



IJPPR

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH  
An official Publication of Human Journals

ISSN 2349-7203




Human Journals

Research Article


July 2021 Vol.:21, Issue:4

© All rights are reserved by Chitra. B et al.

## Anemia in Chronic Kidney Disease Patients: A Prospective Observational Analysis



IJPPR  
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH  
An official Publication of Human Journals



ISSN 2349-7203

**Chitra. B<sup>1\*</sup>, Drizzle M Babu<sup>2</sup>, Reshma Mery Mathews<sup>3</sup>, Roswin Babu<sup>4</sup>, Sheethal K. S.<sup>5</sup>**

<sup>1</sup> M.Pharm, Ph.D. Assistant professor, Department of Pharmacy Practice, College of Pharmacy, Sri Ramakrishna Institute of Paramedical Sciences, Coimbatore- 641044. India.

<sup>2,3,4,5</sup> Pharm.D Intern, Department of Pharmacy Practice, College of Pharmacy, Sri Ramakrishna Institute of Paramedical Sciences. Affiliated to The Tamil Nadu Dr. MGR Medical University, Chennai. India.

**Submitted:** 23 June 2021  
**Accepted:** 30 June 2021  
**Published:** 30 July 2021

**Keywords:** Erythropoietin stimulating agent, Quality of life, Chronic kidney disease, Hypertension, Anemia

### ABSTRACT

**Objective:** Chronic kidney disease is a leading healthcare problem, with a global prevalence of 8-16%. In a recent study, the prevalence of CKD was observed to be 17.2% with 6% having CKD stage 3 or worse. Although the prevalence of anemia ranges from about 1% in stage 2 of CKD to almost 100% in end stage renal disease (ESRD), only few of them received treatment. The objectives of the current study was to identify the prevalence of anemia in CKD patients, to analyze the prescribing pattern of drugs in patients with CKD, to identify the risk factors and drug-drug interactions in the prescriptions. **Methods:** A prospective observational study was conducted for a period of 6 months in the inpatient department of Nephrology and Cardiology. **Result:** The study demonstrates the prevalence of anemia in CKD patients and it was found to be 90%. ESA therapy was administered to 30 % of patients to treat anemia and the remaining patients were treated with iron supplements and folic acid. The important risk factors identified in the study were hypertension, Type II DM, age, gender, dyslipidemia, family history, smoking and obesity. A total of 19 drug-drug interactions were identified. Among them, 47.36% of the prescriptions had major severity. **Conclusion:** The current study observed the prevalence of anemia in CKD patients and are prescribed with appropriate drugs according to the recommended guidelines to a greater extent and are comparable with the existing literature.



HUMAN JOURNALS

[www.ijppr.humanjournals.com](http://www.ijppr.humanjournals.com)

## INTRODUCTION

Chronic kidney disease is a leading healthcare problem, with a global prevalence of 8-16%. In a recent study, the prevalence of CKD was observed to be 17.2% with 6% having CKD stage 3 or worse. Although the prevalence of anemia ranges from about 1% in stage 2 of CKD to almost 100% in end stage renal disease (ESRD), only few of them received treatment. Some of the most common causes of kidney damage include diabetes, hypertension, glomerulonephritis, polycystic kidney disease, kidney stones, urinary tract infections, congenital diseases and certain drugs and toxins like aminoglycosides, amphotericin and cyclosporine.<sup>1</sup>

The National Kidney Foundation had developed a criteria for the assessment of CKD severity by dividing CKD patients into 5 different stages based on their creatinine clearance such as patients with eGFR less than 90, 60 - 89, 30 - 59, 15 - 29 and less than 15 ml/min /1.73 m were categorized into stage 1 (normal or increased GFR ), stage 2 (early renal insufficiency), stage 3 (moderate renal failure ), stage 4 (severe renal failure ) and stage 5 (ESRD) respectively. The causes of anemia in CKD includes blood loss, shortened red cell life span, vitamin deficiencies, iron deficiency, the uremic milieu, erythropoietin (EPO) deficiency and inflammation.<sup>2</sup> CKD patients with anemia have a major incidence of cardiovascular dysfunction, cognitive impairment and sleep disturbances. As anemia is one of the important problem in CKD patients, the objective of our study was to evaluate the prevalence of anemia in CKD patients, to analyze the prescribing pattern of drugs, to identify the risk factors and drug-drug interactions in the prescriptions.

