

**Research Article****A Study of Haematological Changes in Chronic Renal Failure**Sunita G. Rathod<sup>1\*</sup>, Arvind K. Ade<sup>2</sup>, Pravin P. Shekolkar<sup>3</sup><sup>1</sup>Assistant Professor, Department of Medicine, Government Medical College, Akola-444001, Maharashtra, India<sup>2</sup>Associate Professor, Department of Surgery, Government Medical College, Akola-444001, Maharashtra, India<sup>3</sup>Assistant Professor, Department of Physiology, Government Medical College, Akola-444001, Maharashtra, India**\*Corresponding author**

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**Abstract:** Chronic renal failure is associated with variety of hematological abnormalities. Hemostatic defects in uremia are often complex and may include coagulation abnormalities. The present study was conducted to see the incidence, severity and types of various hematological abnormalities in patients of chronic renal failure. Forty patients (35 males & 5 females) diagnosed to have chronic renal failure with end stage renal disease was considered for this study. Various hematological abnormalities like anemia, platelet abnormalities, and coagulation defects were studied in patients of chronic renal failure. In this study all the patients had anemia mainly normocytic normochronic. 22% patients had leucocytosis and very few had thrombocytopenia. Few patients showed presence of Burr cells in their peripheral smear. Anemia is the most common hematological abnormality in chronic renal failure. Burr cells are observed in the study group which suggests the more severe form of chronic renal failure. Although platelet count was normal in majority of the patients, qualitative platelet defect is the main cause of bleeding in these patients.**Keywords:** Anemia, Burr cells, Chronic renal failure, Leucocytes, Platelets

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**INTRODUCTION**

Chronic renal failure is associated with variety of hematological abnormalities. Anemia is the most common, consistent and severe of the various hematological abnormalities [1]. In addition to anemia, patients with chronic renal failure are prone to develop infections and hemorrhagic diathesis [2]. Abnormal haemostasis in chronic renal failure is characterized by tendency to abnormal bleeding and bruising. Decreased factor III activity, abnormal platelet aggregation and adhesiveness and impaired prothrombin consumption contribute to the clotting defect in uremia [3]. Although hemostatic defects in uremia are often complex, it is probable that platelet dysfunction is the most consistent and clinically the most important feature [4].

**Aims & Objectives**

The present study was undertaken to see the incidence, severity and types of the hematological abnormalities like anemia, platelet abnormalities, and coagulation defects in patients of chronic renal failure. We also tried to correlate hematological abnormalities with the severity of chronic renal failure.

**MATERIALS & METHODS**

Forty diagnosed patients (35 males and 5 females) of chronic renal failure with end stage renal disease, between the age group 16-70 yrs, who were admitted in

the MICU or/and Medical wards unit at Grant Government Medical College, Mumbai were selected for the study. Diagnosis of chronic renal failure was made on the basis of a detailed clinical history, clinical examination and investigations like biochemical tests and ultrasound examination. A detailed history was taken with special emphasis on urinary symptoms, symptoms of uremia, symptoms related to severe anemia and heart failure. The diagnosis of chronic renal failure was confirmed with biochemical parameter like blood urea and serum creatinine. End stage renal disease was confirmed with ultrasound examination. Hematological examinations done were as follows.

- Hemoglobin estimation of all patients was estimated by Sahli's method.
- Peripheral smear was stained with Leishmann's stain and studied for RBC morphology, WBC morphology and differential count, and adequacy of platelets on peripheral smear and platelet count
- Blood indices like MCV, MCHC
- Coagulation profile like bleeding time, clotting time and prothrombin time

The individuals were given explanation about the relevance of the study and the experimental procedures. The participants gave informed written consent to

participate in the experiment which was approved by the institutions human research ethics committee.

Statistical analysis of data done with paired t-test.

**RESULTS**

**Table 1: Patients Categorization according to types of anemia**

Type of anemia	No. of patients	Percentage
<b>Mild anemia</b> (Hemoglobin level between 7.6-11 gm %)	9	22.5
<b>Moderate anemia</b> (Hemoglobin level between 5.1-7.5 gm %)	20	50
<b>Severe anemia</b> (Hemoglobin level between 5.1-7.5 gm %)	11	27.5

Five out of forty patients had evidence of microcytic, hypochromic anemia. Twenty two out of 40 had evidence of normocytic normochromic anemia. It was observed that the anemia was relatively more severe in those patients who presented with more severe forms of renal failure.

**Leucocyte abnormality**

Nine out of forty had evidence of polymorphological leucocytosis. None of the patient had leucopenia.

**Platelet count**

Two patients had thrombocytopenia without any evidence of overt bleeding or purpuric spots. Other

Following are the hematological abnormalities observed in chronic renal failure patients.

**Anemia**

It was present in all 40 patients giving an incidence of 100%. Out of them, 20 patients had moderate anemia, 11 had severe anemia.

three patients had evidence of overt bleeding though their platelet count was normal.

**Burr cells**

Five patients showed presence of burr cells in their peripheral smear. These were seen in those patients who had severe forms of renal failure.

**Clotting abnormalities**

None of the patient had any clotting abnormality.

**Correlation between severity of uremia and anemia**

It was found that there is an inverse relationship between BUN levels and hemoglobin levels.

**Table-2: Relationship between BUN levels and hemoglobin levels**

	BUN	Hb	Correlation coefficient	p	Significance
Mean	205.25	6.54	-0.7039	p<0.05	significant
S.D.	(S.D. 38.38)	(S.D. 1.79)			

**DISCUSSION**

In the present study all the patients had anemia with hemoglobin values in the range of 3.3 to 11 gm %. Normocytic normochromic anemia is the dominant anemia in most patients. Most studies in literature state that uremic patients are almost invariably anemic [1]. Anemia of the chronic renal failure is multifactorial. The pathogenesis of this type of anemia has been attributed to decreased plasma erythropoietin due to renal damage, inhibitors of erythropoiesis in uremic plasma and decreased hemoglobin oxygen affinity [5]. In addition to damage to renal site of erythropoietin production, plasma erythropoietin and erythropoiesis is further suppressed in patients with renal disease. The stimulus to erythropoietin production is less intense than in patients with comparable severe anemia due to other causes. This is because the affinity of oxygen decreases which increases the availability of oxygen per unit of hemoglobin circulating through kidney [5].

Nine patients had polymorphonuclear leucocytosis without any evidence of infection. Granulocytes are not reduced in number in uremic subjects and they are morphologically normal except for an occasional increase in the number of hypersegmented polymorphonuclear granulocytes. The chemotactic response of polymorphonuclear granulocytes is subnormal and this abnormality is partially ameliorated by hemodialysis. It is quite probable that this acquired granulocyte dysfunction is related to high incidence of infection in this group of patients. Craddock *et al.* has indicated that hemodialysis results in activation of C5 [6]. This in turn causes increase in adhesiveness of granulocytes and therefore results in their margination in the lungs.

Five patients showed presence of Burr cells in their peripheral smear who had more severe form of

renal disease. This finding is consistent with other studies [7]. Two patients had thrombocytopenia though not severe without any evidence of overt bleeding or purpuric spots. Three other three patients had evidence of overt bleeding though their platelet count was normal. The above clinical findings as well as laboratory findings can be taken as indirect evidence of qualitative platelet function defects.

#### **CONCLUSION**

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. Burr cells are observed in the study group which suggests the more severe form of chronic renal failure. Although platelet count was normal in majority of the patients, qualitative platelet defect may be the main cause of bleeding in these patients.

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