Assessment of prescription pattern in patients with chronic kidney disease

Kaunain Fatima*1, Kanchana N Dussa2, Shazia Sama1

1Anwarul Uloom College of Pharmacy, New Mallepally, Hyderabad - 500001, Telangana, India
2Department of Pharmacy Practice, Anwarul Uloom College of Pharmacy,New Mallepally, Hyderabad - 500001, Telangana, India

ABSTRACT

Aim of this present study was assessment of prescription pattern in patients suffering from chronic kidney disease (CKD). The study design was prospective observational. Study was conducted in the nephrology in-patient department. The study site was Mahavir hospital and research center, Hyderabad. Duration of this study was six months from November 2021 to April 2022. Total 101 patients with CKD were included. Data was collected from patient medical records and documented in data collection form. Prescription pattern and drug-drug interactions (DDIs) were assessed using WHO prescribing indicators and clinirex respectively. Majority, 61.39% of the patients were male followed by 38.61% were female. Majority, 73.27 % of patients were suffering from CKD stage V followed by 18.81% of patients were suffering from CKD stage IV. Majority, 41.74 % patients were suffering from hypertension and 31.65% from type 2 diabetes as co-morbid condition. Majority, 58.42 % and 32.67 % of male and female patients were anaemic respectively. Total 1197 drugs were prescribed out of it 915 drugs were single drugs and 282 drugs were fixed dose combinations (FDC). The total injections prescribed were 41.35%. Total number of antibiotics prescribed were 13.62%. Number of drugs prescribed with generic name were 13.70%. Drugs prescribed from essential drugs list were 9.52%. Average number of drugs prescribed was 11.85 per prescription. Total 742 DDIs were noticed. Out of it 73.18% were from category of to be monitored DDIs. However, 4.99% DDIs were from category of dosing adjustment and 3.50% were from category of generally avoid DDIs. Only 1.21% DDIs were from category of contraindicated DDIs. The most commonly prescribed drugs, 21.09% was from anti-hypertensive drugs category. Results indicate that pharmacist involvement with nephrologist in future is necessary for assessment of DDIs and in turn prevention of adverse drug reactions.

*Corresponding Author

Name: Kaunain Fatima
Phone: 9160870625
Email: kaunainf18@gmail.com

INTRODUCTION

Prevalence of patients of Chronic Kidney Disease [CKD] and end stage renal disease [ESRD] is increasing continuously. Thus providing medical care to these patients has become a complex job due to their wide spreadco-morbidities and risk factors. Treatment of complications and to prevent or minimize morbidity is the main goal of CKD therapy [1, 2].

Christina Pothen carried out the study to deepen insight of drug usage in patients with CKD [3].

Studies of prescribing patterns provide information about the rational or appropriateness of the drugs [4]. If these drugs are unsuitably administered often causes toxicity or patient noncompliance to treatment [5].

There are limited studies on CKD medication profile in Hyderabad, India. Medical audits help to achieve rational use of drugs [2]. Thus this present study aim was to assess prescription pattern in patients with CKD.

METHODOLOGY

Study was conducted in the nephrology in-patient department at Mahavir hospital and research center, located in Hyderabad, India. Ethical committee approval was obtained from Mahavir hospital and Research center. The design of this present study was an ambidirectional observational study. This present study was conducted for six months duration from November 2021 to April 2022. Patients records available in inpatient department were collected from November 2021 to April 2022. However patients records were also collected from medical record department from January 2021 to October 2021. Patients of either gender, equal to or more than 18 years and equal to or below 90 years, patients with CKD undergoing dialysis or not were included in this present study. Patients below 18 years and above 90 years, pregnant and lactating women were excluded from this study. Eligible patientswere explained about this present study and were invited to participate. Total 101 patients with CKD were included in this present study.

Drug utilization review process was carried out as per WHO prescribing indicators [6]. WHO prescribing indicators were used to assess prescription pattern [http://apps.who.int, Handle PDF selected drug use indicators-WHO, accessed on 26/4/22].

Data collection form was specially designed for the purpose of this present study. Data collection form comprised of the following parameters-demographics: age, inpatient number, date of admission, date of discharge, unit, gender, complaints on admission, patient history and medication history. Laboratory investigations such as blood urea nitrogen (BUN), serum creatinine, uric acid, hemoglobin. Treatment chart details such as names of the drugs, dosage, route of administration, frequency and duration of treatment. All the data collected from the patient medical records was documented in the data collection form and entered into an excel sheet.Descriptive statistical analysis was carried out.

