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Original Research Article

Prescribing Patterns in Moderate to Severe Chronic Kidney Disease Patients with Associated Comorbidities

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Abstract

Introduction: A comprehensive systematic review and meta-analysis reported that chronic kidney disease (CKD) has a worldwide prevalence of around 13.4%, underscoring its emergence as a global health concern [1,2]. Alongside CKD, patients are often affected by multiple co-morbidities such as hypertension, diabetes, and cardiovascular disorders [2-4] ***Methodology:*** A prospective observational study was conducted over six months in the Department of Nephrology at Karuna Medical College Hospital, Chittur, Palakkad. The study enrolled adult participants aged 18 to 70 years with moderate to severe chronic kidney disease (CKD). Patients were classified into CKD stages G1, G2, G3a, G3b, G4, and G5[5] ***Results:*** Table 1 shows the association of CKD stages across various demographic factors, BMI, and comorbidities. There was no statistically significant association between age and CKD stages. Among 188 patients maximum cases were observed in CKD stage V (34.57%), followed by CKD stage IV (27.65%). Table 3 shows that a higher number of patients were prescribed cilnidipine (27.4%), followed by telmisartan (19.0%), and the lowest number of patients were prescribed metolazone (1%), vasopressin (1%), and verapamil (1%). Table 4 shows that a higher number of patients were prescribed insulin (32.25%), followed by linagliptin (28.0%), and the lowest number of patients were prescribed voglibose (0.53%). ***Conclusion:*** This study emphasized the complexities involved in treating patients with chronic kidney disease (CKD), particularly when co-existing health conditions are present. It provided valuable information on current clinical practices and foundational data relevant to managing such patients.

Keywords: CKD, Prescribing Pattern, HTN, T2DM, CAD, BPH, COPD, CVA, BMI.

INTRODUCTION

According to a systematic review and meta-analysis, chronic kidney disease (CKD) affects about 13.4% of the global population across all stages of CKD [1,5,6]. Alongside CKD, patients are often affected by multiple co-morbidities such as hypertension, diabetes, and cardiovascular disorders. These conditions intensify the treatment challenges and raise the financial demands associated with managing CKD [2-4].

Managing chronic kidney disease (CKD) frequently necessitates the use of multiple medications to address various health concerns, increasing their susceptibility to drug-related issues. Managing CKD involves intricate therapeutic regimens that necessitate regular and careful monitoring [4,7].The primary aim of a therapeutic regimen is to prevent, manage, or treat different medical conditions. For patients with chronic kidney disease, selecting suitable medications is essential to minimize the risk of side effects, prevent harmful drug interactions, and ensure optimal clinical outcomes [3,9,10].

According to the Kidney Health Australia guideline titled 'CKD Management in General Practice', managing chronic kidney disease (CKD) necessitates a tailored approach based on disease stage, particularly in controlling hypertension, dyslipidemia, and albuminuria. Blood pressure targets are set at ≤140/90 mm Hg for CKD patients without diabetes and ≤130/80 mm Hg for those with diabetes or significant albuminuria[8,11]. Angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin receptor blockers (ARBs) are recommended as first-line antihypertensive agents for individuals with elevated blood pressure and CKD, especially in the presence of albuminuria, due to their efficacy in both blood pressure reduction and slowing disease progression. In terms of lipid management, statin therapy

is a standard approach in the management of chronic kidney disease (CKD) to reduce cardiovascular risk, particularly in individuals aged 50 and above who are not receiving dialysis. Furthermore, the guidelines caution against the use of drugs that may impair kidney function or lead to toxicity due to accumulation. Such medications include non-steroidal anti-inflammatory drugs (NSAIDs), metformin (especially in advanced CKD), and high-dose digoxin [8,9].

The focus of this research was to analyse prescription practices in CKD patients and determine the potential for promoting more rational prescribing to minimize the adverse drug events and to enhance therapeutic effectiveness.

METHODOLOGY

A prospective observational study was conducted over six months in the Department of Nephrology at Karuna Medical College Hospital, Chittur, Palakkad. Briefly, the study population comprised adults aged 18 to 70 years with moderate to severe CKD, who were attending the department's outpatient or inpatient services.

