ANEMIA IN CHRONIC RENAL FAILURE

Muhammad Luqman Butt, Tahir Shaft, Moinuddin and Aziz urr Rahman

Anaemia in chronic renal failure (CRF) is almost universal abnormality. Sixty diagnosed cases of i. 'RF were included in this study which included patients of peritoneal and haemodialysis. anemia of variable degree was present in almost all the patients and its incidence was same in both groups. The mean pre-dialysis haemoglobin (lib) was 7.4 g dl. After dialysis slight increase in HB occurred, the increase was more in, patients on haemodialysis. The post-dialysis mean lib level was S.3 g dl. Similar changes occurred in R.B(count and packed cell Volume (PVC). The pre-dialysis sample in IS. 13% showed reticulocytosis and the mean Retie. Count was 1.5%. Vo changes in mean Retie count occur after dialysis. The presence of burr cells and fragmented RBC was the commonest red cells morphological abnormality observed in our patents. Dialysis in any form has no wholesome effect on morphological abnormalities. Anaemia of CRF persists and despite treatment remain significantly anemic.

INTRODUCTION

Anemia is one of the most characteristic and visible manifestation of Chronic Renal Failure (CRF). Since the report by Bright in 1835°. renal disease has been linked with anemia, numerous observers have attempted to characterize and explain the underlying anemia. The degree of anemia appears to be roughly proportional to the degree of uremia, but strict linear relationship docs not exist[1] Anemia is an inevitable complication of CRF and is due to depressed erythropoiesis. diminished erythropoietin. haemolysis. blood loss' and hypersplenism. Transfusion may contribute to haemosiderosis and suppression of erythropoiesis. Plasma lev el of erythropoietin docs not increase in response to anemic hypoxia in patients with CRF[11].

MATERIALS AND METHODS

Sixty diagnosed cases of CRF irrespective of age. sex ethnic group and number of previous dialysis were studied in the haematology and Nephrology Department of Sheikh Zayed Hospital. Lahore. Patients of both peritoneal and haemodialysis were included in the study. Pre and post dialysis samples after six hours were taken for the following investigations. With each batch of test samples, a normal control was also put up.

1. Haemoglobin (Hb)
2. Red blood cells count
3. Packed red cells volume.
4. Reticulocyte count

Morphology of red blood cells.

Muhammad Luqman Butt. Assistant Professor. Department of Haematology. Bolan Medical College. Quetta.
Tahir Shall, Department of Medicine. Sheikh Zayed Hospital. Lahore.
Moinuddin. Professor of Haematology. Baqai Medical College. Karachi.
Aziz Ur Rahman, Assistant Professor. Department of Medicine. Bolan Medical College. Quetta.

with both types of dialysis majority of patients Hb and RBC counting by counting were done in coulter counter.

Normal values of HIV Men 13-28 g/dl

Normal Values of Hb[8]		
	Men	13-28 g/dl
	Women	11.5-16.5 g/dl
Normal Values of RBC[8]		
	Men	4.5 - 6.5 10 x^{12}/L
	Women	3.8 - 5.8 x 10 ^{12}/L

Packed Red Cell Volume[9]:

PCV was measured by micro method using plain capillary tube of 75 mm length and 1 mm internal diameter. Anticoagulated (EDTA) blood was allowed to enter the tubes by capillarity leaving 15 mm unfilled. Tubes were sealed and centrifuged for 05 minutes. PCV was measured with reading device.

Normal values of PCV[8]

Men :40 - 45
Women: 3 7 — 47

Reticulocyte Count[10]:

Three drops of Relic Stain were delivered in a lest lube and equal volume of the patients EDTA blood was added in the test tube, mixed and placed in a water bath at 37°C for 20 minutes. After that n was again mixed to re-suspend the red cells and film was made on glass side. When the slide dried, it was examined under oil immersion lens of microscope. The number of red cells in one field was assessed and according to that number of reticulocytes in 1000 red cells was counted and percentage calculated. In reticulocytes reticulo-filamentous material stained deep blue while non reticulated cells stained diffuse shades of pale greenish blue.

Normal range in Adulis'O.2-2 %

Red cell morphology[8].

For Red cells morphology blood film was made on glass slide by placing a small drop of blood on the slide 2cm from one end. Without any delay a spreader was

placed at 45° angle to the slide and moved back to make contact with the drop. The drop was spread by rapid, smooth, forward movement of the spreader. The slides were air dried, labelled and stained with Leishman's stain.

