

Red Cell Folate is Better Indicator of Body Stores than Serum Folate in End Stage Renal Disease: A study of 30 patients

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Thirty subjects with end stage renal disease were selected for the study (Group A) with 30 normal healthy subjects as control (Group B). Routine investigations i.e. Hb, platelets and absolute values were done by hematology auto analyzer and specific investigations like serum and red cell folate were done by commercially available kits. Results were analyzed by using students 't' test and level of significance was done. A significant decrease in serum and red cell folate in end stage renal disease patients as compared to control. Hb, PCV and Platelets were also reduced in patients with end stage renal disease.

Key words: Red cell folate, end stage renal disease

In chronic renal failure, there is progressive loss of renal functions and characterized by prolonged symptoms and sign of uraemia¹. Patients of end stage renal disease require dialysis therapy to stay alive, and during dialysis erythropoietin deficiency occurs. Erythropoietin therapy improves the quality of life, reduces the need for red-cell transfusions². Erythropoietin is an acidic single chain polypeptide that has two internal disulfide bonds that are necessary for their biological activity³. Haemodialysis is an extracorporeal procedure, during which movement of solutes such as urea from one compartment (blood) to another (dialysate) across a semipermeable membrane. It helps in removal of dialyzable toxic products and reverses the abnormalities in uraemia^{4,5}. Anaemia is one of the more constant clinical features of renal failure. During the haemodialysis anaemia is exacerbated due to haemolysis because of mechanical and thermal injury and folic acid deficiency⁶. Pathogenetic mechanisms of anaemia development in chronic renal failure patients on dialysis may be due to low level of erythropoietin and development of ineffective erythropoiesis and having a suppressive effect on haemopoiesis⁷. Folic acid is easily removed by dialysis and if not supplemented deficiency occurs which impairs DNA synthesis and result in a megaloblastic erythroid marrow and macrocytic red cells⁸. Haemodialysis patients may develop a water soluble vitamin deficiency which was found to be folic acid, caused by poor intake, interference with absorption by drugs, altered metabolism, and losses in dialysate⁹. Folate concentration is significantly decreased after haemodialysis, so folate supplementation is necessary during haemodialysis¹⁰. In chronic haemodialysis patients total homocysteine levels depend on folate status and folate is significantly lost during haemodialysis and its supplement is necessary to prevent complications¹¹.

The purpose of this study was to measure serum and red cell folate level in ESRD so that we can manage anaemia due to folate deficiency.

Methodology

Sixty subjects were divided into two groups. Group A included 30 patients with end stage renal disease and group B included 30 normal healthy subjects as control. Routine hematological investigations i.e. Hb, platelets and absolute values were done by hematology autoanalyzer and specific investigations like serum and red cell folate were done by commercially available kits¹². Results were analyzed by using students 't' test and level of significance was done¹³.

Results

Results and level of significance of these groups are given in table 1 and 2

Table 1: Routine Hematological investigation in groups A and B

Tests	Group B (Control)	Group A (Patients of ESRD)	B Vs A
Hb	12.5 ± 1.33	11.3 ± 0.64	S
Platelets	295 ± 63.6	231.6 ± 42.5	HS
PCV	40.6 ± 0.91	38.5 ± 1.6	S
MCV	79.8 ± 11.9	81.2 ± 5.5	S
MCH	30.6 ± 0.98	31.2 ± 2.4	NS
MCHC	31.4 ± 1.1	32.4 ± 1.9	NS

Table 2: Special Hematological investigation in groups A and B

Tests	Group B (Control)	Group A (Patients of ESRD)	B Vs A
Serum Folate	10.7 ± 2.9	4.1 ± 1.8	HS
Red Cell Folate	368.5 ± 119.8	110.7 ± 47.9	HS

Discussion:

Routine Haematological Investigations

Hb was found to be lower in patients of ESRD (Group A) when compared with control group (B) and the difference was highly significant ($p < 0.01$). The present study is consistent with the results of Bamonti Catera et al (1999)⁹,

Makoff (1992)⁵ and Aviles et al (2002)¹⁴ who also observed decreased Hb levels in ESRD patients.

PCV was found to be decreased in patients of ESRD when compared with control group (B). The present study is in favour of the results of Bamonti-catena et al (1999)⁹ & Aviles et al (2002)¹⁴ who also found decreased PCV in ESRD patients MCV was found to be raised in patients of ESRD when compared with control group (B). The present study is consistent with the results of Hung et al (2003)¹⁵ & Bamonti-Catena et al (1999)⁹. MCH and MCHC were found to be comparable in these groups & difference was non-significant.

Platelet count was found to be decreased in patients of ESRD (groups A) when compared with control group (B). The present study is in favour of the results of Armada et al (2001)¹⁶ who also observed decreased platelets count in ESRD patients due to release of toxic substances in uremic patients.

Special Investigations:

Serum Folate Level:

Serum folate levels were found to be decreased in patients of end stage renal disease (ESRD) as compared to controls. This decreased serum folate level may be due to toxic effects of uremia, as well as conditioned folate deficiency. This study is consistent with the results of Bamonti-catena et al (1999)⁹, Hung et al (2003)¹⁵ and Labelane et al (2000)¹⁷, who also observed decreased serum folate levels in patients of ESRD .

Red Cell Folate levels :

Red cell folate levels were significantly decreased in patients of end stage renal disease (ESRD) (Group A). This decreased red cell folate level may be due to conditioning folate deficiency and toxic effects of uremia. The present results are consistent with the study of Schaefer et al (2002)¹⁸, Bamonti-Catena et al (1999)⁹ and Hung et al (2003)¹⁵ who also observed decreased red cell folate levels in ESRD patients.

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