After receiving approval from the Institutional Research Ethics Committee (KMC/IHEC/04/2025), we included patients admitted to the medicine department and outpatients with CKD and associated comorbidities in the study. Informed consent was obtained from the patients to access data from their case sheets. A predesigned data collection form was used to gather information from patients with CKD and comorbidities. Patient demographic details were collected, such as age, gender, body weight, height, co-morbidities, and current medications prescribed [3,14]. Laboratory parameters, including serum creatinine, sodium, potassium, phosphate levels, hemoglobin levels, systolic and diastolic blood pressure, and blood glucose, were collected from the patients' case sheets. The study included adult participants with moderate to severe chronic kidney disease (CKD), attending the department's outpatient or inpatient services. Participants with complete prescription data at the time of recruitment were eligible for analysis. Kidney function was assessed using the estimated glomerular filtration rate (eGFR), and patients were categorized into CKD stages G1 to G5 according to the Kidney Disease: Improving Global Outcomes (KDIGO) guidelines. The eGFR was calculated using the CKD-EPI creatinine equation. Prescribing patterns were evaluated by reviewing patient prescriptions to identify common medication practices among CKD patients [8,15].

Statistical Analysis

Descriptive statistical techniques and Chi-square test were employed to summarize the data, and all data were entered into Microsoft Excel for organization and analysis.

RESULT

The study included 188 patients who gave their consent to participate. Of these, 119 (63.3%) were male, and 69 (36.7%) were female. The minimum age was 31 years, and the maximum was 70 years.

Table 1: Association of Stages of CKD with various characteristics

Demographics	Overall	Ckd 1	Ckd 2	Ckd 3a	Ckd 3b	Ckd 4	Ckd 5	Chisquare	P Value
Participants	188(100)	4(2.13)	6(3.19)	26(13.83)	35(18.62)	52(27.7)	65(34.6)		
Mean age (SD)	63.23(9)	49(14.76)	65.33(9.02)	61.62(11.48)	63.11(8.33)	64.48(7.99)	63.62(8.08)	9.081	0.106
Gender									
Male	119(63.30)	2(1.7)	5(4.2)	22(18.5)	23(19.3)	30(25.2)	37(31.1)	9.173	0.102
Female	69(36.70)	2(2.9)	1(1.4)	4(5.8)	12(17.4)	22(31.9)	28(40.6)		
Mean BMI (SD)	24.92(5.01)	23.41(2.19)	19.81(3.19)	24.88(6.22)	24.05(3.88)	25.29(5.25)	25.68(4.85)	13.057	0.023
Comorbidities									
HTN	169(89.89)	4(2.37)	4(2.37)	23(13.61)	33(19.53)	43(25.44)	62(36.69)	9.94	0.077
T2DM	137(72.87)	1(0.73)	5(3.65)	23(16.79)	26(18.98)	39(28.47)	43(31.39)	9.804	0.081
CAD	53(28.2)	1(1.89)	3(5.66)	9(16.98)	12(22.64)	9(16.98)	19(35.85)	5.679	0.339
BPH	24(12.77)	0	3(12.5)	5(20.83)	4(16.67)	7(29.17)	5(20.83)	10.612	0.06
Anemia	16(8.51)	0	0	0	3(18.75)	6(37.5)	7(73.75)	4.387	0.495
COPD	11(5.85)	1(9.1)	0	3(27.3)	3(27.3)	2(18.2)	2(18.2)	6.32	0.276
Hypothyroidism	19(10.11)	0	1(5.26)	2(10.53)	4(21.05)	6(31.58)	6(31.58)	1.14	0.95
CVA	9(4.79)	2(22.22)	0	1(11.11)	1(11.11)	1(11.11)	4(44.44)	19.78	0.001
Dyslipidemia	14(7.45)	0	1(7.14)	0	6(42.86)	1(7.14)	6(42.86)	10.53	0.062

Table 1 shows the association of CKD stages across various demographic factors, BMI, and comorbidities. The study included 188 participants, with a mean age of 63.23 years (SD: 9). There was no statistically significant association between age and CKD stages (p=0.106). Males constituted 63.3% of the cohort, while females accounted for 36.7%, with no significant gender difference across CKD stages (p=0.102). Mean BMI differed significantly between stages (p=0.023), suggesting a potential association. Among comorbidities, hypertension (HTN) was the most prevalent (89.9%), followed by type 2 diabetes mellitus (T2DM) (72.87%) and coronary artery disease (CAD) (28.2%). Notably, cerebrovascular accident (CVA) showed a significant association with CKD stages (p=0.001), indicating that the prevalence of CVA varied significantly across the stages. Other comorbidities, including benign prostatic hyperplasia (BPH), anaemia, chronic obstructive pulmonary disease (COPD),

hypothyroidism, and Dyslipidemia, did not show significant associations (p>0.05).