Clinirex was utilized for identifying DDIs and DDIs were categorized as contraindicated, generally avoid, monitor, adjust dosing, additional contraception and unclassified interactions [www.clinirex.com]. In this study, drugs were classified as per ATC (Anatomical Therapeutic Chemical) classification as proposed by WHO [7]. GFR was calculated using CKD-EPI creatinine equation [https://www.kidney.org/professional / kdoqi/gfr_calculator].

RESULTS AND DISCUSSION

Gender wise distribution:

Roja Rani K et al., reported that males were more than females. The reason could be high prevalence of risk factors like smoking in males [8]. Chander Ritesh Kumar et al., reported that the majority of patients were males, the reason can be attributed to smoking, alcohol, obesity, hypertension and hyperlipidemia being more common in males [9]. Avez Ali, et al., reported that male dominance might be due to different hormonal environment [10]. This present study results were similar to results of it [8–10] [Table 1].

Age wise distribution:

Roja Rani K. et al. reported that 29.6% and 24.8% patients were in age group category of 51-60 years and 61-70 years respectively. This present study results were similar to it [8]. Stephin V Mathew et al. and Kamanth L, et al. reported that the majority of patients belonged to the age group of 41-50 years. This present study results were contrary to results of it [5, 11]. The reason could be the age group of more than 45 years might have an increased prevalence of co-morbidities such as diabetes and hypertension and these are risk factors for CKD [11] [Table 2].

Distribution of CKD stages:

Stephin V Mathew, et al. reported that majority 41.2% of the patients were in stage 5 of CKD [5]. Kamanth L. et al. reported that majority of patients were in stage 4 or stage 5 of CKD [11]. Roja Rani K.et al. reported that 35.2% and 34.4% of the patients were in stage 4 and stage 5 of CKD respectively. Roja Rani et al. reported that majority of patients were suffering from ESRD. This present study results were almost similar to it [5, 8, 11] [Table 3].

Classification of single drugs according to ATC classification:

Kamanth L et al., reported that the most commonly prescribed drugs, 43.8% were from ATC class C-cardiovascular drugs as the majority of patients

Table 1: Gender wise distribution (N=101)

S. No.	Gender	Number (N)	Percentage (%)
1	Male	62	61.39
2	Female	39	38.61
	Total	101	100.00

Table 2: Age wise distribution (N=101)

S. No.	Age group (in years)	Number (N)	Percentage (%)
1	21-30	7	6.93
2	31-40	7	6.93
3	41-50	21	20.79
4	51-60	28	27.72
5	61-70	25	24.75
6	71-80	12	11.88
7	81-90	1	0.99
	Total	101	100

Table 3: Distribution of CKD stages (N= 101)

S. No.	CKD Stages	eGFR (ml/min/1.73m^2)	Number (N)	Percentage (%)
1	Stage 2	60-89	1	0.99
2	Stage 3a	45-59	4	3.96
3	Stage 3b	30-44	3	2.97
4	Stage 4	15-29	19	18.81
5	Stage 5	<15	74	73.27
		Total	101	100.00

Table 4: Classification of single drugs according to ATC classification (N=101)

ATC class	ATC class of single drugs	Number (N)	Percentage (%)
A	Alimentary tract and metabolism	289	31.58
B	Blood and blood forming products	106	11.58
C	Cardiovascular drugs	250	27.32
G	Genitourinary system and sex hormones	6	0.66
H	Systemic hormonal preparations	30	3.28
J	Anti-infectives for systemic use	108	11.80
L	Anti-neoplastic and immuno-modulatory agent	4	0.44
M	Musculoskeletal system	6	0.66
N	Nervous system	75	8.20
R	Respiratory system	28	3.06
V	Various	13	1.42
	Total	915	100.00

Table 5: Hemoglobin levels in female patients with CKD(N=101)

S.No.	Hemoglobin (g/dl)	Number (N)	Percentage (%)
1	More than 11	6	5.94
2	Less than 11	33	32.67
	Total	39	38.61