## MATERIALS AND METHODS

A prospective observational study was conducted for a period of 6 months in the inpatient department of Nephrology and Cardiology. The study was approved by hospital ethical committee (EC/2019/0503/CR/18) and written consent was obtained from all the participants. The relevant data were collected using a standard data entry format. Baseline data collection included age, sex, social history, comorbid conditions and causes of kidney disease. From the medical records, laboratory investigations such as hemoglobin, serum ferritin, serum iron, TSAT and serum folate were noted. Current use of drugs were also recorded. All the cases were analyzed to identify the prevalence of anemia, evaluate the prescribing pattern of drugs in CKD patients and identify the risk factors in the study population. Micromedex drug

database was used to identify drug-drug interactions. According to the inclusion and exclusion criteria, 100 patients were enrolled in our study.

**Inclusion criteria:**

- Patients with chronic kidney disease with stage I – V.
- Age > 18 years (both gender).
- CKD patients undergoing hemodialysis.

**Exclusion criteria:**

- Patients with other systemic illness without renal failure.
- Pregnancy.
- CKD patients undergoing peritoneal dialysis and GI bleeding.

**RESULT**

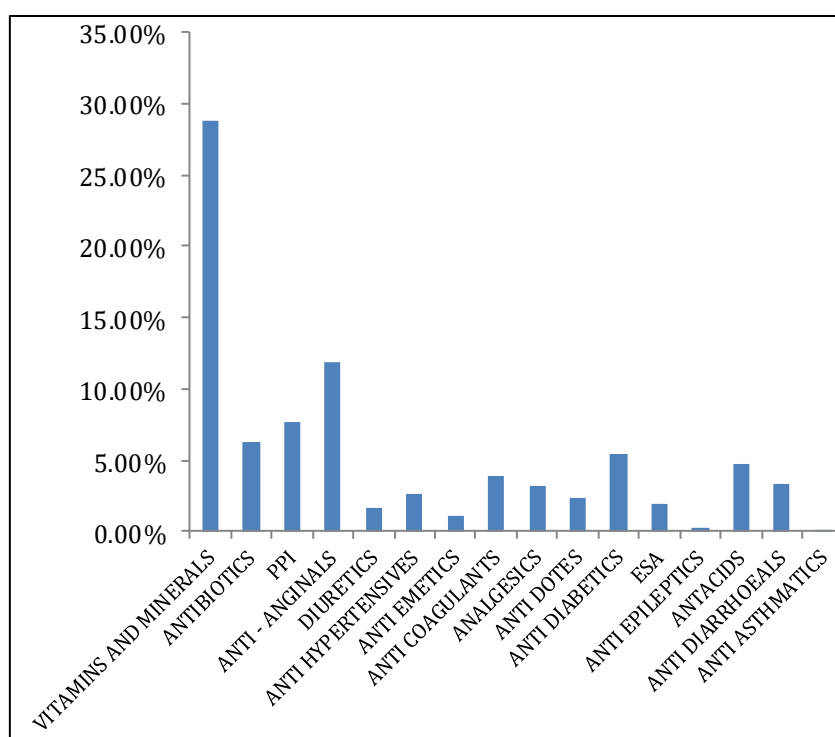
The study subjects were generally old people between the age group of 56 - 65 years. Gender distribution indicates 67% male patients and 33% females. In our study 76% of the patients were categorized under stage 5 of CKD, 11% in stage 4, 6% in stage 3, 5% in stage 2 and 2% were under stage 1 of CKD. Major causes of CKD were hypertension (86%) and diabetes mellitus (63%). The current study could identify 90 % of anemia in CKD patients (table no:1). The drugs used in the study population were analyzed and the drugs prescribed are shown in figure no: 1. Majority of the study population received vitamins and minerals (28.82%), anti-hypertensive (13.83%) and anti anginals (11.82%) followed by other categories of drugs. As the prevalence of anemia was high in the study population, iron preparations and erythropoietin stimulating agents were used for the management of anemia. In our study, 30 % of patients were treated with erythropoietin stimulating agents whereas remaining patients were treated with iron, vitamin and mineral supplements. The important risk factors identified in the current study were hypertension, Type II DM, age, gender, dyslipidemia, family history, smoking and obesity (figure no:2). The laboratory investigations analysed in our study indicate that haemoglobin levels of patient population were between a minimum of 5gm/dl and a maximum of 11gm/dl. The renal parameters (serum creatinine, urea, GFR) were found to be elevated. The most commonly used

endogenous marker for assessment of glomerular function was creatinine.