Table 2: Distribution of Severity Assessment of CKD

Sl. No	CKD Stages	No. of Patients	%
1.	Stage I	4	2.12%
2.	Stage II	6	3.19%
3.	Stage III a	26	13.82%
4.	Stage III b	35	18.61%
5.	Stage IV	52	27.65%
6.	Stage V	65	34.57%
	Total	**188**	**100%**

Among 188 patients maximum cases were observed in CKD stage V (34.57%), followed by CKD stage IV (27.65%).

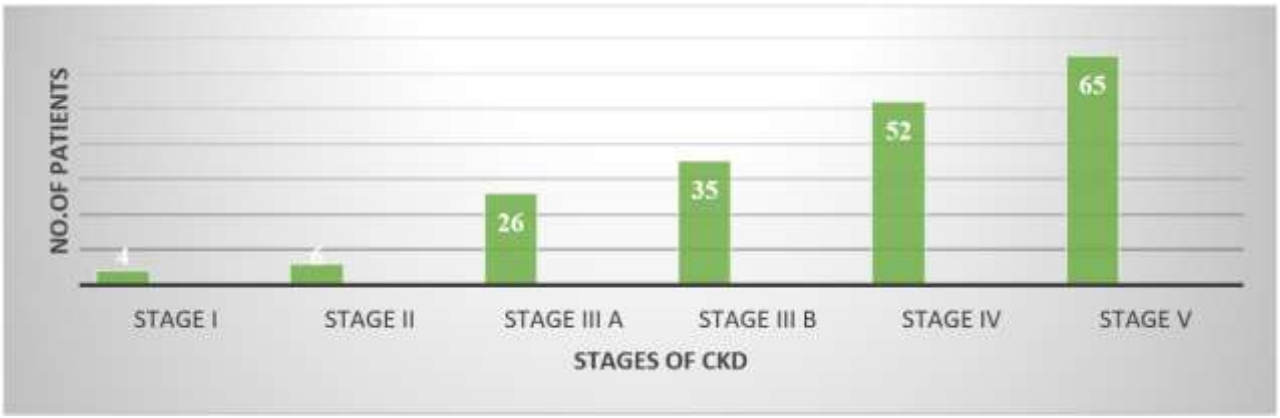

Figure 2: **Distribution of Severity Assessment of CKD**

Table 3: Distribution of Antihypertensives among CKD patients

Sl. No	Antihypertensives	No. of Patients	%
1.	Cilnidipine	78	27.4%
2.	Telmisartan	54	19.0%
3.	Furosemide	37	13.0%
4.	Clonidine	24	8.4%
5.	Bisoprolol	19	6.6%
6.	Prasozin	17	5.9%
7.	Torsemide	13	4.5%
8.	Amlodipine	11	3.8%
9.	Nifedipine	9	3.1%
10.	Carvedilol	5	1.7%
11.	Metoprolol	5	1.7%
12.	Diltiazem	3	1.05%
13.	Enalapril	2	0.70%
14.	Nebivolol	2	0.70%
15.	Spironolactone	2	0.70%
16.	Metolazone	1	0.35%
17.	Vasopressin	1	0.35%
18.	Verapamil	1	0.35%

Table 3 shows that a higher number of patients were prescribed cilnidipine (27.4%), followed by telmisartan (19.0%), and the lowest number of patients were prescribed metolazone (1%), vasopressin (1%), and verapamil (1%).

