

disease is classified into different stages, this present study shows that and stage 1 (45%) is more common than stage 2 (30%), pre hypertension (18%), and normal hypertension (9%) respectively, it is similar to the studies of Amish Uprety and V. Jyothirmayee.

As per our study, the clinical parameter data of 110 patients is analysed to find out the means of the patient data: the creatine mean value 7.29 mg/dl, followed by the urea mean value 76.82 mg/dl, the sodium mean value 136.51 mmol/l, the potassium 5.133 mmol/l, and the Hb% (8.15 gm/dl) as respective values.

Our study discovered a total of 589 prescribed drugs, 146 of which were anti-hypertensive drugs. Calcium channel blockers (43%) are the most commonly prescribed anti-hypertensive class, followed by ACE inhibitors (17%), diuretics (16%), AT1 receptor blockers (14%), alpha-adrenergic blockers (6%), alpha- and beta-adrenergic blockers (3%), and beta-adrenergic blockers (1%), respectively. It is similar to the study of Purna Atray.

Monotherapy was the most commonly prescribed therapy in our study, accounting for 118 prescriptions, or 81% of the total data collected. Two drug therapy accounted for 23 prescriptions, or 16% of total collected data, with triple drug therapy accounting for about 3%.

In our study, patients with CKD and HTN suffered from anaemia to the tune of about 76%, followed by diabetes to the tune of about 17%, and CVD to the tune of about 7%.

In our study, among the 110 subjects, it is found that 18 of them suffered from minor drug interactions, which accounted for 60% of the total data collected, and that only 7% of the identified drug interactions were major drug interactions; moderate interactions account for 33%.

In our study, comparing the prescribing drugs as generic and brand, maximum no. of drugs was prescribing in generic name of about 90% and 10% of prescribed drug were in brand name.

A total of 589 drugs were prescribed, in which 316 drugs which count 54% were per oral followed by IV which counts for 45% and followed in IM of about 1% respectively.

## CONCLUSION

Our study concludes, that male patients are more suffering from CKD with hypertension. Among study participants 46 – 65 years aged peoples are more admitted and most of them were in the stages of 4 and 5 of CKD. Calcium channel blockers are most preferred drug in that amlodipine used for the treatment and management of disease conditions. Patients having co-morbidities conditions such as anemia, diabetic mellitus and cardiovascular diseases. Clinical parameters are shown that mean creatinine, urea and haemoglobin were imbalanced.

Clinical pharmacist plays an important role in the selection of drugs for treatment of CKD with hypertension otherwise leads to increase mortality and morbidity. Improving medication adherence, patient counselling and dietary recommendations helps the patient to increase good therapeutic outcomes.

## ACKNOWLEDGEMENTS

We could not have undertaken this journey without Dialysis Unit, MIMS, Mandya. And lastly, I'd like to mention Dr. Blessin V Shervin, Dr. Amal Joseph, Dr Vishnu T and Dr. Bonny Babu.

## REFERENCE

1. Chronic Kidney Disease: Practice Essentials, Pathophysiology, Etiology. Emedicine. medscape. com. (Online); Updated July 21, 2021. Accessed August 22, 2022.
2. Rajesh Hadia, Hemraj Singh Rajput, Vidhi Mehta, Pushti Shah, Jyoti Thakkar, Trupal Rathod, Dhaval Joshi, Rajesh Maheshwari and Vikas Chandrakar. An Observational Study on Drug Utilization Pattern in Chronic Kidney Disease Patients using Antihypertensive Drugs in a Tertiary Care Teaching Hospital. Journal of Pharmaceutical Research International, 2021; 33(35B): 9-18.