The complications associated with CKD were analyzed. Anemia was identified in 90% of the patients, 50% with heart disease, 41% with fluid overload, 22% with hyperkalemia, 15% with bone disease and 11% with hyperphosphatemia. A total of 19 drug-drug interactions were identified. Among them, 47.36% of the prescriptions had major severity, 42.10 % with moderate severity and 10.52 % had minor severity. The major drug interactions are discussed in table no: 2.

**TABLE NO. 1: PREVALENCE OF ANEMIA IN CKD PATIENTS (n=100)**

Sl. No.	Category of patients	Number of Patients	Percentage
1.	Anemic patients	90	90
2	Non anemic patients	10	10



**FIGURE NO. 1: PRESCRIBING PATTERN OF DRUGS (n=100)**

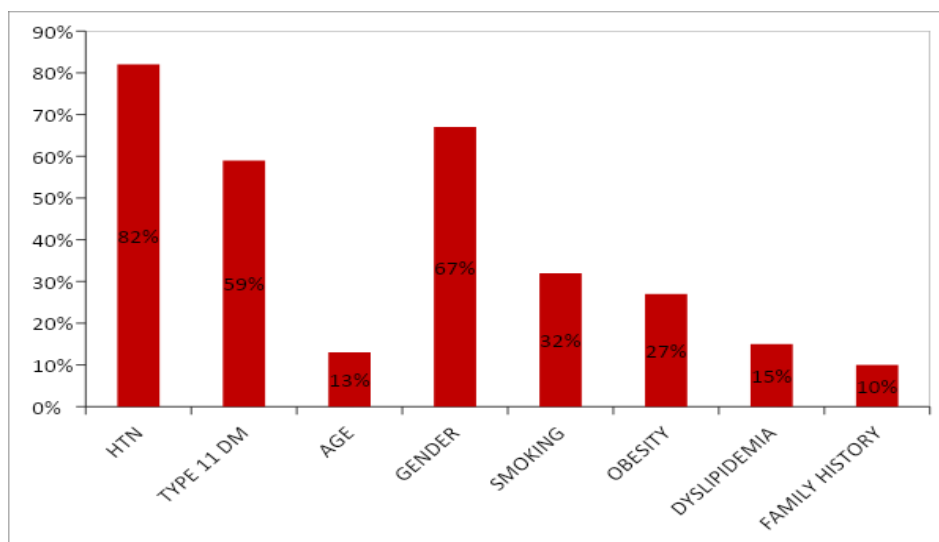


FIGURE NO. 2: RISK FACTORS (n=100)

TABLE NO. 2: MAJOR DRUG - DRUG INTERACTIONS (n=100)

Drugs	Interaction effect	Management
Metoprolol + Clonidine	Increased risk of sinus bradycardia	Monitor heart rate when both drugs are given concurrently.
Aspirin+ Torsemide	Increased risk of renal toxicity	Monitor the signs of worsening renal function and assure diuretic efficacy.
Ivabradine + Levofloxacin	Increased risk of QT prolongation.	Monitor ECG
Metolazone +Aspirin	Reduced diuretic effectiveness and possible nephrotoxicity	Monitor signs of worsening renal function and assure diuretic efficacy.
Diltiazem+Cilostazol	Concomitant use may result in increased cilostazol exposure	Dosage adjustment is required for cilostazol.
Amiodarone+Ondansetron	Increased risk of QT prolongation	Avoid concomitant administration of these drugs.
Aspirin + Furosemide	Reduced diuretic effectiveness and possible nephrotoxicity	Monitor for signs of worsening renal function and assure diuretic efficacy
Ivabradine +Haloperidol	Increased risk of QT prolongation	Use caution with the concomitant administration of these drugs.
Vancomycin+Gentamycin	May result in nephrotoxicity	Monitor the signs of nephrotoxicity.

## DISCUSSION

The current study observed the prevalence of anemia and prescribing pattern of drugs in CKD patients. The most affected population in our study were between 56 – 65 years. As age progresses, the arteries supplying the kidney narrows and there is a decrease in the GFR rate. A similar study was conducted by Havva T. et al revealed that as the age of the patient increases their quality of life scores decreases which was found to be consistent with the findings of our study<sup>3</sup>. The gender distribution of the study reports more number of male patients when compared to females. Previous studies conducted by Sridhar Srimath et al reported similar results. The present study could confirm anemia as a common complication of CKD. The study could also observe patients in various categories of CKD and more number of patients under stage 5. The study findings align with the reports of study confirmed by Evans et al.