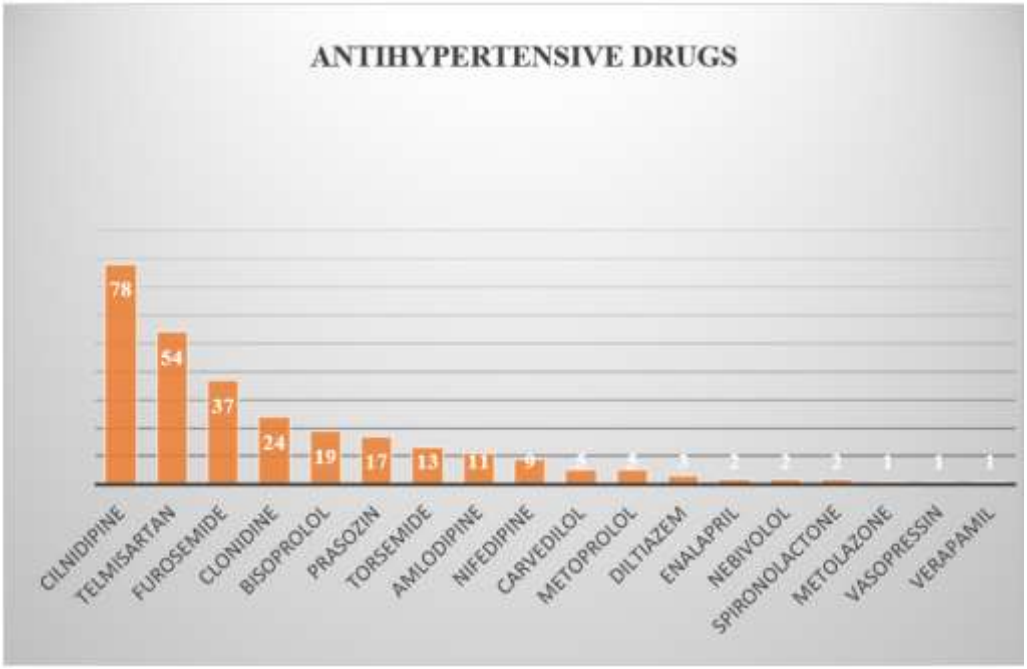

Figure 3: **Distribution of Antihypertensives Among CKD Patients**

Table 4: Distribution of Antidiabetics Among CKD Patients

Sl. No	Antidiabetics	No. of Patients	%
1.	Insulin	60	32.25%
2.	Linagliptin	52	28.0%
3.	Glimepiride	22	11.8%
4.	Metformin	20	10.75%
5.	Dapagliflozin	13	7.0%
6.	Vildagliptin	13	7.0%
7.	Teneligliptin	3	1.61%
8.	Sitagliptin	2	1.06%
9.	Voglibose	1	0.53%

Table 4 shows that a higher number of patients were prescribed insulin (32.25%), followed by linagliptin (28.0%), and the lowest number of patients were prescribed voglibose (0.53%).

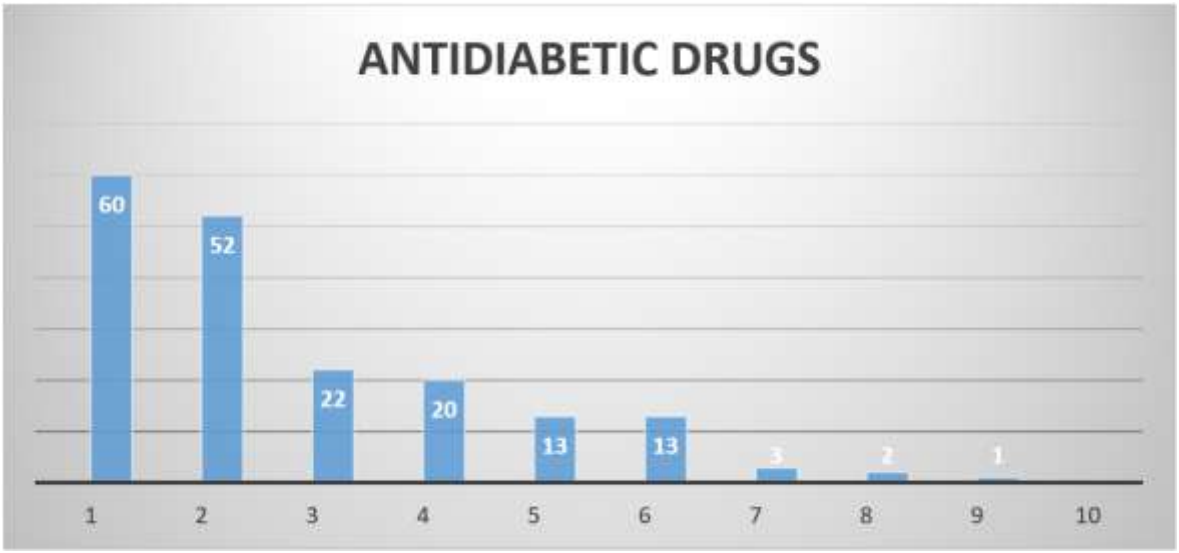

Figure 4: Distribution of Antidiabetics Among CKD Patients

Table 5: Distribution of Other Various Concerning Various Comorbidities

Sl. No	Comorbidities	No. of Patients	Drug Prescribed		(%)	
			With Combination	Without Combination	With Combination	Without Combination
1.	CAD	53	18	35	33.96%	66.03%
2.	Hypothyroidism	20	NIL	20	NIL	100%
3.	BPH	24	5	19	20.83%	79.16%
4.	COPD	11	11	NIL	100%	NIL
5.	Anemia	49	49	NIL	100	NIL

