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Sneha V George
PG student, Department of Physiology, Little Flower Institute of Medical Sciences and Research.

JoJo K Pullockara
Nephrologist, Little Flower Hospital and Research Centre, Angamaly.

Kumar Sai Sailesh
Asst. Professor, Department of Physiology, Little Flower Institute of Medical Sciences and Research.

Dr. J K Mukkadan.
Research Director, Little Flower Medical Research Centre, Angamaly.

Correspondence:
Dr. J K Mukkadan
Research Director, Little Flower Medical Research Centre, Angamaly.

A study to assess changes in the hematological profile in chronic kidney disease

Sneha V George, JoJo K Pullockara, Kumar Sai Sailesh, Mukkadan J K.

Abstract
Chronic kidney disease is a condition that affects kidney functions and if untreated, causes kidney failure. The aim of the study was to assess the hematological changes in chronic kidney disease of the patients. 50 chronic kidney disease patients were recruited for the present study by using convenience sampling technique. Data was collected from the medical records. It was observed that the main cause for Chronic kidney disease is type 2 diabetes mellitus in 90% cases, systemic hypertension in 86% cases, coronary artery disease in 72% cases, renal calculi in 30% cases and acute pyelonephritis in 4% cases. Our study agrees with the previous studies as we have observed significant decrease in the PCV and hemoglobin levels and increase in TLC, platelet count in patients with chronic kidney disease. We have observed that normocytic normochromic anemia is most common anemia in CKD patients. Further it was observed that type 2 diabetes mellitus and systemic hypertension are more common causes for CKD. From the present study, it may be concluded that anemia is the most common hematological changes in CKD patients. However, we recommend further detailed study in this regard to confirming the results.

Keywords: Chronic kidney disease, Hematological changes

1. Introduction
Chronic kidney disease is a major health problem throughout the world. It is a global public health problem, with a greater burden and very high cost of care especially in developing countries [1]. In 1990 death due to chronic kidney disease is 409,000 and it has increased to 956,000 in 2013 [2]. Chronic kidney disease is identified by a blood test for creatinine. Higher levels of creatinine indicate a lower glomerular filtration rate and, as a result a decreased capability of the kidneys to excrete waste products [3]. The present study was undertaken to study the hematological changes in chronic kidney disease.

Methodology
The study was approved by Institutional Ethics Committee. A written, informed consent was obtained from all the participants. The study was performed in accordance with the "Ethical Guidelines for Biomedical Research on Human Participants, 2006" by the Indian Council of Medical Research and the Declaration of Helsinki, 2008.

Study design
Cross-sectional study

Participants, Inclusion and exclusion criteria
50 chronic kidney disease patients (35 males and 15 females) admitted in nephrology department of our hospital were recruited for the present study. The following criteria were used to recruit the patients.

Inclusion criteria
1. Patients with end-stage renal failure on renal replacement therapy in the form of hemodialysis and peritoneal dialysis.

Exclusion criteria
1. Pregnant women, hematological malignancy, renal transplantation patients were excluded from the study.

Methods

On admission, patients were subjected to complete physical examination and laboratory investigations of Hemoglobin, Total leucocyte count, packed cell volume, peripheral blood smear and blood urea and serum creatinine by standard methods at our hospital. Data was collected from case sheet of the patients from the medical records department.

Data analysis: Data was analyzed by SPSS 20.0.

Results

2% of chronic kidney disease was in the age group of 21 – 30 years, 10% were in the age group of 31 – 40 years, 12% were in the age group of 41 – 50 years, 16% were in the age group of 51 – 60 years, and 60% were in the group of above 61 years. 0 – 6 gm % of hemoglobin was found in 6% cases, 7 – 10 gm % was found in 72% cases and above 10 gm % was found in 22% cases. 17 patients were having blood urea level between 50 – 90 mg/dl, 18 were having between 91 – 130 mg / dl, 6 were having between 131 – 170mg /dl and 9 were having above 171 mg / dl. 6 % cases were having 0 – 2.0 mg/dl, 18 cases were having 2.1 – 4.0, 14 cases were having 4.1 – 6.0, 9 cases were having between 6.1 – 8.0 and 6 cases were having above 8.1 mg / dl.

Table 1: Description of systemic disease associated with chronic kidney disease (n=50)

Disease	Frequency	Percentage (%)
Diabetes mellitus	45	90
Hypertension	43	86
Coronary artery disease	36	72
Renal calculi	15	30
Acute pyelonephritis	2	4

Table 2: Distribution of Total leukocyte count in chronic kidney disease patients (n=50)

TLC in thousands/cumm	Frequency	Percentage (%)
4.1-6.0	6	12
6.1-8.0	6	12
8.1-10	13	26
10.1-12	6	12
>12	19	38

Table 3: Distribution of platelet count in chronic kidney disease patients (n=50)

Platelet count in lakhs	Frequency	Percentage (%)
<1	5	10
1.0-1.5	5	10
1.5-2	9	18
>2	31	62

Table 4: Distribution of PCV in chronic kidney disease patients (n=50)

PCV (%)	Frequency	Percentage (%)
10-20	2	4
21-30	34	68
31-40	13	26
41-50	1	2

Table 5: Distribution of types of anaemia blood urea in chronic kidney disease patients (n=50)

Type of anemia	Frequency	Percentage (%)
Normocytic normochromic	31	62
Microcytic hypochmic	15	30
Macrocytic hypochromic	4	8

Discussion

It was reported that Uremia interferes with erythropoiesis, granulocyte, platelet, and immune functions. As a result, uremic patients are almost invariably anemic, and have a high incidence of infections and hemorrhagic complications [4]. Many of the abnormalities described in acute or chronic renal failure appear to be directly related to accumulation of uremic toxins, particularly those in the middle molecular range and may respond to dialysis treatment [5].

Suresh M *et al.*, reported that Chronic renal failure patients have lower hematological indices, due to impaired production of erythropoietin, and other factors like increase hemolysis, suppression of bone marrow erythropoiesis, hematuria and gastrointestinal blood loss. The concentration of serum creatinine shows negative correlation with all the hematological parameters. And the degree of changes depends on the severity of renal failure [6].

It was reported that Normochromic normocytic anemia is the most common hematological abnormality in chronic renal failure. Anemia can be correlated with severity of renal failure. Higher the blood urea the severe is the anemia [7]. Naghmi Asif *et al.*, reported that among hematological parameters hemoglobin is the most commonly affected [8].

Afshan Zeeshan Wasti *et al.*, reported that mean of RBCs, Hb and PCV were significantly lowered in chronic kidney disease patients and similarly MCH and MCHC indices also decreased significantly [9].

It was reported that CRF patients with anemia had lower hematological indices and the degree of changes depend on the severity of renal failure [10]. Our study agrees with the previous studies as we have observed significant decrease in the PCV and hemoglobin levels and increase in TLC, platelet count in patients with chronic kidney disease. We have observed that normocytic normochromic anemia is most common anemia in CKD patients. Further, it was observed that type 2 diabetes mellitus and systemic hypertension are more common causes for CKD.

Limitations and future perspectives

The major limitation of the present study was less sample size. Also, we have not studied male and female comparison. In our future studies, we plan a multi-centered study with study with higher sample size to confirm the results and also to observe male and female differences.

Conclusion

From the present study, it may be concluded that anemia is the most common hematological changes in CKD patients. However, we recommend further detailed study in this regard to confirming the results.

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