

## THE STUDY AND EVALUATION OF DRUGS IN RENAL IMPAIRED PATIENTS IN TERTIARY CARE HOSPITAL

Deeba Shaista<sup>\*1</sup>, S. K. Syed Hussain<sup>2</sup>, Dr. Mohammed Ashfaq Hussain<sup>3</sup>, Dr. Anupama Koneru<sup>4</sup> and Imrana Siddiqua<sup>1</sup>

<sup>1</sup>Department of Pharmacology, Sultan-UI-Uloom College of Pharmacy, Hyderabad, Telangana State, India.

<sup>2</sup>Associate Professor, Department of Pharmacology, Sultan-UI-Uloom College of Pharmacy, Hyderabad, Telangana State, India.

<sup>3</sup>Assistant Professor, Department of Pharmacology, Sultan-UI-Uloom College Of Pharmacy, Hyderabad, Telangana State, India.

<sup>4</sup>Principal, Sultan-UI-Uloom College of Pharmacy, Hyderabad, Telangana State, India.

\*Corresponding Author: Deeba Shaista

Department of Pharmacology, Sultan-UI-Uloom College of Pharmacy, Hyderabad, Telangana State, India.

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### ABSTRACT

In our study we have studied and evaluated the drug dose management of renal impaired patients in the Prime Hospital Hyderabad. In the present study of 250 patients, 109 (43.6 %) were male and 141 (56.39 %) were female. In our study it was found that renal impaired patients were more prevalent in females than males. Evaluation of GFR stages showed that out of 250 patients, 72 (28.80%) were of stage 3, 150 (60%) were of stage 4 and 28 (11.20%) were of stage 5. In our study 72 (28.79%) patients are under GFR stages iii. (60-30 GFR mL/min). 150 (60%) GFR stages iv. (30-15 GFRmL/min) and GFR stages v. 28 (11.20%) (15-0 GFR mL/min). In our study, out of 250 patients, out these patients, 90 (36%) were suffering from hypertension. Other concomitant conditions were electrolyte imbalances in 42 patients (16.8%), anaemia in 24 patients (9.6%), cardiovascular disorders in 15 patients (6%), diabetes mellitus in 24 patients (9.6%), liver disorders in 32 patients (12.8%), chronic glomerulonephritis in 18 patients (7.19%) and retroviral disease in 5 patients (2 %). Interventions on account of our observations we found out that the major drugs to be avoided for renal impaired patients are, Nonsteroidal anti-inflammatory drugs (NSAIDs) such as diclofenac, ibuprofen, and indomethacin, Selective COX-2 inhibitors. Pethidine, cefepime, metformin, spironolactone should not be administered to renal impaired patients, because the renal-dependent metabolite, normeperidine may leads to cerebral convulsions. Patients with renal insufficiency needs high amount of initial dose of antibiotics. Start with the normal dose, then the maintenance dose is adjusted to renal function depending on its half-life. The need of dialysis is to patients with severe hyperkalaemia and unresponsive to medical therapy and drug overdose with a dialysable toxin.

**KEYWORDS:** Renal impaired patients, GFR stages, hyperkalaemia.

### INTRODUCTION

Renal impairment implies that your kidneys are not working regularly. One of the major complications that can take after a liver transplant could be a sudden misfortune of kidney work. This is often known as intense renal disappointment and influences as numerous as one in four individuals.

Renal disability makes it much more troublesome for specialists to oversee your infection. It may be reversible on the off chance that specialists can analyze it early sufficient, so it is vital that issues are recognized rapidly and appropriately treated.<sup>[1]</sup>

The common impacts of immunosuppression can debilitate your kidneys. The utilize of cyclosporin and tacrolimus is known to influence the kidneys by lessening blood stream and causing a sort of fibrosis (scarring) to happen.

To treat this and halt kidney work getting more regrettable, specialists will decrease the dose of CNIs and endorse other compelling but less harmful medicate combinations. Immunosuppressants such as sirolimus and mycophenolate work in an unexpected way to CNIs and don't influence the kidneys to the same degree. Specialists may use these drugs rather than or in combination with a low measurement of CNIs.