Table 5 shows that 53 patients had CAD, and most of the drugs prescribed were without combination (66.03%). Similarly, in the case of BPH, most of the drugs were without combination (79.16%), while patients with COPD and Anemia were prescribed only in combination. But in the case of hypothyroidism, the drugs were prescribed without combination.

Table 6: Distribution of drug therapy usage in CKD patients

Sl. No	Therapies	Antihypertensive	%	Antidiabetic	%
1.	Monotherapy	76	40.43%	80	42.55%
2.	Dual Therapy	53	28.19%	47	25.00%
3.	Three-Drug Therapy	36	19.15%	10	5.32%
4.	Four Drug Therapy	7	3.72%	0	0.00%
5.	Blank	15	7.98%	51	27.13%
	Total	**188**	**100%**	**188**	**100%**

Table 6 shows that a higher frequency of distribution of antidiabetic (42.55%) as well as antihypertensive (40.43%) drugs was found in monotherapy.

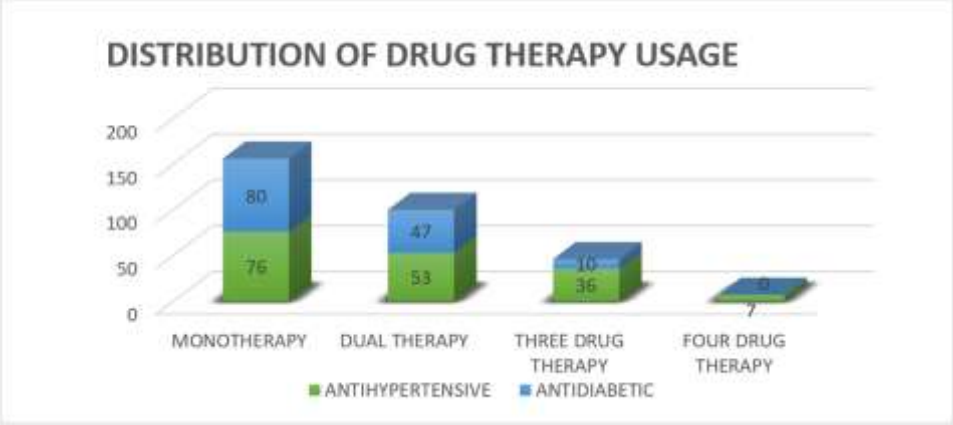

Figure 6: Distribution of drug therapy usage in CKD patients

DISCUSSION

This study provides an overview of how medications are prescribed among CKD patients, particularly focusing on the management of hypertension, diabetes, and associated comorbidities. The current study reported a male predominance (63.3%), similar to the findings of Yousoof *et al.*, where male patients were also more frequently affected. The age range in our study (31–70 years) reflected a slightly broader demographic compared to their study, which focused more on middle-aged individuals. In terms of CKD staging, our data showed a higher concentration of patients in advanced stages—stage IV (27.65%) and stage V (34.57%). Yousoof *et al.*, reported more patients in stage III, suggesting earlier-stage management in their population. Regarding drug usage, cilnidipine (27.4%) and telmisartan (19%) were the most commonly prescribed antihypertensives in our study, while Yousoof *et al.*, highlighted the frequent use of amlodipine and furosemide. Insulin use was common in both studies, though our data also showed significant use of linagliptin (28%). Both studies reported cardiovascular disease as a common comorbidity. However, our study additionally observed substantial cases of anemia and hypothyroidism, which were less emphasized in their findings.[1]

Our study reported a higher proportion of male CKD patients (63.3%), similar to male dominance seen in the survey by Astray *et al.*, Most of our patients were between 31 and 70 years old, whereas their study showed most patients in the 41–60 age group. A greater number

of our patients presented in advanced stages—stage IV (27.65%) and stage V (34.57%)—while their study noted more cases in stage III and IV. Antihypertensive use in our cohort was led by cilnidipine (27.4%) and telmisartan (19%), whereas amlodipine and furosemide were more common in their setting. Insulin was the primary antidiabetic in both studies. Cardiovascular conditions were prevalent in both groups, although our study also reported notable rates of anemia and hypothyroidism.[2]