Table 6: Hemoglobin levels in male patients with CKD (N=101)

S.No.	Hemoglobin (g/dl)	Number (N)	Percentage (%)
1	More than 13	3	2.97
2	Less than 13	59	58.42
	Total	62	61.39

Table 7: Drug therapy details in patients with CKD (N=101)

Drug therapy prescribed in patients with CKD	Number (N)	Percentage (%)
Total number of prescription analyzed	101	100
Total number of drugs (single+FDC)	1197	
Average number of drugs per prescription	11.85	
Drug prescribed by generic name (single+FDC)	164	13.70
Drugs prescribed from EDL	114	9.52
Single drug prescribed as injections	415	45.36
Total No. of single non-calcium based phosphate binders	13	1.42
Total number of Vitamin D (single+FDC)	37	3.09
Total number of single Vitamin D	16	1.75
Total number of FDC Vitamin D	21	7.45
Total number of single Vitamin B12 prescribed	1	0.11
Number of single anti-fungal	4	0.44

Table 8: Details of single phosphate binders prescribed (N=101)

S. No.	Single phosphate binders	Number (N)	Percentage(%)
1	Sevelamer	13	1.42

Table 9: Details of single anti–hypertensive class of drugs prescribed in CKD (N=101)

S. No.	Single anti–hypertensive drug class	ATC Class	Number (N)	
1	Diuretics	C07	75	8.20
2	Calcium channel blockers(CCBS)	C08	53	5.79
3	Beta- blockers	C07	32	3.50
4	Alpha agonist	C02	16	1.75
5	Angiotensin receptor blockers(ARBS)	C09	7	0.77
6	Neprilysin inhibitors	C09	0	0.00
7	Alfa blockers	C02	10	1.09
	Total		193	21.09

Table 10: Details of single iron supplements in oral and injection formulation prescribed (N=101)

S. No.	Single iron supplements	Number (N)	Percentage (%)
1	Ferrous sulphate	4	0.44
2	Ferrous fumarate	1	0.11
3	Iron sucrose	3	0.33
	Total	8	0.87

Table 11: Details of single erythropoiesis stimulating agents prescribed (N=101)

S. No.	Single erythropoiesis stimulating agents prescribed	Number (N)	Percentage (%)
1	Erythropoietin	9	0.98
2	Darbepoetin alfa	3	0.33
	Total	12	1.31

Table 12: Details of single vitamins and minerals prescribed (N=101)

S. No.	Single vitamins and minerals	Number (N)	Percentage (%)
1	Other Vitamins and minerals (Vitamin B 12, Folic acid, Magnesium sulphate, Thiamine, Riboflavin, Vitamin K, Vitamin B6)	16	1.75
2	Calcitriol (Vitamin D)	10	1.09
3	Cholecalciferol (Vitamin D3)	6	0.66
	Total	32	3.50

Table 13: Details of FDC prescribed (N=101)

S. No.	Name of FDC	Number (N)	Percentage (%)
1	FDC antibiotic	62	21.99
2	Other FDC drugs	220	78.01
	Total	282	100.00

Table 14: Details of DDIs categories

S. No	DDIs category	Number (N)	Percentage (%)
1	contraindicated	9	1.21
2	Generally avoid	26	3.50
3	Monitor	543	73.18

were suffering from hypertension as a co-morbid condition. The next common prescribed group was ATC class A alimentary tract and metabolism drugs. This present study results were contrary to it [11].

Stephin V Mathew et al., reported that the most common 35.7% patients were prescribed from ATC class C - cardiovascular system drugs, followed by 25.9% of patients were prescribed from ATC class A- alimentary tract and metabolism drugs. This present study results were contrary to it [5].

However only 10.1% and 7.9% patients were prescribed from ATC class anti-infectives and blood and blood forming agents respectively. This present study results were almost similar to it [5] [Table 4].

Details of hemoglobin levels in female patients with CKD:

Roja Rani K. et al. reported that anemia with haemoglobin levels less than 11g/dl was predom-

inant among 39.9% female patients. This present study results were almost similar to it [8] [Table 5].

Details of hemoglobin levels in male patients with CKD:

Roja Rani K. et al. reported 92.8% male patients were anemic and reason was due to reduced erythropoietin production. This present study results were similar to it [8] [Table 6].