Whereas more inquire about has to be carried out, certain variables can help doctors to foresee whether you're likely to advance to chronic kidney disease (CKD). The most 'predictors' are:

- Having renal disappointment within the to begin with three to twelve months taking after transplantation
- Renal failure before your operation
- A history of cirrhosis and renal disease before your operation
- Having taken cyclosporin or another CNI medicine and your body reacting to it
- Having hepatitis C before transplantation
- Having diabetes before transplantation
- High blood pressure (hypertension)
- Your age and sex – CKD occurs more in older recipients and more commonly in women.

## OBJECTIVE

The Present aim is to assess the for drug dosing management of renal impaired patients at Prime Hospital (Hyderabad)

- To study the number of drugs prescribed to renal impaired patients.
- To evaluate other concomitant conditions of the patients.
- To study and evaluate the management of drug dose changes to renal impaired patients.
- To evaluate the percentage of drugs reduced in all concomitant patients.

## METHODOLOGY

Prime Hospital from November 2017 to June 2018, Prime Hospital is a private teaching hospital and a state referral centre for Hyderabad with a bed capacity of 1,500 beds positioned to serve patients from different parts of the country and is, in effect, the apex of the private health service hierarchy in Hyderabad.

### Study design

This was a prospective cross section hospital based study conducted for 8 months from November 2017 to June 2018.

### Sample size

Sample size was convenient sampling in which all renal impaired patients who were prescribed with drugs across many concomitant conditions were included. Total patients data collected were 250 were included in the study.

### Sampling Technique

Convenient enrolment technique was employed in which all renal impaired patients who were prescribed with drugs across many concomitant conditions in Prime Hospital from November 2017 to June 2018 were enrolled to evaluate the management of dosing.

## Study procedure

Prior to data collection the hospital administration visited to explain the purpose of the study. The principal investigator made a pre-test of the questionnaire and were responsible for data collection. Audit of elective prescriptions was done by collecting information. A Structured questionnaire was used to collect information.

## Monitoring

Research information was gathered everyday and followed, and the resources, quality/quantity of activities reviewed frequently. This helped to identify gaps and problems which could be solved early and avoid affecting the research.

## Data processing and analysis

Data recorded on the data collecting tool was processed and checked for completeness and consistency using SPSS version 16 program followed by data cleaning and coding then data analysis using frequency tables and cross tabulation with respective statistical tests. After analysis of the data followed by interpretation, report was written and presented.

## Limitation of the study

The study was done at single institution. The study does not involve other public/private hospitals.

## RESULTS

The present cross-sectional study in the management of renal impaired patients was done at the Prime Hospital (Hyderabad), for a period of 6 months. Total of 250 patient's prescriptions data were collected and analysed. In this study it was noted that patients with pre-existing renal impairment are at higher risk of developing further renal insufficiency.

### Age distribution of patients studied

In the current study out of 250 patients, 160 patients (64%) belonged to age group of 61-70 years. There were 70 patients (28%) in age group of 51-60 years, 10 patients (4%) in age group of 71-80 years, 10 patients (5%) in age group of 41-50 years.

### Gender distribution of patients studied

In the current study out of 250 patients, 109 (43.6 %) were male and 141 (56.39 %) were female.

### GFR of patients studied

Evaluation of GFR stages showed that out of 250 patients, 72 (28.80%) were of stage 3, 150 (60%) were of stage 4 and 28 (11.20%) were of stage v.

Table 1: Distribution of patients studied.

Sl. no.	Demographics		
1.	Age in years		Number of patients
	i.	41 - 50	10
	ii.	51 - 60	70
	iii.	61 - 70	160
	iv.	71- 80	10
2.	Sex		
	i.	Male	109
	ii.	Female	141
3.	GFR stages		
	GFR stages iii.	60-30 GFR (mL/min)	72
	GFR stages iv.	30-15 GFR (mL/min)	150
	GFR stages v.	15-0 GFR (mL/min)	28

## Renal Clinical Characteristics

Table 2: Renal Clinical Characteristics.

