



## HEMATOLOGICAL PROFILE IN CHRONIC KIDNEY DISEASE PATIENTS – A RETROSPECTIVE STUDY

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### ABSTRACT

**Background:** Chronic kidney disease (CKD) is linked to a variety of alterations in haematological parameters. The most common abnormality is anaemia, but white cell and platelet counts as well as their functionality may be compromised. Poor overall clinical prognosis is linked to these abnormalities. **Aim:** To evaluate the hematological changes in CKD patients. **Materials and Method:** Retrospective study conducted was for a period of 2 months in 60 chronic kidney disease patients who attended the nephrology department of our hospital were recruited for the present study. Data was collected from case record of patients from medical records department. Hematological details such as Hemoglobin (Hb), red Blood Cell (RBC) count, Mean Corpuscular Volume (MCV), Mean corpuscular Hemoglobin(MCH), Mean cell hemoglobin Concentration(MCHC), Red Cell Distribution width (RDW), White blood cell (WBC) count, platelet count and type of anemia were noted. Results were analysed using SPSS 20.0 version. **Results:** Of the 60 CKD patients, the most common age group was 5th to 6th decade with male predominance (68.3%). Mean age was 56 years. The study revealed that Hemoglobin (Hb), Red Blood Cells (RBC) were low in CKD patients. The most common type of anemia was normocytic normochromic anemia (68.3%). Leucocytosis and thrombocytopenia was seen in 15% and 40% patients respectively. **Conclusion:** Anaemia was highly prevalent in CKD patients and was significantly. Hematological parameters can be evaluated for the underlying cause and treated appropriately. The present study might help clinicians understand haematological profile and take necessary steps in the management.

**KEYWORDS :** Anaemia, Chronic Kidney Disease, Erythropoietin, hemoglobin, Leukocyte, platelet.

### INTRODUCTION:

Chronic kidney disease (CKD) is a major health problem with a steady rise in its incidence and prevalence globally. Its burden is in epidemic proportions, affecting both developed and developing nations.<sup>1</sup> Around the world, including India, the prevalence of chronic kidney disease (CKD) and end-stage renal disease (ESRD) is quickly increasing. The number of Indians receiving hemodialysis is thought to be 55,000, and it is increasing by 10–20% per year.<sup>2</sup>

According to the Kidney Dialysis Outcomes Quality Initiative (K/DOQI) guideline from the US National Kidney Foundation, CKD is defined as kidney damage or an estimated glomerular filtration rate (eGFR) of less than 60 ml/min/1.73 m<sup>2</sup> for more than three months.<sup>3</sup>

According to reports, uremia impairs the immune function, granulocyte, platelet, and erythropoiesis processes. Because of this, uremic patients nearly always have anaemia, which increases their risk for infections and hemorrhagic consequences. The accumulation of uremic toxins, especially those in the medium molecular range, appears to be directly linked to many of the abnormalities identified in acute or chronic renal failure.<sup>4</sup>

The most frequent hematologic abnormality associated with CKD is anaemia. Depending on the disease's stage, anaemia is more common in CKD patients in a range of 77.5 to 94%.<sup>5</sup>

Anemia was defined using the World Health Organization definition hemoglobin (Hb) concentration <12g/dl in females, <13g/dl in males. The severity of anemia was classified as mild when Hb is between 11–12.9g/dl for males and 11–11.9g/dl for females; moderate anemia when Hb is between 8–10.9g/dl and severe when Hb is <8g/dl.<sup>6</sup>

The major cause of anemia in CKD is lack of erythropoietin (EPO) synthesis in the diseased kidneys. As renal disease progresses, specialized peritubular cells that produce EPO

are depleted or injured, resulting in inappropriately low EPO comparative to the degree of anemia, which is usually of the normocytic normochromic type.<sup>7</sup>

### AIMS AND OBJECTIVES:

- To study the hematological changes in patients with chronic kidney disease.

### MATERIALS AND METHODS:

Retrospective study conducted was for a period of 2 months in 60 chronic kidney disease patients who attended the nephrology department of our hospital were recruited for the present study. Patients with end-stage renal failure on renal replacement therapy in the form of hemodialysis and peritoneal dialysis were included in the study. Pregnant women, haematological malignancy, renal transplantation patients were excluded from the study. Data was collected from case record of patients from medical records department. Hematological details such as Hb, red Blood Cell (RBC) count, Mean Corpuscular Volume (MCV), Mean corpuscular Hemoglobin(MCH), Mean cell hemoglobin Concentration(MCHC), Red Cell Distribution width (RDW), White blood cell (WBC) count, platelet count and type of anemia were noted. Data entered in excel sheet. Statistical Analysis was carried out using SPSS 20.0 version.