A higher prevalence of Stage V CKD was noted, whereas Motan *et al.,* (2023) reported more cases in Stage IV. Common comorbidities across both studies included hypertension and anemia. The most frequently prescribed antihypertensive agents were cilnidipine and telmisartan, while Motan *et al.,* observed greater use of calcium channel blockers and diuretics. Insulin use for diabetes management was also more prominent compared to their findings. These variations may be influenced by institutional protocols, drug availability, and patient-specific factors.[3]

Our study included 188 CKD patients, with 63.3% being male, which is similar to the male predominance observed in the study by Kantanavar *et al.,* However, the age distribution in our research ranged from 31 to 70 years, while their study reported a higher proportion of elderly patients aged over 60 years. Regarding CKD staging, we observed that a significant number of patients were diagnosed at advanced stages—34.57% in stage V and 27.65% in stage IV. In contrast, Kantanavar *et al.,* found that most patients were in stage III, indicating earlier detection or referral in their setting. Regarding antihypertensive prescriptions, our study used cilnidipine (27.4%) and telmisartan (19%) most frequently. For antidiabetic therapy, insulin (32.25%) and linagliptin (28%) were most prescribed in our study, whereas their research primarily Kantanavar *et al.,* observed that both calcium channel blockers and angiotensin receptor blockers are utilized in clinical practice, with amlodipine frequently being the preferred choice." ported metformin and glimepiride, suggesting different prescribing trends, possibly influenced by CKD stage or institutional protocols [4].

Compared to the study by Amoako *et al.,* in Ghana, our research showed a higher proportion of male CKD patients (63.3% vs. 58.5%). While their mean patient age was 44.3 years, our study involved a wider and slightly older age group (31–70 years). Notably, a larger number of patients in our study presented with advanced CKD stages—stage V (34.57%) and stage IV (27.65%)—whereas the Ghanaian study reported lower rates for stage V (20.1%) and stage IV (10.6%). In terms of therapy, our data showed cilnidipine (27.4%) and telmisartan (19%) as the most used antihypertensives, and insulin (32.25%) and linagliptin (28%) as the top antidiabetics. Comorbidities such as CAD were also prevalent in both studies, though slightly higher in Ghana (41.7% vs. 28.2%). These differences may reflect variations in healthcare access, disease awareness, and treatment protocols.[5]

CONCLUSION

The rising prevalence of chronic kidney disease (CKD) is posing a substantial public health challenge in India, with a high incidence contributing significantly to both morbidity and mortality. The analysis was executed to explore the patterns of drug prescriptions used in managing various complications among CKD patients. The results yielded several important insights. The data indicated that CKD stage V was more common and mostly observed in males. Hypertension emerged as the most prevalent co-morbid condition, followed by type 2 diabetes and coronary artery disease. The predominant antidiabetic agent prescribed was insulin, whereas cilnidipine was the most commonly used antihypertensive.

This study emphasized the complexities involved in treating patients with chronic kidney disease (CKD), particularly when co-existing health conditions are present. It provided valuable information on current clinical practices and foundational data relevant to managing such patients. This underscores the necessity for adopting more evidence-based and systematic approaches in medication prescribing. Furthermore, there is an urgent need to formulate specific prescribing guidelines tailored to the needs of CKD patients.

REFERENCE

1. K. A. Kantanavar, R. Holla, and S. N. Rao, “International Journal of Pharmacological Research A study of prescription pattern in the drug therapy of chronic kidney disease QR Code *Correspondence Info,” *International Journal of Pharmacological Research*, vol. 7, no. 04, pp. 81–87, 2017, doi: 10.7439/ijpr.
2. N. Prasad *et al.*, “Prescription Practices in Patients With Mild to Moderate CKD in India,” *Kidney Int Rep*, vol. 6, no. 9, pp. 2455–2462, Sep. 2021, doi: 10.1016/j.ekir.2021.06.011.
3. S. N. Motan, A. Vohra, and M. Shoaib, “Prescription pattern of medicines in chronic kidney disease patients in nephrology department of a tertiary care teaching hospital: An observational study,” vol. 30, 2023, doi: 10.53555/jptcp.v30i16.1933.
4. I. Haque and S. Jangra, “Evaluation of drug prescribing pattern in chronic kidney disease patients at tertiary care hospital in Northern India-an observational study,” *Article in World Journal of Pharmacy and Pharmaceutical Sciences*, 2021, doi: 10.20959/wjpps20212-18174.
5. G. R. Matzke et al., “Drug dosing consideration in patients with acute and chronic kidney disease clinical update from Kidney Disease: Improving Global Outcomes (KDIGO),” *Kidney Int*, vol. 80,