Clinical test results	Range	n	%
eGFR (mL/min/1.73m <sup>2</sup> )	CKD stage 3A	34	13.60%
	CKD stage 3B	38	15.20%
	CKD stage 4	150	60%
	CKD stage 5	28	11.20%
Blood Pressure (mmHg)	< 120/80	31	12.4%
	120/80 – 140/90	121	48.4%
	>140/90	98	39.2%
Potassium (mmol/l)	3.5 – 5.0	164	65.60%
	> 5.0	86	34.4%
Calcium (mmol/l)	< 2.25	40	16%
	2.25 – 2.65	210	84%
Phosphate (mmol/l)	0.8 – 1.5	190	76%
	> 1.5	60	24%
Albumin (g/l)	< 35	25	10%
	35 – 50	225	90%
HbA1c (%)	4.2 – 6.5	240	96%
	> 6.5	10	4%
HDL (mmol/l)	≤ 0.9	75	30%
	> 0.9	175	70%
LDL (mmol/l)	≤ 2.0	215	86%
	> 2.0	35	14%
Currently medicated	≤ 3	25	10%
	4 – 7	75	30%
	≥ 8	150	60%

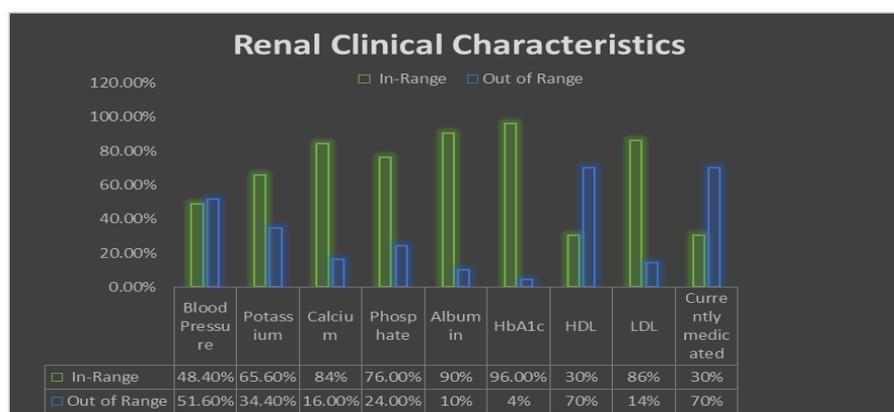


Figure 1: Renal Clinical Characteristics.

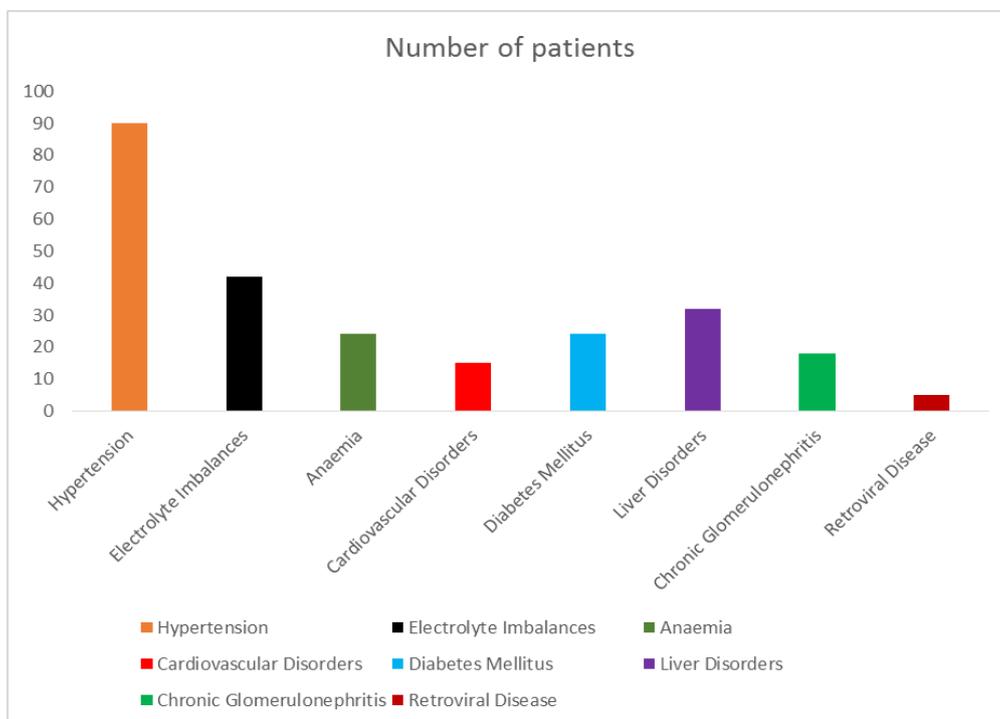
**Concomitant conditions**

In our study, out of 250 patients, out these patients, 90 (36%) were suffering from hypertension. Other concomitant conditions were electrolyte imbalances in 42 patients (16.8%), anaemia in 24 patients (9.6%),

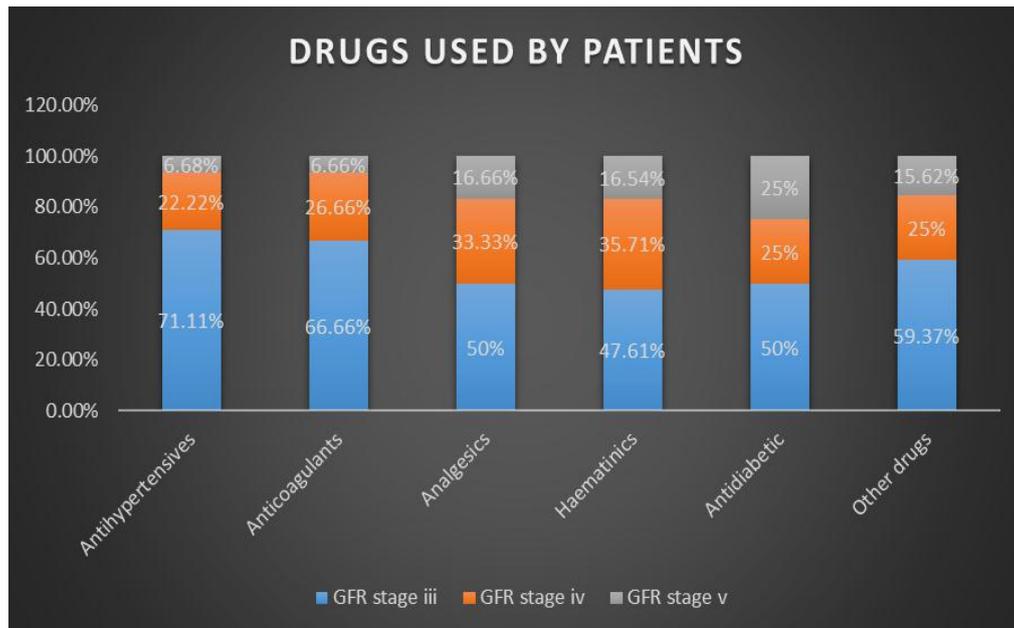
cardiovascular disorders in 15 patients (6%), diabetes mellitus in 24 patients (9.6%), liver disorders in 32 patients (12.8%), chronic glomerulonephritis in 18 patients (7.19%) and retroviral disease in 5 patients (2 %).

**Table 3: Concomitant conditions of the patients studied.**

Concomitant conditions of the patients studied		Number of patients
i.	Hypertension	90
ii.	Electrolyte Imbalances	42
iii.	Anaemia	24
iv.	Cardiovascular Disorders	15
v.	Diabetes Mellitus	24
vi.	Liver Disorders	32
vii.	Chronic Glomerulonephritis	18
viii.	Retroviral Disease	5

**Figure 2: Concomitant conditions of the patients studied.****Drugs used by patients****Table 4: Drugs used by patients.**