Drug therapy details in patients with CKD

Roja Rani K et al reported that 125 prescriptions were analyzed. Roja Rani K et al reported that total number of drugs prescribed were 1163. Roja Rani K et al reported that percentage of drugs prescribed by generic name was 52.27%. This present study results were contrary to it. Roja Rani K et al reported that percentage of prescriptions with injections was 95.20%. This present study results were contrary to it. Roja Rani K et al reported that percentage of drugs prescribed from WHO EDL was 62.90%. This present study results were contrary to it [8] [Table 7].

Details of single phosphate binders prescribed:

Avez Ali, et al. reported 93.47% of sevelamer was prescribed to avoid soft-tissue calcification which is caused by calcium based phosphate binders. Sevelamer also reduces the coronary and aortic calcification. Only 6.52% calcium acetate was prescribed. This present study results were contrary to it [10] [Table 8].

Details of single anti-diuretics drugs prescribed:

In this present study, it is observed that 0.22% vasopressin were the most commonly prescribed anti-diuretics, followed by 0.22% terlipressin [Table 9].

Details of single inotrope prescribed:

In this present study, dobutamine 0.33 % was the only inotrope prescribed [12].

Details of single anti–hypertensive class of drugs prescribed in CKD:

Chandel Ritesh Kumaret al., reported that 11.5% CCBs were prescribed followed by 4.71% of alpha-2 agonists, 3.35% of diuretics. This present study results were contrary to it [9].

Details of single iron supplements in oral and injection formulation prescribed:

Avez Ali, et al, reported that 33.80% of intravenous iron sucrose were prescribed to the CKD patients followed by 6.10% oral elemental iron was prescribed to CKD patients. This present study results were contrary to it [10]. Kamath L et, al, reported that 6.3% 0f oral iron supplements were prescribed

to CKD patients. This present study results were contrary to it [11] [Table 10].

Details of single erythropoiesis stimulating agents prescribed:

Vikram Raja et al. reported that 11% of erythropoietin was prescribed to CKD patients. Anemia is common in CKD patients due to decrease in erythropoietin production. This present study results were similar to it [Table 11].

Details of single vitamins and minerals prescribed:

Rajiv Ahlawatet al. reported that 12.2% of the vitamin D followed by 1.1% of vitamin B12 were prescribed to patients. This present results were similar to it [Table 12].

Details of single anti-fibrinolytic drugs prescribed

In this present study,0.55% tranexamic acid was the only drug prescribed from the single anti-fibrinolytics.

Details of single immunosuppressant drugs prescribed

In this present study,0.22% tacrolimus was the most commonly prescribed single immunosuppressant,followed by 0.11% mycophenolic acid and 0.11% mycophenolate sodium. Purna Atray et al., reported that10.13% ofimmunosupressants were prescribed to the patients. This present study results were similar to it.

Details of single opiate analgesic prescribed

In this present study single opiate analgesics, tramadol 0.22% was the only drug prescribed.

Details of single calcimimetics drugs prescribed

In this present study, cinacalcet 0.11% was the only single calcimimetics drugs prescribed.

Details of single hemorrheologic agents prescribed

In this present study only pentoxifylline 0.11% was prescribed.

Details of single volume expanders prescribed

In this present study only human albumin 0.11 % was prescribed.

Details of FDC prescribed:

Roja Rani, et al., reported that total 282 DDIs were detected in 125 prescriptions in which 48.90% were major DDIs followed by 41.40% were moderate DDIs and 9.57% were minor DDIs. The reason behind high number of DDIs might be polypharmacy. This present study results were contrary to it [8] [Tables 13 and 14].

CONCLUSION

This present study results provided information about prescription pattern of drugs in patients with CKD. Out of total 1197 number of drugs prescribed, 915 were single drugs and 282 were FDC drugs. The most commonly prescribed 21.09%, category of drugs was anti-hypertensive drugs. More number of drugs prescribed per prescription in these patients might be due to high incidence of co-morbid conditions among these patients. Total 742 DDIs were identified in this present study. Thus results indicate that pharmacist need to be involved along with nephrologist to identify DDIs, prevent as well as reduce DDIs and adverse drug reactions and promote rational prescribing of drugs. In future such studies need to be carried out with larger sample size and with fine tuned methodology.

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Nil.

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