### OBSERVATION AND RESULTS:

The age of the patients ranges between 17 to 78 years with the mean age of 56 years. Most common age group affected in the present study was 51 to 60 years accounting for 25(41.7%) cases followed by 41 to 50 years seen in 13(21.7%) patients. Among the 60 cases 41 (68.3%) was males and 19 (31.7%) were females. Table 1 to 5 describes various haematological parameters in CKD patients.

**Table 1: Mean RBC count, Hb, PCV, MCV, MCH, MCHC and RDW**

Parameters	Mean
RBC (million cells/mm <sup>3</sup> )	2.83±0.64
Hb (gm/dl)	9.15
PCV (%)	26.35
MCV (fL)	89.17
MCH (pg)	30.89
MCHC (gm/dl)	33.31
RDW (%)	15.34

**Table 2: Distribution of severity of anemia**

Grading of anemia	Frequency	Percentage %
Mild	13	21.7
Moderate	28	46.7
Severe	19	31.6

**Table 3: Distribution of type of anemia**

Type of Anemia	Frequency	Percentage %
Normocytic normochromic anemia	41	68.3
Microcytic hypochromic anemia	15	25
Dimorphic anemia	3	5
Macrocytic normochromic anemia	1	1.7

**Table 4: Distribution of WBC count**

WBC count	Frequency	Percentage %
Normal	49	81.7
Increased	9	15
Decreased	2	3.3

**Table 5: Distribution of Platelet count**

Platelet count	Frequency	Percentage %
1.5 – 4.5	36	60
1.0 - 1.5	14	23.3
<1	10	16.7

**DISCUSSION:**

A total of 60 cases were included in the present study. Mean age in this study was 56 years. This was similar to studies done by Ijoma C et al.<sup>8</sup> and Islam MN et al.<sup>9</sup> respectively. In the present study, RBC count was decreased in chronic renal failures. Primary cause of decrease RBC count in chronic renal failure is impaired erythropoietin production and other factors which suppress marrow erythropoiesis and shortened red cell survival. Erythropoietin is the hormone which is the major humoral regulator of red cell production and helps to maintain the viability of RBC.<sup>7</sup>

All the patients included in the were anemic. The mean haemoglobin level was 9.15g/dl. This finding was in concordance with the studies by Bhatta S et al.<sup>10</sup> and Bhattacharjee K et al.<sup>11</sup> According to WHO criteria the prevalence of mild, moderate and severe anemia was 21.7%, 46.7% and 31.6% respectively. This was comparable to study conducted by chakravarthi A et al.<sup>12</sup> in their study mild moderate and severe anemia was seen in 5.26%, 55.26% and 39.48% respectively.

In this study, normocytic normochromic anemia was seen in majority 41(68.3%) of the CKD patients. This was similar to the studies by Bhattacharjee K et al.<sup>11</sup> chakravarthi A et al.<sup>12</sup> and Arun S et al.<sup>13</sup> but in contrast to study done by Talwar et al.<sup>14</sup> in their study they found a 60% prevalence of microcytic hypochromic anemia among CKD patients.

Neutrophilic leukocytosis was seen in 15% of the patients. Other studies such as chakravarthi A et al.<sup>12</sup> and George SV et al.<sup>15</sup> also showed neutrophilic leukocytosis. This may be due to the high incidence of latent or secondary infection in these patients. 13.16% of the patients had thrombocytopenia. Gafter U et al.<sup>16</sup> found the mean platelet count was significantly

reduced (1.75+/- 0.065 lakhs/cmm) in CKD patients. Another study by Dorgalaleh et al.<sup>17</sup> also found thrombocytopenia in CKD patients with a mean platelet count of 1.72+/-0.9 lakhs/cmm. Platelet dysfunction in CKD patients can predisposes the patients to bleeding.<sup>18</sup>

**CONCLUSION:**

This study found that all CKD patients had anaemia. Since it was primarily of the normocytic normochromic type, erythropoietin insufficiency may have been the root cause. Some patients' propensity for latent or secondary infections may be the cause of neutrophilic leukocytosis. In the context of this study, nephrologists should monitor the haematological profiles of patients with CKD and treat any abnormalities to improve patient outcomes.

**Financial Support And Sponsorship:**

Nil.

**Conflicts Of Interest:**

There are no conflicts of interest

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