3. Shana Sherin C., Anupama V. Harshan, Rincy R. L., Shabna Sulthana S, Lilly M and Arun J. L. A prospective study on drug utilization evaluation in end stage renal disease patients at dialysis department. *World journal of pharmacy and pharmaceutical sciences*, 2022; 11(8): 2202-2212.
4. Rajiv Ahlawat, Sanjay Dcruz and Pramila Tiwari. Drug Utilization Pattern in Chronic Kidney Disease Patients at a Tertiary Care Public Teaching Hospital: Evidence from a Cross- Sectional Study. *Pharmaceutical Care & Health Systems*, 2015; 3(1): 149-155.
5. Amish Uprety, study of antihypertensive drug utilization pattern in chronic kidney disease patients. *International Journal of Drug Research and Technology*, 2019; 9(3): 252-270.
6. Purna Atray, Irfanul Haque, Sarita Jangra Bhyan, Kartikey Pathak and Anjali. Evaluation of drug prescribing pattern in chronic kidney disease patients at tertiary care hospital in northern india -an observational study. *World journal of pharmacy and pharmaceutical sciences*, 2021; 10(2): 1128-1138.
7. Abraham G, Arun K, Gopalakrishnan N, Renuka S, Pahari DK, Deshpande P, Isaacs R, Chafekar DS, Kher V, Almeida AF, Sakhuja V. Management of hypertension in chronic kidney disease: Consensus statement by an expert panel of Indian nephrologists. *Journal of Association Physicians India*, 2017; 65(1): 6-22.
8. Singh R, Hans P, Era N, Mukherjee S, Bordoloi SK. Utilization pattern of antihypertensive drugs among chronic kidney disease patients in a tertiary care hospital. *National Journal of Physiology, Pharmacy and Pharmacology*, 2022; 12(12): 1-4.
9. Jyothirmayee V, Chandana P, Ashwani M, Mamatha D, Deepthi N and Madhav K: Drug utilisation evaluation of anti-hypertensive drugs in chronic kidney disease patients. *International Journal of Pharmaceutical Science & Research*, 2018; 9(8): 3480-86.
10. Harsh Mohan. *Textbook of Pathology*. Sixth ed. Ajanta Press: Jaypee-Highlights Medical Publishers, 2010; 649 - 702
11. Dan Pugh<sup>1,2</sup> · Peter J. Gallacher<sup>1</sup> · Neeraj Dhaun<sup>1,2</sup>: Management of Hypertension in Chronic Kidney Disease. *Drugs*, 2019; 79: 365–379.
12. Beltrami, M.; Milli, M.; Dei, L.L.; Palazzuoli, A. The Treatment of Heart Failure in Patients with Chronic Kidney Disease: Doubts and New Developments from the Last ESC Guidelines. *Journal of Clinical Medicine*, 2022; 11: 1-4
13. Portolés J, Martín L, Broseta JJ and Cases. Anemia in Chronic Kidney Disease: From Pathophysiology and Current Treatments, to Future Agents. *Frontiers in Medicine*, 2021; 8: 642296. 1-4.
14. KD Tripathi, *textbook of Pharmacology*. Seventh ed. Ajanta Press: Jaypee-Highlights Medical Publishers, 2018; 558–598.
15. Arjun D. Sinha and Rajiv Agarwal. *Clinical Pharmacology of Antihypertensive Therapy for the Treatment of Hypertension in CKD*. *Clinical Journal of the American Society of Nephrology*, 2019; 14: 757–764.
16. Kamal I, Hamdy R, Mohamed N. Kidneys: The Victim of Hypertension: Review. *Journal of Nephrology and Therapeutics*, 2015; 6: 231. 1- 4.
17. Josef Coresh, MD, PhD Elizabeth Selvin, PhD, MPH Lesley A. Stevens, MD, MS Jane Manzi, PhD John W. Kusek, PhD Paul Eggers, PhD Frederick Van Lente, PhD Andrew S. Levey, MD. Prevalence of Chronic Kidney Disease in the United States. *Journal of American medical Association*, 2007; 298(17): 2038-2047.
18. Ewa Deskur-Smielecka, Aleksandra Kotlinska-Lemieszek, Sylwia Kropinska Katarzyna Wieczorowska- Tobis. Medical Students' and Internal Medicine Trainees' Knowledge of Drug Prescribing Recommendations in Older Patients with Impaired Kidney Function. *Clinical Interventions in Aging*, 2020; 15: 53–60.
19. Lin S-Y, Lin C-L, Lin C-C, Hsu W-H, Hsu C-Y and Kao C-H Chronic Kidney Disease Progression Risk in Patients with Diabetes Mellitus Using Dihydropyridine Calcium Channel Blockers: A Nationwide, Population- Based, Propensity Score Matching Cohort Study. *Frontiers in Pharmacology*, 2022; 13: 786203.
20. Maitha Mohammed Al-Jabri, C. S. Shastry\*, Sharad Chand. Assessment of Drug Utilization Pattern in Chronic Kidney Disease Patients in A Tertiary Care Hospital Based on Who Core Drug Use Indicators. *Journal of Global Pharma Technology*, 2019; 11(09): 01-09.
21. Rajiv Agarwal, M.D., Arjun D. Sinha, M.D., Andrew E. Cramer. Chlorthalidone for Hypertension in Advanced Chronic Kidney Disease. *New England Journal of Medicine*, 2021; 385: 2507-19.
22. Sankar D. Navaneethan, Ankit Sakhuja, Susana Arrigain, John Sharp, Jesse D. Schold, and Joseph V. Nally Jr..Practice patterns of phosphate binder use and their associations with mortality in chronic kidney disease, 2014; 82: 16-25.
23. Devi DP, George J. Diabetic nephropathy: prescription trends in tertiary hospital. *Indian Journal of Pharmaceutical Science*, 2015; 70: 374-78.
24. Chang PY, Chien LN, Lin YF, Wu MS, Chiu WT, Chiou HY. Risk factors of gender for renal progression in patients with early chronic kidney disease. *Journal of Medicine*, 2016; 95(30): 1-19.
25. Kamath, L., G., H. N., & S., H., A study of drug utilisation pattern in patients of chronic kidney disease at a tertiary care hospital. *International Journal of Basic & Clinical Pharmacology*, 2019; 8(2): 170–175.
26. Bajait C, Pimpalkhute S, Sontakke S, Jaiswal K, Dawrl A, Prescribing pattern of medicines in chronic kidney disease with emphasis on phosphate binders. *Indian journal of pharmacology*, 2014; 46(1): 35-39.