

**A PROSPECTIVE STUDY OF HEMATOLOGICAL PROFILE IN PATIENTS ADMITED WITH CHRONIC KIDNEY DISEASE.**

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(ABSTRACT) The number of cases of chronic kidney disease is rising daily. Chronic kidney disease patients frequently have extensive medical requirements and a high risk of complications. Hematological abnormalities, such as anemia, thrombocytopenia, are prevalent in these patients. The prevalence and severity of hematological impairment rise in direct proportion to the severity of renal dysfunction. According to studies, anemia starts to show symptoms when GFR drops below 60 ml/min/1.73 m² (Stage III). As a result, the prevalence of anemia varies between stage 2 CKD patients (1%) and end stage renal disease (ESRD) patients (100%). It is crucial to assess the prevalence and etiological profile of anemia in patients with chronic kidney disease at the regional level, particularly in contexts where there are scarce resources in developing nations like India. This study was conducted to study the profile of Anemia and the impact of Hemodialysis on anemia in Chronic Kidney Disease patients.

Aims and Objectives

1. To study various hematological manifestations in patients with chronic kidney disease.
2. To study type of Anemia in patient with chronic kidney disease, with respect to abnormalities of RBC indices and peripheral smear.

Materials and Methods

--Study Design and Sample Size: All prospective cases admitted in tertiary care hospital from date of approval of ethics committee till completion of 18 months. (matching inclusion and exclusion criteria) Type of study: Prospective observational study Period of Study: 18 Months (18/01/2020 to 18/07/2022) Source of Data: All patients admitted with diagnosis of Chronic Kidney Disease meeting the inclusion criteria, and exclusion criteria at this tertiary care center during the study period

Conclusion-

- Anemia remains a common finding in the chronic kidney disease patients.
- Normocytic normochromic type of peripheral blood smear was the prominent feature among study population.
- It was observed that there is increase in severity of anemia according to the stages of chronic kidney disease.
- Erythropoietin can play very significant role in improving hematological parameters of patients of chronic kidney disease.
- It can be concluded from the study that anemia severity increases according to the stages of chronic kidney disease.
- Early identification and Effective management of CKD patients is very important in Improving Outcomes and preventing Complications of CKD patients. Since many of them land up into serious morbidity and mortality.
- The knowledge gained from this study's information and data will be used to improve patient care and management, as well as to track changes in the patient's hematological parameters due to their Chronic Kidney Disease.

KEYWORDS : Chronic Kidney Disease (CKD), End Stage Renal Disease (ESRD), Hemodialysis (HD), Peritoneal Dialysis (PD).

INTRODUCTION

The number of cases of chronic kidney disease is rising daily. Chronic kidney disease patients frequently have extensive medical requirements and a high risk of complications. Hematological abnormalities, such as anaemia, thrombocytopenia, and coagulation deficiencies, are prevalent in these patients and have multiple causes. They are also linked to an increased risk of consequences, such as bleeding and infection, which may worsen the patient's hemodynamic condition.

The chance of an individual acquiring anemia and other hematological illnesses, cardiovascular (CV) diseases, hyperlipidemia, problems of the minerals and bones, as well as other metabolic and electrolyte imbalances, increases when CKD is present.

Anemia is one of these symptoms that patients with CKD experience the most frequently. There are several different systemic derangements caused by chronic kidney disease. Anemia is a CKD patient's most prevalent symptom. Normocytic, normochromic, and hypo proliferative anemia is prevalent in CKD.

Due to persistent bleeding from uremia-related platelet dysfunction, frequent phlebotomy, and blood clotting in the dialysis machine, CKD patients experience elevated iron losses, which are estimated to be between 1-3 gm per year in hemodialysis patients. Patients with CKD, particularly those receiving hemodialysis, also have worse dietary iron absorption.

As a result, iron supplementation is a cornerstone of the anemia treatment for CKD patients since they are more likely to experience true iron deficiency.

Because dietary iron absorption is compromised in hemodialysis patients, intravenous iron is favored. These patients have normal or high serum ferritin levels but low serum transferrin saturation, which measures the amount of circulating iron (a marker of body iron stores).

According to recent research, hepcidin overproduction may be to blame for the reduced dietary iron absorption and iron blockage of reticuloendothelial cells seen in many CKD patients. The primary hormone in charge of preserving the homeostasis of systemic iron is hepcidin. Hepcidin, which is made by the liver and released into the bloodstream, binds to and causes the breakdown of ferroprotein on the surfaces of hepatocytes, reticuloendothelial macrophages, and duodenal enterocytes to prevent iron from entering the plasma.

Hepcidin transcription is directly induced by inflammatory cytokines, likely as a means of securing iron from invasive pathogens. As a result, iron sequestration, hypoferrremia, and anemia develop, which are symptoms of many chronic illnesses, including CKD.

Total leukocytes and its differential counts, platelet count, bleeding time, and prothrombin time are other hematological parameters that are impacted by CKD. In CKD patients, the white blood cell (WBC) count, platelet count, and bleeding time were all within normal ranges

(25). Eosinophilia and extended bleeding times are two more findings that have been mentioned.. Patients on hemodialysis and predialysis typically have lower platelet counts.

The normocytic normochromic type of peripheral blood is the most typical blood type in CKD-related anemia. The clinical symptoms linked to declining renal function have anemia as a major contributing factor. In anemic patients with CKD, the likelihood of cardiovascular dysfunction, cognitive impairment, and sleep problems is enhanced. Additionally, it is linked to the development of renal illness and higher mortality. This study was conducted to study the profile of Anemia and the impact of Hemodialysis on anemia in Chronic Kidney Disease patients.

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MATERIALS AND METHODS:

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Type of study: Prospective observational study
Period of Study: 18 Months (18/01/2020 to 18/07/2022)

Selection of Cases: Patient admitted in this tertiary care centre will be screened regarding presence of sign and symptoms of Chronic Kidney Disease. Eligible patient will be counseled regarding participation in the study and all those who will meet inclusion and exclusion criteria, will be enrolled after informed & written consent obtained from eligible patient / relative. Detailed history will be recorded with special reference to history of Anuria / oliguria, Breathlessness, Hiccups, Itching/Skin rashes, Nausea/Vomiting, Pedal Edema, Pleural Effusion, Azotemia for >3 months, Signs and symptoms of Uremia or signs of Kidney failure, Signs and Symptoms of Fluid overload & features of Anemia like Generalised weakness, easy fatigability, headache, loss of appetite will be noted with respect to duration of symptoms.

Detail physical / clinical examination including general examination, vital parameters and per abdominal examination with relevant examination of other systems will be recorded.

Following investigations may be carried out in Central Clinical Laboratory and Radiology, Department. All the data obtained from the study will be recorded on proforma. Data will be entered in spreadsheet and will be analyzed with statistical software like SPSS and will be plotted on charts and graph for easy demonstration of observation concluded from study.

Inclusion Criteria

1. Admitted patient with age ≥ 18 years both male and female diagnosed with Chronic Kidney disease. (CKD is defined as either Kidney Damage or GFR < 60 ml/min/1.73m² for more than or equal to 3 months.)
2. Presented with Signs and symptoms of Uremia or signs of Kidney failure or signs and symptoms of Fluid Overload.

Exclusion Criteria

1. Pregnancy and Pediatrics Age Group
2. All those diagnosed as Acute Kidney Disease
3. Malignancy
4. All patients diagnosed with primary hematological or bleeding disorder.
5. Patients who are HBsAg Positive, HIV Positive, HCV Antibody Positive

RESULTS

Table 01: Mean Age of the Study Population

	Mean	Standard deviation
Age	55.35	14.86

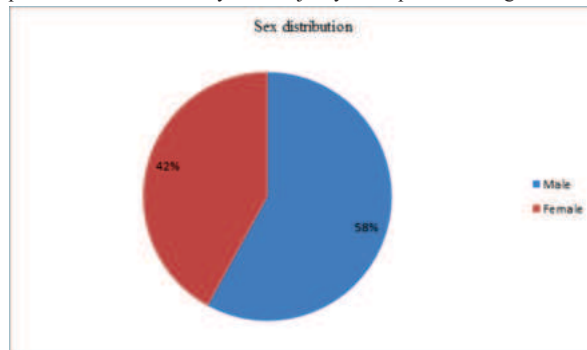
Majority of the patients were found in the age group of 41-50 years and 51-60 years with total contribution of 21% and 30% respectively. Though 5% of CKD patients were present in the age group of < 30 years suggestive of genetic etiology.

The mean age of the population was calculated to be 55.35 years (± 14.86).

Table 02: Sex Distribution Table

Sex	Frequency	%age
Male	58	58%
Female	42	42%
Total	100	100%

Of total 100 participants of CKD, 58 patients were males whereas 42 patients were females. It was observed that there was a male predominance in the study with majority of the patients being males.



Graph 01: Pie Chart Showing The Sex Distribution

Table 03: Distribution Of Co Morbidities Among The Study Population

co morbidities	Present	%
DM	17	17%
HTN	22	22%
Both		54%
CGN	4	4%
ADPKD	3	3%
Total	100	100%

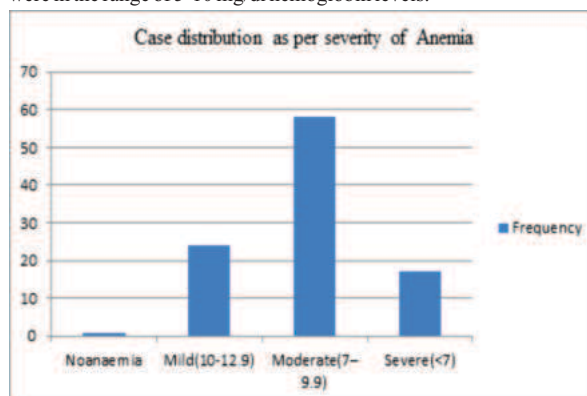
Majority of the patients were having history of Diabetes Mellitus and Hypertension together with total 54 patients. Small portion of the participants were observed to have history of Chronic Glomerulonephritis and 3 patients were having history of Autosomal Dominant Polycystic Kidney Disease.