RESULTS

Pre-dialysis samples in 59 patients (98%) showed low Hb level. Its incidence was almost same in both groups. The range of pre-dialysis Hb was 3.8 to 13.3g/dI (mean 7.4g. dl), the decrease was more in cases of peritoneal dialysis. After dialysis Hb of 03 patients (5%) reached to normal range. The increase in Hb level was more in patients on haemodialysis. The range of post-dialysis Hb level was 3.5 to 14.6 g/d 1 (mean 8.3 g/dl).

The pre-dialysis samples in 56 patients (93%) showed low RBC count. The incidence was the same in both groups. The range of pre-dialysis RBC count was 1.4 to 4.5 x 10^{12}/L (mean 2.6 x 10^{12}/L). The decrease was slightly more in cases of peritoneal dialysis. After dialysis same number of patients showed low RBC Count. Slight increase in RBC Count occurred after both type of dialysis. The range of post-dialysis RBC Count was 1.2 to 5.6 x 10^{12}/L (mean 2.8 x 10^{I2}/L).

All patients showed low PCV before dialysis. The range of pre-dialysis PCV was 10 to 36% (mean 22.6%). The decrease was more in case of peritoneal dialysis. After dialysis PCV of 04 patients (6.66%) reached to normal level, who were having little lower level from normal, the increase in PCV was more in cases of haemodialysis. The range of post-dialysis PCV was 11 to 50% (mean 25.6%).

Pre-dialysis sample in II patients (18.13%) showed reticulocytosis. Its incidence was higher in cases of peritoneal dialysis. One patient (1.33%) from haemodialysis group showed reticulopenia. The range of pre-dialysis reticulocyte count was 0.1 to 12% (mean 1.5%). After dialysis II patients (18.3%) showed reticulocytosis. One patient who had normal reticulocyte count became reticulopenia after dialysis. No changes in retie count occur after dialysis. The range of post dialysis reticulocyte count was 0.1 to 10% (mean 1.5%)

The presence of Burr cells and fragmented red cells were the commonest red cells morphological abnormality observed in this study. Burr cells were seen in 24 patients (40%) before and in 16 patients (26.6%) after dialysis. Fragmentation of red cells was present in 31 patients (51.6%) before and in 32 patients (53.3%) after dialysis. The incidence and effects of dialysis on other morphological abnormalities are shown in table.

Table-1: Comparison of The Incidence of Anaemia Before and After Dialysis.

Method	Pre-dialysis		Post-dialysis	
	No.	%	No.	%
Peritoneal dialysis (n=30)	29	96.66	28	93.33
Haemodialysis (n=30)	30	100	28	93.33

Table-2: Effect of Dialysis On the Mean Hemoglobin Concentration and Comparison of the Two Methods

Method	Pre-dialysis		Post-dialysis		P-value
	Mean	SEM	Mean	SEM	
Peritoneal dialysis (n=30)	6.88	0.83	7.49	0.42	<0.01
Haemodialysis (n=30)	8.00	0.27	9.11	0.93	<0.001
P-Value	<0.05		<0.05		

Table-3: Comparison of The Incidence of Low RBC Count Before and After Dialysis.

Method	Pre-dialysis		Post-dialysis	
	No.	%	No.	%
Peritoneal dialysis (IV 30)	28	93.33	28	93.33
Haemodialysis (n=30)	28	93.33	28	93.33

Table-4: Effect of Dialysis on The Mean Red Blood Cell Count and Comparison of the Two Methods

Method	Pre-dialysis		Post-dialysis		P-value
	Mean	SEM	Mean	SEM	
Peritoneal dialysis (n=30)	2.40	0.13	2.62	0.15	<0.05
Haemodialysis (11=30)	2.85	0.10	3.13	0.10	<0.001
P-Value	<0.05		<0.05		

Table-5. Comparison of The Incidence of Low PCV Before and After Dialysis.

Method	Pre-dialysis		Post-dialysis	
	No.	%	No.	%
Peritoneal dialysis (n=30)	30	100	28	93.33
Haemodialysis (n=30)	30	100	28	93.33

Tablc-6. Effect of Dialysis On the Mean Packed Red Cell Volume and Comparison of the Two Methods.

Method	Pre-dialysis		Post dialysis		P-value
	Mean	SEM	Mean	SEM	
Peritoneal dialysis(n=30)	20.90	1.06	22.76	1.23	<0.05
Haemodialysis (n=30)	24.43	0.98	28.46	1.26	<0.001
P-Value	<0.05		<0.01		

Table-7. Comparison of The Incidence Reticulocytosis and Reticulopenia Before and After Dialysis.

Method	Pre-dialysis		Post-dialysis	
	No.	%	No.	%
Peritoneal dialysis (n=30)	8	26.66	8	26.66
Reticulocytosis	0	0.00	1	3.33
Reticulopenia				
Haemodialysis (n=30)	3	10	3	10
Reticulocytosis	1	3.33	0	0.00
Reticulopenia				

Table-8. Effect of Dialysis on The Mean Reticulocyte Count and Comparison of the Two Methods.

