HEMATOLOGICAL PROFILE IN PATIENTS WITH CHRONIC KIDNEY DISEASE: A RETROSPECTIVE ANALYSIS OF 103 PATIENTS

YEGUMUTHU KRISHNAN
Department of Pathology,
PSG INSTITUTE OF MEDICAL SCIENCE & RESEARCH

Abstract:
Objective Chronic kidney disease (CKD) is a common public health issue. A renal damage or decreased renal function with persistent elevation of serum creatinine levels (1.5 mg/dl) for three or more months is defined as CKD. Anemia is commonly observed in patients with CKD and the early detection of the type of anemia is important as it has a favorable response to treatment among other conditions associated with CKD. The objective of this retrospective study was to evaluate the hematological profile in patients with CKD.

Materials and methods The case records of 103 patients between January 2007 and September 2011 in a single institution with the diagnosis of CKD were retrospectively evaluated. The mean age of the patients was 54 years (Range 25-80 years). Complete blood picture, hemoglobin (Hb) level, red blood cell count, white blood cell count, platelet count and bone marrow (BM) aspirates were evaluated in all these cases.

Results Of the 103 cases, 70 patients were males and 33 were females. The mean age of the patients was 54 years (Range 25-80 years) of which the majority (60 patients) were between the age group of 50 and 70 years. 91.3% of patients (94/103) were anemic with a hemoglobin concentration less than 12 g/dl. Normocytic normochromic (NN) anemia was the most commonly observed peripheral smear pattern that was seen in 67 patients (65%); followed by microcytic hypochromic (MH) anemia in 21 patients (20%); and macrocytic normochromic (MN) anemia in 10 patients. Dimorphic picture was the least common pattern and was observed only in 5 patients. Leukocytosis that was predominantly neutrophilic was observed in 10 patients while leukopenia was noted in 11 patients. 23 patients had thrombocytopenia while thrombocytosis was observed in 4 patients. Hypercellular bone marrow was observed in 57 cases.

Conclusion Anemia is commonly observed in patients with CKD and normocytic normochromic (NN) anemia is the most frequently noted peripheral smear pattern.
Early detection of the type of anemia with hematological evaluation and its appropriate management can delay and avoid the associated complications in patients with CKD and improve their quality of life.

**Keyword:** chronic kidney disease, anaemia

Chronic kidney disease (CKD) is a major public health issue throughout the world. It is defined by the presence of proteinuria (ratio of more than 30 mg of albumin to 1 gm of creatinine) on untimed urine testing or a decreased glomerular filtration rate for 3 or more months. Undiagnosed anemia in patients with CKD can lead to progressive decline in the renal function resulting in renal failure and its associated complications including cardiovascular disease and poor quality of life. As anemia is the condition that has a favorable response to management among the disorders affecting patients with CKD, early identification of the type of anemia is essential to avoid or delay the development of complications in CKD.

**INTRODUCTION:**

The objective of this retrospective study was to analyze the hematological profile of 103 cases with CKD, the prevalence of anemia and the patterns of peripheral smear in these patients.

**MATERIALS AND METHODS:**

103 cases of CKD with persistently elevated serum creatinine levels of more than 1.5 mg/dl for three or more months who attended our hospital between January 2007 and September 2011 were included in this retrospective study. The patients who did not fulfill the above mentioned criteria for diagnosing CKD were excluded. The medical records of all these patients were retrieved from the archives. The complete blood picture, hemoglobin level, RBC count, WBC count, platelet count and BM aspirates were evaluated in all these cases.

The bone marrow iron stores were graded based on the appearance in higher magnification [400 x] as given in table 1.

**RESULTS:**

Epidemiology: The mean age of the patients was 54 years (Range: 25-80 years) of which the majority of them (60 patients) were between the age group of 50 and 70 years. Of the 103 patients, 70 were males and 33 were females.

Serum creatinine levels: The serum creatinine level was between 1.5-6 mg/dl in 90 patients (87.3%) while it was more than 6 mg/dl in the remaining 13 patients (12.6%). The distribution of patients according to their serum creatinine levels is displayed in Fig 1.

**Fig 1:** Graph showing the distribution of cases according to the level of serum creatinine.

Hemoglobin levels: 94 patients (91.3%) had anemia with a hemoglobin level below 12 gm/dl while the levels were normal in the remaining 9 patients (8.7%). The distribution of cases according to the concentration of hemoglobin is mentioned in table 2.

Peripheral smear: Normocytic normochromic (NN) anemia was the most commonly observed peripheral smear pattern that was seen in 67 patients (65%) followed by microcytic hypochromic (MH) anemia in 21 patients (20%) and macrocytic normochromic (MN) anemia in 10 patients (9.7%).