Categories	GFR stage iii		GFR stage iv		GFR stage v	
	n	%	n	%	n	%
<b>Antihypertensives</b>	64	71.11%	20	22.22%	6	6.68%
<b>Anticoagulants</b>	10	66.66%	4	26.66%	1	6.66%
<b>Analgesics</b>	12	50%	8	33.33%	4	16.66%
<b>Haematinics</b>	20	47.61%	15	35.71%	7	16.54%
<b>Antidiabetic</b>	12	50%	6	25%	6	25%
<b>Other drugs</b>	19	59.37%	8	25%	5	15.62%



**Figure 3: Drugs used by patients.**

#### Treatment strategies in hyperkalaemia

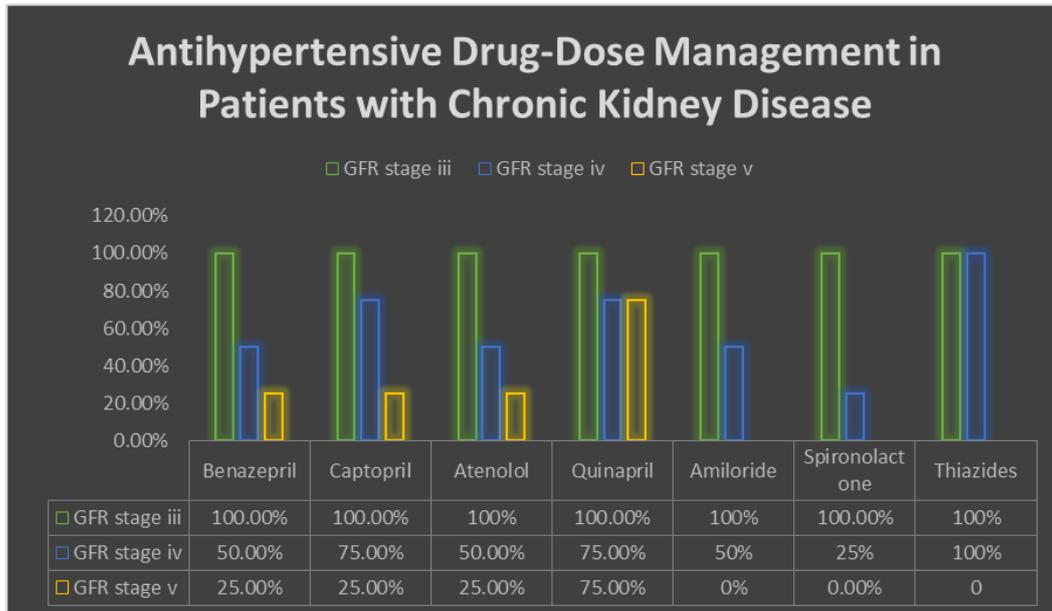
**Table 5: Treatment strategies in hyperkalaemia.**

Treatment	Immediacy of action	Reduction in $[K^+]_p$	Duration of action	N=86
Calcium gluconate and carbonate	1–4 min	Nil	30–55 min	13
Insulin +/- dextrose	15–25 min	0.65–1.0 mmol/l	4–5 h	8
Salbutamol	25 min	0.6–1.0 mmol/l	2–3 h	27
Haemodialysis	Immediate	$\leq 1.7$ mmol/l/h	Time taken for dialysis	38

#### Antihypertensive Drug-Dose Management in Patients with Chronic Kidney Disease

**Table 6: Antihypertensive Drug-Dose Management.**

Drug used for Treatment	General Dosage	n	GFR stage iii	GFR stage iv	GFR stage v
			%	%	%
Benazepril	10mg daily	12	100%	50 to 75%	25 to 50%
Captopril	25mg/8hrs	10	100%	75%	50%
Atenolol	5 to 100 mg daily	34	100%	50%	25%
Quinapril	10 to 20 mg daily	5	100%	75 to 100%	75%
Amiloride	5 mg daily	3	100%	50%	Avoid
Spirolactone	50 to 100 mg daily	4	100%	50%	Avoid
Thiazides	25 to 50 mg daily	22	100%	100%	Avoid