no. 11, pp. 1122–1137, 2011, doi: 10.1038/ki.2011.322.
6. "Editorial Board," *Kidney Int*, vol. 105, no. 4, p. A1, Apr. 2024, doi: 10.1016/s0085-2538(24)00110-8.
7. L. Kamath, H. N. G., and H. S., "A study of drug utilisation pattern in patients of chronic kidney disease at a tertiary care hospital," *Int J Basic Clin Pharmacol*, vol. 8, no. 2, p. 170, Jan. 2019, doi: 10.18203/2319-2003.ijbcp20190131.
8. A. Saleem and I. Masood, "Pattern and predictors of medication dosing errors in chronic kidney disease patients in Pakistan: A single center retrospective analysis," *PLoS One*, vol. 11, no. 7, Jul. 2016, doi: 10.1371/journal.pone.0158677.
9. A. W. Garedow *et al.*, "Drug-Related Problems and Associated Factors among Patients Admitted with Chronic Kidney Disease at Jimma University Medical Center, Jimma Zone, Jimma, Southwest Ethiopia: A Hospital-Based Prospective Observational Study," *Int J Nephrol*, vol. 2019, 2019, doi: 10.1155/2019/1504371.
10. Z. Hassan *et al.*, "Assessment of Medication Dosage Adjustment in Hospitalized Patients With Chronic Kidney Disease," *Cureus*, Feb. 2021, doi: 10.7759/cureus.13449.
11. C. M. Tauro, J. V Kamath, M. Mishal, and Z. Hateefa, "Assessment of Prescribing Patterns of Drugs in Chronic Kidney Disease Patients in a Tertiary Care Hospital," *Indian Journal of Pharmacy Practice*, vol. 15, no. 3, pp. 205–209, Jul. 2022, doi: 10.5530/ijopp.15.3.38.
12. W. M. Bezabhe *et al.*, "Medication prescribing quality in australian primary care patients with chronic kidney disease," *J Clin Med*, vol. 9, no. 3, Mar. 2020, doi: 10.3390/jcm9030783.
13. C. F. Whittaker, M. A. Miklich, R. S. Patel, and J. C. Fink, "Medication safety principles and practice in CKD," 2018, *American Society of Nephrology*. doi: 10.2215/CJN.00580118.
14. V. Subeesh, R. Abraham, M. Satya Sai, and K. Koonisetty, "Evaluation of prescribing practices and drug-related problems in chronic kidney disease patients: A cross-sectional study," *Perspect Clin Res*, vol. 11, no. 2, pp. 70–74, Apr. 2020, doi: 10.4103/picr.PICR_110_18.
15. M. A. Barbieri *et al.*, "Chronic kidney disease management in general practice: a focus on inappropriate drugs prescriptions," *J Clin Med*, vol. 9, no. 5, May 2020, doi: 10.3390/jcm9051346.
16. A. Yousoof, R. Singh, M. Talat, U. Tuba Dar, A. A. Paray, and M. Chand, "Clinical Pharmacology & Biopharmaceutics Assessment of the Prescribing Pattern of Drugs in Chronic Kidney Disease Patients in a Tertiary Care Hospital," *Clin Pharmacol Biopharm 2023*, vol. 12, p. 10, 2023, doi: 10.4172/2167-065X.1000383.
17. K. A. Kantanavar, R. Holla, and S. N. Rao, "International Journal of Pharmacological Research A study of prescription pattern in the drug therapy of chronic kidney disease QR Code *Correspondence Info," *International Journal of Pharmacological Research*, vol. 7, no. 04, pp. 81–87, 2017, doi: 10.7439/ijpr.
18. Y. A. Amoako, D. O. Laryea, G. Bedu-Addo, H. Andoh, and Y. A. Awuku, "Clinical and demographic characteristics of chronic kidney disease patients in a tertiary facility in Ghana," *Pan African Medical Journal*, vol. 18, p. 274, 2014, doi: 10.11604/pamj.2014.18.274.4192.