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University Journal of Pre and Para Clinical Sciences
Dimorphic picture [microcytic hypochromic and macrocytic normochromic] was the least common pattern that was observed only in 5 patients (4.8%). Table 3 shows the distribution of cases according the morphological picture in the peripheral smear.

Table 3: Distribution of cases according to the morphological picture in the peripheral smear. Pancytopenia was observed in nine patients of which megaloblastic anemia was seen in two cases, multiple myeloma in two patients and hypocellular marrow in four patients.

Although no significant morphological changes were observed in the WBC lineage, quantitative changes were noted with leukocytosis in ten patients and leucopenia in eleven patients. The leukocytosis was predominantly neutrophilic. Quantitative changes were observed in the platelet profile with thrombocytopenia in 23 patients and thrombocytosis in four patients.

Bone marrow: The marrow was hypercellular in 57 patients and the erythroid series showed normoblastic maturation in majority of the cases (64 patients). The distribution of cases according to the marrow cellularity is depicted in fig 2.

Fig 2: Distribution of cases according to bone marrow cellularity. Bone marrow aspirate features were suggestive of multiple myeloma in seven patients of which five were males and two were females. NN blood picture was visualized in the peripheral smear of these patients with exaggerated rouleaux formation seen in five of them. The plasma cell count was more than 40% in all these patients. Another patient, a 68 year old male was...
diagnosed as a case of myelodysplastic syndrome-refractory anemia with excess blasts (MDS-RAEB) showing immature cells in peripheral smear and 56% blast cells in the bone marrow with features of dyspoiesis. Acute myeloid leukemia (AML-M3) was diagnosed in a 51 years old female showing NN to MH anemia, leukocytosis and thrombocytopenia with atypical cells in the peripheral smear. 48% blast cells were observed in the peripheral smear while 72% blast cells were noted in the bone marrow which were positive for myeloperoxidase (MPO) and sudan black B (SBB).

DISCUSSION:

CKD is a major cause of morbidity and mortality worldwide and it predominantly affects the elderly age group between 50 and 70 years. Renal insufficiency can occur in patients with hematopoietic neoplasms as a result of various nephrotoxic influences such as sepsis, exposure to multiple drugs, decreased renal perfusion & increased urate excretion. CKD can frequently develop during the course of multiple myeloma and myeloma should be considered as a differential diagnosis in any patient with chronic renal insufficiency with normal blood pressure. Undiagnosed and untreated CKD can progress resulting in complications like renal failure, hypertension, alteration in body fluid mechanics, cardiovascular abnormalities, hematological abnormalities and bony abnormalities due to altered vitamin D metabolism. Early detection and appropriate management of CKD can prevent or delay the onset of these complications. Anemia is one of the most common manifestations of CKD and 95% of the cases respond to treatment with erythropoietin. The primary mechanism causing anemia loss, iron deficiency, vitamin B12 or folate deficiency, hypothyroidism, chronic infection, inflammation, hyperparathyroidism, aluminium toxicity, malignancy, hemolysis, bonemarrow infiltration & pure red cell aplasia. Anemia also affects the cardiovascular system with development of left ventricular hypertrophy, congestive heart failure and even death if left untreated. NN anemia is commonly observed in patients with CKD followed by MH anemia. The reticulocyte count is generally within normal limits but might be moderately increased at times. The platelet count is either normal or slightly increased. The bone marrow tends to be moderately cellular with mild erythroid hyperplasia. Erythroid maturation appears to be morphologically normal. Marrow hypocellularity was observed in 3.8% of our cases and studies have shown that inadequate marrow response occurs in patients with CKD due to erythropoietin deficiency and direct suppression of erythropoiesis by uremic toxins. There is considerable variation in the level of serum iron and with severe renal impairment, micronormoblastic erythroid proliferation with depletion of iron stores is observed. Anemia is an adverse indicator of progression of CKD. However, fortunately among the disorders affecting patients with CKD, anemia is the most responsive to treatment. Hence early detection of anemia by evaluation of hematological parameters and its appropriate management can slow or even stop the progression of CKD. Earlier treatments for anemia in chronic renal disease involved repeated blood transfusions and steroids with its associated risks of transmitting infections, antigenic susceptibility precluding the chances of later renal transplantation and the adverse affects of steroids. The recent use of human recombinant
erythropoietin has improved the quality of life in patients with anemia associated with chronic renal disease. As described in the literature, anemia was observed in 91.3% of our patients and NN anemia was the most common type of blood picture followed by MH anemia. Dimorphic blood picture was the least common type. Quantitative changes were observed in the leukocyte and platelet profiles.

CONCLUSION:
Anemia is commonly observed in patients with CKD and normochromic normocytic (NN) anemia is the most frequently noted peripheral smear pattern in our series. Early detection of the type of anemia with hematological evaluation and its appropriate management can delay and avoid the associated complications in patients with CKD and improve their quality of life.

REFERENCES:


