STATUS OF ANAEMIA IN DIFFERENT STAGES OF CHRONIC KIDNEY DISEASE PATIENTS

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Abstract

Background: Anemia is the universal complication of Chronic Kidney Disease (CKD) and reflects problem either in abnormally low production of RBC by the bone marrow or excessive haemolysis or blood loss. This study has been designed to observe the status of anaemia in different stages of chronic kidney disease patients. **Materials and methods:** It is a hospital based cross sectional comparative study. 100 patients of diagnosed case of chronic kidney disease admitted in the Department of Nephrology, Chittagong Medical College Hospital were selected as cases and 100 apparently healthy persons, age and sex matched were selected as controls. According to stages of CKD, cases were subdivided into three groups stage III, IV and V. Haemoglobin estimation was done manually by traditional method (Sahli's acid-haematin method) in the Department of Physiology, Chittagong Medical College, Chittagong. Peripheral Blood Film (PBF) study also was performed in the department of Physiology, Chittagong Medical College, Chittagong. Data were analyzed by different statistical methods. **Results:** In our study, among the case group (100 patiens), we found that 5.5% are on CKD stage III, 21% on stage IV, 23.5% on stage V. And 50% (100 apparently healthy subjects) were taken as control. Here the mean (±SD) hemoglobin concentrations were 8.75(± 1.45) and 12.07(±1.77) gm/ dl of blood in case and control group respectively. Peripheral blood film study among the study groups showed that RBCs were found microcytic hypocromic in 69% of case and 20% control group. On the other hand RBCs were normocytic normocromic in 31% of case and 80% of control group. Again among the case group it was found that 54.5%, 71.4% and 70.2% of RBCs were found microcytic hypocromic in CKD patients with stage III, IV and V respectively. On the other hand RBCs were normocytic normocromic in 05%, 12% and 14% of CKD patients with stage III, IV and V respectively. **Conclusion:** The results of this study revealed that all the patients (100%) of the study were found anaemic and 69% CKD patients had microcytic hypochromic anaemia.

Key words
Chronic kidney disease; Haemoglobin; RBC; Microcytic hypocromic anaemia; Normocytic normocromic anaemia.

Introduction

Chronic Kidney Disease (CKD) is one of the major public health problems. Early diagnosis and proper management have important role in prevention of CKD progression to end stage renal disease[1]. Most patients with chronic kidney diseases eventually become anemic. We should review the management of anemia in these patients as a part of the overall management of the many clinically relevant manifestations of chronic kidney diseases. Factors likely contributing to anemia in chronic kidney diseases include blood

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loss, shortened red cell life span, vitamin C deficiencies, the "uremic milieu," Erythropoietin (EPO) deficiency, iron deficiency, and inflammation. Unfortunately, we know little about the relative contributions of the different factors and conditions in the early stages of chronic kidney disease[2]. The World Health Organization (WHO) defines anemia when hemoglobin concentration is lower than 13.0 gm/dl in men and postmenopausal women and lower than 12.0 gm/dl in other women[2].

Some studies reported that Hb-level start to decrease even early renal deficiency around 70ml/min in male and 50 ml/min in female[3]. Deficiency of erythropoietin is the primary cause of anemia in chronic renal failure, but it is not the only cause. A minimal workup is necessary to rule out iron deficiency and other cell line abnormalities[4]. Very slow loss of blood can also cause anemia by depleting the body's stores of iron, which the bone marrow uses to produce blood cells[5]. Anemia is important because it causes many debilitating symptoms (eg. Tiredness and lethargy, muscle fatigue. intolerance to cold, breathlessness on exertion, poor exercise capacity). It is also a major factor in the high prevalence of cardiovascular disease in CKD patients, and it is reported that cardiovascular diseases account for more than 50% of deaths in these patients. Excessive destruction of red blood cell also seen in advanced CKD patients, probably due to chemical effects of uremia and decreased flexibility of the red blood cell. This hemolysis is usually mild and a person with a normal bone marrow could easily compensate for it by increasing red blood cell production but in renal failure, the bone marrow's capacity to compensate is diminished[5]. Furthermore, anemia in CKD aggravates the adverse outcomes in CKD and worsens the comorbidities of diabetes and hypertension[6]. Early identification of anemia in CKD retards the development of end stage renal disease and consequently improves from CVD morbidity and mortality[7].Therefore the present study has been designed to observe the status of anaemia in different stages of chronic kidney disease patients.

Materials and methods

The present study was a hospital based, cross-sectional case-control study. The study was conducted in the Department of Nephrology, Chittagong Medical College Hospital, Chittagong in collaboration with the Department of Physiology, Chittagong Medical College, Chittagong between January 2011 and December 2011.

The study population consisted of 100 patients of diagnosed case of CKD admitted in the Department of Nephrology, Chittagong Medical College Hospital, Chittagong during study period were selected as cases by the process of purposive sampling and 100 apparently healthy persons, age and sex matched are selected as controls. According to stages of CKD, case group were subdivided into three groups stage III, IV and V. CKD stage I and II rarely admitted in hospital because treatment for CKD stage I and II may involve some mild dietary changes (A low protein diet) and a blood pressure medication may be prescribed[8].

Inclusion criteria includes patient with chronic kidney disease (Serum creatinine level 2mg/dL) with age >18 years and <70 years providing informed written consent. Patients with acute medical conditions like acute MI, Stroke, CKD with other preexisting known diseases like tuberculosis, bronchial asthma, COPD etc. CKD with H/O bleeding disorders eg. haemophilia, purpura, haemolytic anaemia, etc. CKD with H/O gastrointestinal bleeding or any other co morbid medical condition, CKD with CLD, PKD , any chronic inflammatory disease, malignancy were excluded. Ethical clearance was taken properly from the ethical committee of Chittagong Medical College, Chittagong.

From all eligible subjects clinical history had been taken and clinical examination were performed. Then, for haematological study, about 2-3 ml of venous blood were collected aseptically in a heparinised test tube. Haemoglobin estimation was done manually by traditional method (Sahli's acid-haematin method) and Peripheral Blood Film (PBF) study was performed in the Department of Physiology, Chittagong Medical College, Chittagong. Data were processed and analyzed by computer based soft ware 'SPSS' (Statistical Package for Social Sciences) for windows version 18. Data were expressed as mean ±SD. Confidence level was fixed at 95% level and 'p' value of 0.05 or less was considered significant.

Results

Table I : Distribution of the study groups (n = 200)

Study Groups		Frequency		Percentage (%)	
Case (CKD Patients)	Stage III	11		5.5	
	Stage IV	42	100	21.0	50.0
	Stage V	47		23.5	
Control			100		50.0
Total			200		100.0

Table II : Distribution of physical findings among study groups

	Clinical Variables	Frequency	Percentage (%)
Anaemia	+	76	76
	++	18	18
	+++	6	6
Oedema	+	64	64
	++	26	26
	+++	10	10
Total		100	100

Table III : Statistics of Haemoglobin (gm/dl) level among study groups

	Group	N	MEAN	SD	MEDIAN	RANGE	SIGNIFICANCE
Haemoglobin	Case	100	8.75	1.45	9.00	5.1 - 11.4	t = 14.984
(gm/dl)	Control	100	12.07	1.77	12.40	8.5-15.0	p = 0.000
	Total	200	10.41	2.24	10.00	5.1 -15.0	*HS

*HS - Highly significant

Table IV : Distribution of peripheral blood film study among the study groups

PBF Study	STUDY GROUPS				Total	
	Case		Control			
	n	%	n	%	n	%
Microcytic Hypochromic	69	69.0	20	20.0	89	44.5
Normocytic	31	31.0	80	80.0	111	55.5
Total	100	100.0	100	100.0	200	100.0

χ^2 value = 48.608, p = 0.000 Highly significant (p< 0.001)

Table V : Distribution of peripheral blood film study among the CKD stages

CKD Stages	PBF Study				Total	
	Microcytic Hypochromic		Normocytic			
	n	%	n	%	n	%
Stage III	06	54.5	05	45.5	11	11.0
Stage IV	30	71.4	12	28.6	42	42.0
Stage V	33	70.2	14	29.8	47	47.0
Total	69	69.0	31	31.0	100	100.0

χ^2 value = 1.223, p = 0.543

Table I showing among the case group patients we found that 5.5% are on CKD stage III, 21% on stage IV, 23.5% on stage V and 50% non CKD apparently healthy subjects are considered as control.