Table 04: Distribution Of Cases According To Anemia:

Anemia	Frequency	%
No anemia	1	1%
Mild (10-12.9)	24	24%
Moderate (7- 9.9)	58	58%
Severe (<7)	17	17%
Total	100	100%

In the present study all the patients were evaluated according to the level of hemoglobin and the likelihood of anemia among the population.

Of total 100 patients it was observed that only one patient of CKD had hemoglobin level less than 5mg/dl where as almost 75% of the patients were in the range of 5-10 mg/dl hemoglobin levels.



Graph 02: Bar Chart Showing Case Distribution According To Anemia

Table05: Stage Of CKD:

Stage of CKD	Frequency	%
Stage I	0	0
Stage II	5	5%
Stage III	11	11%
Stage IV	19	19%
Stage V	65	65%
Total	100	100%

It was observed that majority of the patients in the population were found to be diagnosed with stage V kidney disease with total 65%. Followed by 19% cases of stage IV CKD cases and 11% in stage III cases and 5% cases of Stage II CKD. There were no patients of stage I Chronic kidney disease found among the study population in the present study.

Table06: Clinical Presentation Among The Study Population

Clinical presentation	Frequency	%
Edema	67	67%
Oliguria	54	54%
Dyspnea	42	42%
Fatigue	81	81%
Encephalopathy	15	15%
Nausea/Vomiting	66	66%
Total	100	

Most common findings was fatigue which was seen in almost 81% of the population followed by 67% of the patients had edema and 66% patients had nausea and vomiting.

This was followed by 54% cases of oliguria, 42% cases of dyspnea where as relatively less number of cases of encephalopathy with only 15% cases were seen.

Table07: Hematological Profile Of CKD Patients

Hematological	Mean	Standard deviation
Hb	8.68	±1.91
TLC	9155.90	±4841.15
Neutrophils	73.51	±9.65
Lymphocytes	18.10	±8.63
Eosinophils	2.62	±1.98
Monocytes	5.05	±2.29
Basophils	0.12	±0.37
Platelet	2.72	±6.86
PCV	26.71	±5.23
MCV	83.14	±7.62
MCH	27.21	±4.04
MCHC	32.36	±2.67

Mean hemoglobin levels in the study population was 8.68 (±1.91) mg/dL. Mean count of total leukocytes was found to be 9155.90 (±4841.15) microliters. Mean neutrophils count was 73.51%, followed by 18.10% of mean lymphocytes, 2.62% of eosinophils and 5.05% of mean monocytes whereas there was very less proportion of basophils present in the hematological parameters with only 0.12% of mean basophils were observed.

Platelets were also counted during the hematological analysis of CKD patients. It was found that the mean platelet levels were 2.72 (±6.86) (in thousands) per microliters.

Mean packed cell volume was 26.71% (±5.23), mean MCV was 83.14 fl (±7.62), mean corpuscular hemoglobin was observed to 27.21 (±4.04) pictogram per cell and mean MCHC was observed to be 32.36 (±2.67) g/dL.

Table 08: Peripheral Smear:

Smear type	Frequency	%
Normocytic normochromic	69	69%
Microcytic hypochromic	19	19%
Anisormocytic	9	9%
Anisomicrocytic hypochromic	1	1%
Anisomacrocytic macroovalocytes	2	2%
Total	100	100%

In the present study 69% of the population showed normocytic normochromic type of peripheral blood film picture followed by 19% showed microcytic hypochromic type of smear whereas 9% showed an

isornormocytic type. There was one case of anisomicrocytic hypochromic case and 2 cases of anisomicrocytic macroovalocytes were present.

CONCLUSIONS

Anemia remain a common finding in the Chronic kidney disease patients.

- Normocytic normochromic type of peripheral blood smear was the prominent feature among study population.
- It was observed that there is increase in severity of anemia according to the stages of Chronic kidney disease.
- Erythropoietin can play very significant role in improving hematological parameters of patients of chronic kidney disease.
- It can be concluded from the study that anemia severity increases according to the stages of Chronic kidney disease.
- Early identification and Effective management of CKD patients is very important in Improving Outcomes and preventing Complications of CKD patients. Since many of them land up into serious morbidity and mortality.

Limitations Of This Study:

- Study was limited to one tertiary care center with limited number of cases, study with large sample size belonging to different geographical regions is desirable for better comparison of outcomes.

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