Method	Pre-dialysis		Post-dialysis		P-value
	Mean	SEM	Mean	SEM	
Peritoneal dialysis(n=30)	2.07	0.39	1.48	0.37	NS
Haemodialysis(n=30)	1.12	0.12	1.20	0.12	NS
P-Value	<0.05		NS		

Table-9: Red Cell Morphology in Chronic Renal Failure.

Peritonea			dialysis \ Haemodialysis						Total			
	Pre-dialysis		Post-dialysis		Pre-dialysis		Post-dialysis		Pre-dialysis		Post-dialysis	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
	(n=30)				(n=30)				(n=30)			
Fragments	19	63.33	18	60	12	40	14	46.66	31	5 1.66	32	53.33
Burr Cells	18	60	11	36.66	6	20	5	16.66	24	40	16	26.66
Microcytes	6	20	10	33.33	10	33.33	6	20	16	26.66	16	26.66
Elliptocytes	6	20	4	13.33	4	13.33	1	3.33	10	16.66	5	8.33
Crenation	3	10	3	10	3	10	1	3.33	6	10	4	6.66
Spherocytes	1	3.33	1	3.33	1	3.33	1	3.33	2	6.66	2	3.33
Target cells	0	0.00	0	0.00	1	3.33	0	0.00	1	1.66	0	0.00

DISCUSSION

Anemia of variable degree is an almost universal abnormality. This is reflected in a variable degree of cutaneous and conjunctival pallor which is the commonest presenting symptom. Anemia of CRF persists and represents one of the main factors preventing full rehabilitation of patients, despite optimal treatment with dialysis the majority of patients remain significantly anemic.

Low Hb, RBC Count and PCV was found in almost all of the patients and slight improvement in all of these occur after both type of dialysis. Incidence of anemia in our study was similar to that of Hutton and Shea, however the mean Hb in their study was higher (9.33g/dl)[2]. Anemia is mainly normocytic normochromic in type and in 18.3%, of patients associated with reticulocytosis, but Merrill and Hamper's stated that retientlocytes rarely above normal[3] in CRF. Any improvement in erythropoiesis that occur after dialysis is relatively small and it is difficult to correlate this change with any significant increase in the corrected reticulocyte count. Burr cells are the commonest morphologic Red cell abnormality, dialysis in any form has no wholesome effect on this morphologic change and it is therefore likely that an accumulation of a non-dialyzable factor is responsible for the formation of Burr cells. Other morphological abnormalities are also encountered in these patients, but their prevalence and consistency is not significant and is subject to many pre-existing factors.

REFERENCES

1. *Allan J. E. Anemia of chronic renal failure in Williams WJ. Beutle H. Erslev AJ. Lietman MA. Haematology 3rd ed Singapore Me Grow, Hill. 1986; 417-25.*
2. *Hutton R.A. Shea M.IO, Haemostatic mechanism in Uremia. elm Pathol 1968:21 406-11.*
3. *Merrill JP. Hamper's CL. Uraemia Progress in pathophysiology and treatment New Yourk: Grune and Stralton, 1971r 1-47.*
4. *Allan. .1 F. Erythropoietin. N Engl J. Med 1991:324: 1339- 44.*
5. *Eschbach JW. Funl D. Adanson .1. Kuin Scribner BH, finch CA. Erythropoiesis in patients with renal failure undergoing chronic dialysis. N Engl .1 Med 1967; 276:653- 8*
6. *Adamson J.W. Exhbach .1. finch CA, The Kidneand Erythropoiesis, Am .1 Med 1968; 44:725-31*
7. *Yawata Y. Howe R. Jacob IIS. Abnormal red cells metabolism causing haemolysis in uraemia, aim intern Med 1973; 79:362-7.*
8. *Dacie's JV, Lewis SM Practical haematology. 6lh ed. Edinburgh Churchill Livingstone 1984, 1-13.*
9. *Dacie's. IV. Lewis SM. Practical haematology. 6lh ed. Edinburgh Churchill Livingstone 1984; 22-49.*
10. *Dacie's JV, Lewis SM. Practical haematology. 6"' ed Edinburgh: Churchill Livingstone; 1984; 50-61*
11. *Huraib-S, Gader-AM; al-Momen-AK; Abu-Aisha-H; al- Wakeel-J: Memon. N.A. One-year experience of very low' doses of subcutaneous erythropoietin in continuous ambulatory peritoneal dialysis and its effect on haemostasis. Haemostasis. 1995:25(6) 299-304.*