Table II showing among case group most of the case (76%) had mild anemia, 18% had moderate anemia and 6% of them had severe anemia. On the other hand among case group most of them (64%) also had mild edema, several of them (26%) had moderate range and some of them (10%) had generalized edema.

Table III showing mean (±SD) hemoglobin concentrations were 8.75(± 1.45) and 12.07(±1.77) gm/ dl of blood in case and control group respectively.

Table IV showing RBCs were found microcytic hypocromic in 69% of case and 20% control group. On the other hand RBCs were normocytic normocromic in 31% of case and 80% of control group.

Table V showing 54.5%, 71.4% and 70.2% of RBCs were found microcytic hypocromic in CKD patients with stage III, IV and V respectively.

On the other hand RBCs were normocytic normocromic in 05%, 12% and 14% of CKD patients with stage III, IV and V respectively.

Discussion

Anaemia is an almost invariable consequence of Chronic Renal Failure (CRF). The present study has been designed to observe the status of anaemia in different stages of chronic kidney disease patients. Among the 100 CKD patients almost half ie. 47% of the patients were on stage V, 42% of them are on stage IV, 11% are on stage III and we found no one on stage I and II.

In the present series, the mean (±SD) age of the case group was 48.34 (±13.83). These were consistent with the studies[9-11]. That were 48.8(±14.8), 51.6(±17), 51.4(±9.9) respectively . Among the 100 participants of the case group majority (60%) were male and 40% were female . Reza Afser 2007, found 61% male and 39% female of 1200 CKD patients[10]. Which was similar with our findings. Among the 100 participants of the control group, 68% were male and 32% were female . All the patients (100%) of the study were found anemic clinically which was similar with Lee S W. [9]. In this study the mean (±SD) hemoglobin concentrations were 8.75 (± 1.45)gm/dl and 12.07 (±1.77) gm/dl of blood in case and control group respectively. Further majority of them (64%) also had mild oedema, 26% had moderate and some of them (10%) had severe oedema among the case group.

Among the case group, most of them (91%) were taking anti hypertensive drugs, 56% were on anti diabetic drugs and all of them were taking supportive drugs for CKD.

In the PBF study, RBCs were found microcytic hypocromic in 69% of case and 20% control group. On the other hand RBCs were normocytic normocromic in 31% of case and 80% of control group. Table (Last one) showing 54.5%, 71.4% and 70.2% of RBCs were found microcytic hypocromic in CKD patients with stage III, IV and V respectively. On the other hand RBCs were normocytic normocromic in 05%, 12% and 14% of CKD patients with stage III, IV and V respectively.

ARB (Angiotensin Receptor Blockers) and ACE inhibitors both the anti hypertensive drugs may cause a reversible decrease in Hb concentration in patients with hypertention, diabetes and CKD[12]. Long-term administration of losartan in 50- to 100-mg doses once daily in patients with diabetes and albuminuria is expected to lower Hb by ~1 g/dl. Importantly, this effect does not diminish the renoprotective effect of losartan. It should be recognized that these classes of agents may induce or worsen symptomatic anemia in nephropathy patients.

Conclusion

In this study all the cases (100%) of the study are found anemic which was highly significant. In the PBF study RBCs were found microcytic hypocromic in 69% of case and 20% control group. On the other hand RBCs were normocytic normocromic in 31% of case and 80% of control group which was highly significant ($p< 0.001$). Again the PBF study showed 54.5%, 71.4% and 70.2% of RBCs were found microcytic hypocromic in CKD patients with stage III, IV and V respectively and RBCs were normocytic normocromic in 05%, 12% and 14% of CKD patients with stage III, IV and V respectively which was not significant ($p> 0.05$).

Disclosure

All the authors declared no competing interests.

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