Our analysis indicates that the prevalence of anemia in CKD patients was 90 %. Similar results were confirmed by Sang-Ryol Ryu et al. The key finding of our study reveals that only 30% of patients who had anemia with CKD received ESA therapy and 90% were treated with vitamins and minerals because of the low socio-economic status. In CKD, the kidneys lose the function of producing erythropoietin hormones.

Most commonly prescribed ESA in the study population were erythropoietin alpha and darbopoietin alpha. The beneficial effects of ESA therapy include elevated haemoglobin levels, improved quality of life and cognitive functions. A similar study conducted by Ajay K Singh et al reported that the overall quality of life improved when anemia was treated with epoetin alpha, but aiming for a target value of 13.5 g/dl provided no additional quality of life benefits<sup>6</sup>.

The major complications observed during our study were anemia followed by heart disease and fluid overload. A similar study conducted by Rebecca J et al stated that untreated anemia with CKD is strongly associated with cardiovascular and renal complications resulting in increased hospitalization and mortality<sup>7</sup>.

## CONCLUSION

The current study observed high prevalence of anemia in CKD patients and are prescribed with appropriate drugs according to the recommended guidelines to a greater extent. The

study could also observe only few patients were treated with ESA therapy. Hence patients who did not receive ESA therapy needs to be monitored for hemoglobin levels and appropriate measures are to be taken to improve the quality of life of patients. Clinicians should be receptive about the risk factors, complications and suggest appropriate therapy for the management of anemia.

## ACKNOWLEDGEMENT

We acknowledge S.N.R. Sons charitable trust, Sri Ramakrishna hospital and Principal Dr. T. K. Ravi, College of Pharmacy, Sri Ramakrishna Institute of Paramedical Sciences, Coimbatore, for providing the facilities to carry out the study.

## REFERENCES

1. Dennis L. Kasper, Eugene Braunwald, Antoni S. Fauci, Stephen L. Hauser, Dan L. Longo, J. Larry Jameson. Casademont J.Harrison's. *Principles of Internal Medicine*. 16<sup>th</sup> Edition, (Eds.). Pg. no: 1653-1695
2. Saul Nukro, Anemia in Chronic kidney disease: Causes, diagnosis, treatment. *Cleveland Clinic Journal of Medicine*. 2006 March; 73 (3); 286 – 297.
3. Havva Tel. Determining Quality of Life and Sleep in Hemodialysis Patients. *Dialysis & Transplantation* June 2009 38(6):210
4. Sridhar Srimath Tirumala Konduru, Javvaji Naga Sai Kumar, Kandrekula Leela Siva, Kuppili Girija Varshini. Assessment of drug use patterns and quality of life in hemodialysis patients. *ejpmr*, 2018,5(6), 628-637
5. Sang-Ryol Ryu, Sue K. Park, Ji Yong Jung, Yeong Hoon Kim, Yun Kyu Oh, Tae Hyun Yoo and Suah Sung. The Prevalence and Management of Anemia in Chronic Kidney Disease Patients: Result from the KoreaN Cohort Study for Outcomes in Patients With Chronic Kidney Disease (KNOW-CKD). *J Korean Med Sci*. 2017 Feb; 32(2):249-256.
6. Singh AK, Szczech L, Tang KL, Barnhart H, Sapp S, Wolfson M, Reddan D. Correction of anemia with epoetin alfa in chronic kidney disease. *N Engl J Med*. 2006 Nov 16; 355(20):2085-98.
7. Schmidt, R.J., Dalton, C.L. Treating anemia of chronic kidney disease in the primary care setting: cardiovascular outcomes and management recommendations. *Osteopath Med Prim Care* 1, 14 (2007).
8. Meby Susan Mathew, Nama Ravi Sneha Keerthi, Neelathahalli Kasturirangan Meera. Study of Management of anemia in Chronic Kidney Disease Patients. *Indian Journal of Pharmacy Practice*, 2016 November 15; 9(3):162-166.
9. K.Sai Supraja, Ayemen Almeen, Mariya Kauser, Aiswarya Roy . P, Sarvan Kumar. G, Surender .N. Clinical pharmacist intervention in the management of patients with chronic renal failure. *Indo American Journal of pharmaceutical research*. 2016 November; 6(11).
10. Melissa E. Stauffer, Tao Fan. Prevalence of Anemia in Chronic Kidney Disease in the United States. *Plos one*. 2014;9(1):1- 4.