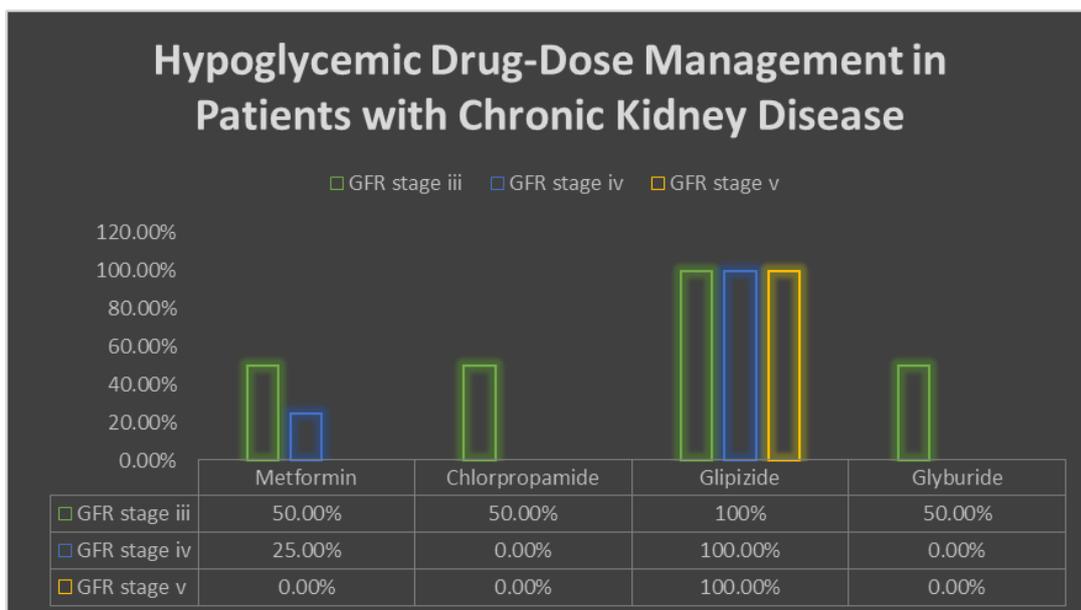


**Figure 4: Antihypertensive Drug-Dose Management.**

**Hypoglycemic Drug-Dose Management in Patients with Chronic Kidney Disease**

**Table 7: Hypoglycemic Drug-Dose Management.**

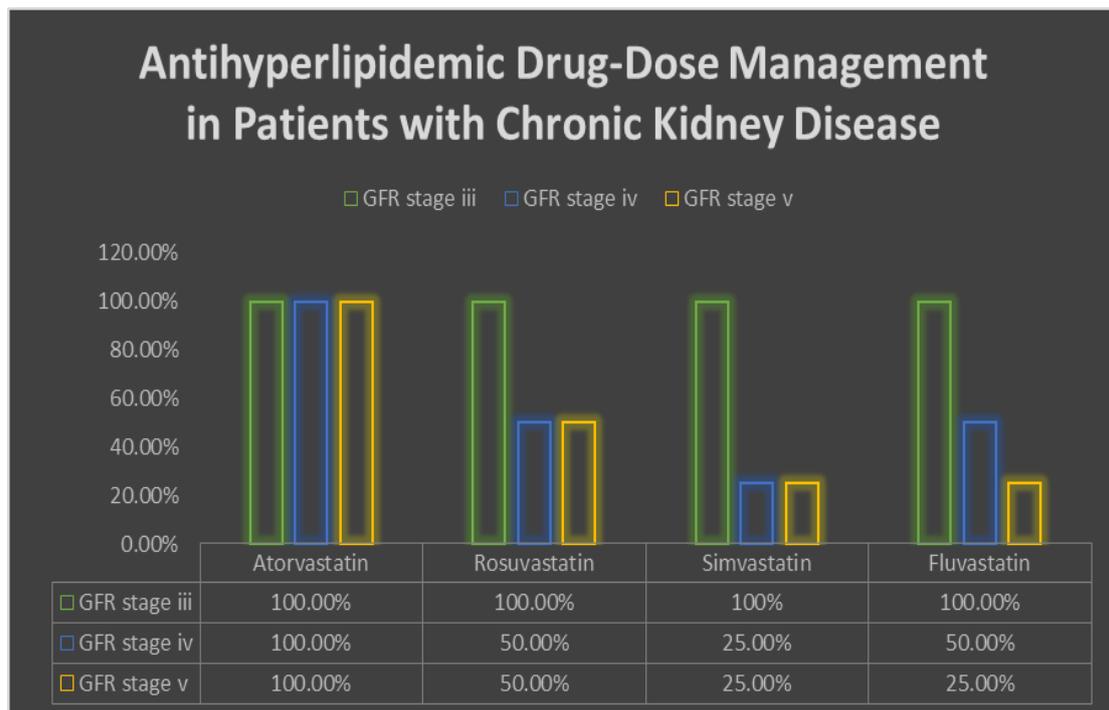
Drug used for Treatment	General Dosage	n	GFR stage iii	GFR stage iv	GFR stage v
			%	%	%
Metformin	500 mg twice daily	8	50%	25%	Avoid
Chlorpropamide	100 to 500 mg daily	5	50%	Avoid	Avoid
Glipizide	5 mg daily	7	100%	100%	100%
Glyburide	2.5 to 5 mg daily	4	50%	Avoid	Avoid



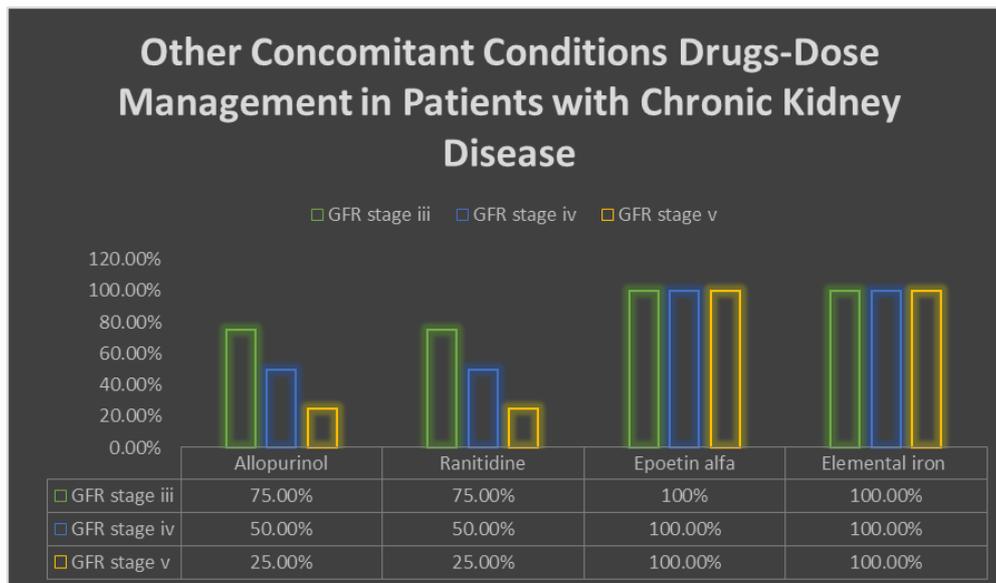
**Figure 5: Hypoglycemic Drug-Dose Management.**

**Antihyperlipidemic Drug-Dose Management in Patients with Chronic Kidney Disease****Table 8: Antihyperlipidemic Drug-Dose Management.**

Drug used for Treatment	General Dosage	n	GFR stage iii	GFR stage iv	GFR stage v
			%	%	%
Atorvastatin	10 mg daily	17	100%	100%	100%
Rosuvastatin	5 to 40 mg daily	9	100%	50%	50%
Simvastatin	10 to 20 mg daily	16	100%	25%	25%
Fluvastatin	20 to 80 mg daily	5	100%	50%	25%

**Figure 6: Antihyperlipidemic Drug-Dose Management.****Other Concomitant Conditions Drugs-Dose Management in Patients with Chronic Kidney Disease****Table 9: Other Concomitant Conditions Drugs-Dose Management.**

Drug used for Treatment	General Dosage	n	GFR stage iii	GFR stage iv	GFR stage v
			%	%	%
Allopurinol	300 mg daily	6	75%	50%	25%
Ranitidine	150 to 300 mg daily	5	75%	50%	25%
Epoetin alfa	4000IU/week	60	100%	100%	100%
Elemental iron	20mg/ml/week	18	100%	100%	100%



**Figure 7: Other Concomitant Conditions Drugs-Dose Management.**

## CONCLUSION

A total of 250 cases have been studied for the evaluation of the drug dose management of renal impaired patients in the Prime Hospital Hyderabad. Commonest age range of the patients was 61 – 70 years. The incidence of renal impairment in 109 (43.6 %) were male and 141 (56.39 %) were female. In our study we conclude the dose management for concomitant conditions were analysed and evaluated with the utilization of high end prescribing drugs and other preferred therapies. The study also compares the management of different types of antihypertensive therapies, other concomitant conditions were electrolyte imbalances, anaemia, cardiovascular disorders, diabetes mellitus, liver disorders, chronic glomerulonephritis and retroviral. In Antihypertensive Drug-Dose Management drugs like Amiloride, Spironolactone, Thiazides should be avoided as far as possible as they have 50-0% renal clearance for proper renal clearance.

In Hypoglycemic Drug-Dose Management drugs like Metformin, Chlorpropamide, Glyburide should be avoided as far as possible as they have 50-0% renal clearance and Glipizide can be administered as it has 100% renal clearance. In Antihyperlipidemic Drug-Dose Management drugs like Rosuvastatin, Simvastatin, Fluvastatin should be avoided as far as possible as they have 25-50% renal clearance and Atorvastatin can be administered as it has 100% renal clearance. Allopurinol and Ranitidine have 25% of renal clearance, Epoetin Alfa and Elemental iron both have 100% of renal clearance. These are regularly administered for CKD patients. This has assessed managing and control of drug dosing after low level of GFR stages in this sample population of patients and also helped to assessed awareness about renal impairment drug dose reduction in the study sampling group.

## REFERENCES

- Hou S H, Bushinsky D A, Wish J B. et al Hospital-acquired renal insufficiency: a prospective study. *Am J Med*, 1983; 74: 243–248. [PubMed].
- Feest T G, Round A, Hamad S. Incidence of severe acute renal failure in adults: results of a community based study. *BMJ*, 1993 306: 481–483. [PMC free article] [PubMed].
- Thadhani R, Pascual M, Bonventre J V. Acute renal failure. *N Engl J Med*, 1996; 334: 1448–1460.[PubMed].
- Klahr S, Miller S B. Acute oliguria. *N Engl J Med*, 1998; 338: 671–675. [PubMed].
- Bellomo R, Ronco C, Kellum J A, and the ADQI workgroup et al Acute renal failure—definition, outcome measures, animal models, fluid therapy and information technology needs: The Second International Consensus Conference of the Acute Dialysis Quality Initiative (ADQI) Group. *Crit Care*, 2004; 8: R204–R212. [PMC free article] [PubMed].
- Brezis M, Rosen S. Hypoxia of the renal medulla—its implications for disease. *N Engl J Med*, 1995 332: 647–655. [PubMed].
- Bonventre J V, Weinberg J M. Recent advances in the pathophysiology of ischaemic acute renal failure. *J Am Soc Nephrol*, 2003; 14: 2199–2210. [PubMed].
- Schrier R W, Wang W, Poole B. et al Acute renal failure: definitions, diagnosis, pathogenesis, and therapy. *J Clin Invest*, 2004; 114: 5–14. [PMC free article] [PubMed].
- Rossert J A, Fischer E A. Acute interstitial nephritis. In: Johnson RJ, Feehally J, eds. *Comprehensive clinical nephrology*. 2nd ed. London: Mosby, 2003; 769–777.
- Firth J D. Medical treatment of acute tubular necrosis. *Q J Med*, 1998; 91: 321–323. [PubMed].