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INSIGHTS INTO ANEMIA AMONG HEMODIALYSIS PATIENTS FROM KERALA'S EASTERN HIGHLANDS: A SINGLE CENTER INVESTIGATION

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ABSTRACT

Anemia is one of the most common complications of CKD. The prevalence and severity of anemia increases with advancing stages of CKD. In this study we analyzed the profile of anemia in patients undergoing maintenance hemodialysis at our centre. ESKD patients undergoing maintenance hemodialysis at Holy Family Hospital, Thodupuzha were included in the study. Total of 143 Chronic Kidney Disease Stage 5D patients were enrolled for the study. All the patients were on Thrice weekly Inj. Erythropoitin 4000 units given subcutaneously. All patients were receiving monthly IV iron depending ontheir Iron status. Hemoglobin of less than 13 gm/dl in males and less than 12 gm/dl in females was considered as anemia. Anemia was further classified as Mild, Moderate and Severe based on Hb levels. Mild anemia: Hb between 9gms to 11gms, Moderate anemia: 7gms to 9gms and Severe anemia: less than 7gms. Iron deficiency was defined by S. Ferritin <100 ng/ml and TSAT < 20%. Anemia was seen in 101 (70.6%) patients. Mild anemia was seen in 28 (19.5%) patients, moderate anemia was seen in 58 (40.6%) patients and severe anemia was seen in 15 (10.4%) patients. Among all the patients on Twice weekly HD, 95.5% patients were having anemia, while 57.8 % of patients on thrice weekly MHD were anemic. Iron deficiency was seen in 23 of 101 patients with anemia i.e. 22.77%. Functional Iron deficiency was seen in 29 of 101 patients i.e. 28.7%. (Hb:Hemoglobin, CKD:Chronic Kidney Disease, ESKD: End Stage Kidney Disease).

KEYWORDS: Anemia, Hb, CKD, ESKD, Hemodialysis.

INTRODUCTION

Chronic Kidney Disease (CKD) is a leading global public health challenge with an estimated prevalence of 13.4% (11.7% to 15.1%) world wide.^[1] The global estimated prevalence of End Stage Kidney Disease (ESKD) patients needing renal replacement therapy are between 4.901 and 7.083 million.^[1]

Anemia is one of the most common complications of CKD. The incidence of anemiaincreases with advancing stages of CKD and it is estimated that approximately 95% patients on maintenance hemodialysis in the US receive treatment for anemia.^[2] In spite of the advances in its treatment, anemia is still universally seen in CKD Stage 5D patients and it contribute to increase in morbidity, mortality and health care costs in dialysis patients.

MATERIALS AND METHODS

ESKD patients undergoing maintenance hemodialysis at Holy Family Hospital, Thodupuzha were included in the study. Patients with ESKD, irrespective of its etiology were included in the study. Patients less than 18 years and those with co- existing hematological disorders were excluded from study. Total of 143 Chronic Kidney

Disease Stage 5D patients were enrolled for the study. All the patients were undergoing Hemodialysis, of which 95 patients were undergoing thrice weeklyhemodialysis while 48 patients were on twice weekly hemodialysis. All the patients were on Thrice weekly Inj. Erythropoitin 4000 units given subcutaneously. All patients were receiving monthly IV iron depending on their Iron status. Detailed history was taken and physical examination was done. Monthly CBC was done and 3 months average Hb was taken. Iron Studies were done once in 3 months. Hemoglobin of less than 13 gm/dl in males and less than 12 gm/dl in females was considered as anemia. Anemia was further classified as Mild, Moderate and Severe based on Hb levels. Mild anemia: Hb between 9gms to 11gms, Moderate anemia: 7gms to 9gms and Severe anemia: less than 7gms. Iron deficiency was defined by S.Ferritin <100 ng/ml and TSAT < 20%.

RESULTS

109 patients were males and 34 were females.

Anemia was seen in 101 (70.6%) patients. Anemia was seen in 72 male patients and 29 female patients (Figure: 1). Mild anemia was seen in 28 (19.5%) patients, moderate anemia was seen in 58 (40.6%) patients and

Research Article ISSN 2394-3211 EJPMR severe anemia was seen in 15 (10.4%) patients.

Anemia was more common and more severe in patients undergoing Twice weekly Hemodialysis (Figure: 2). Among all the patients on Twice weekly HD, 95.5% patients were having anemia, while 57.8 % of patients on thrice weekly MHD were anemic. 11 patients in the twice weekly group i.e. 22.91% patients had severe anemia, while this was just 4.2% (4/95) in patients on thrice weekly MHD.

Iron deficiency was seen in 23 of 101 patients with anemia i.e. 22.77%. Functional Iron deficiency was seen in 29 of 101 patients i.e. 28.7% (Table: 1).









Table 1.

Severity of anemia	Iron deficiney anemia	Functional Iron deficiney anemia	Unknown cause
Severe	26.6% (4/15)	46.6% (7/15)	26.6% (4/15)
Moderate	22.8% (13/58)	36.2% (21/58)	41.37 % (24/58)
Mild	21.42% (6/28)	3.57 % (1/28)	75% (21/28)

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DISCUSSION

Anemia of CKD begins to manifest when eGFR falls below 60ml/min/1.73m and its severity increased with advancing CKD.^[2,3] The National Health and Nutrition Examination Survey (NHANES) analysis showed that the prevalence of anemiawas 17.4%, 50.3% and 53.4% in CKD Stage 3, 4 and 5 respectively.^[4] India has the highest prevalence of anemia globally, which increases from 66.6% at stage 3 to 94.7% at stage 5.^[5]

Multiple factors contribute to the development of anemia in CKD. The most important and primary factor is the deficient production of Erythropoietin (EPO) by the damaged kidneys.^[6] Other important factors contributing to development of Anemia in CKD include nutritional deficiencies (Iron, folic acid or vitamin B12), increased blood loss, systemic and chronic inflammatory state, hyperparathyroidism, and shortened lifespan of RBCs.^[7]

In our study, Iron deficiency is found to be one of the most common causes of EPO resistant anemia. Chronic Kidney Disease patients are at high risk of developing iron deficiency due to multiple factors including decreased dietary intake, decreased gastrointestinal absorption, iron loss during hemodialysis, and inflammation.^[8] The approximate iron loss in patients on hemodialysis is around 1g to 2g/year (approximately 100 to 200 mg monthly) and can be as high as 4g to 5g in some patients.^[9,10] Several well-designed trials have demonstrated that patients require a lower ESA dose and maintain a higher Hb when maintenance iron therapy is given.^[11,12] Our patients were on IV iron supplementation based on their Iron status, still Iron Deficiency was seen in 22.77% patients.

In our study 28.7% patients had features of functional iron deficiency i.e. adequate iron stores as marked by increased ferritin and low transferrin saturation. Functional iron deficiency occurs when iron stores are adequate, but the mobilization of iron is inefficient for erythropoiesis. In this condition, normal serum ferritin (>100ng/ml) and, TSAT less than 20% are observed. CKD is a state of chronic Inflammation and this inflammatory state is considered to be a contributing factor in the development of anemia. Hepcidin is upregulated in inflammation and it down regulates ferroportin. Down regulation of ferroportin leads to decreased iron absorption and decreased release of iron in to the plasma.^[13]

Probably the most important observation from our study is the relationship of anemia with the frequency of dialysis. 95.5% patients on twice weekly HD were anemic while only 57.8% of patients on thrice weekly HD were anemic. A similar trend can be seen in severity of anemia also. Severe anemia was seen in 22.9% patients on twice weekly HD and 4.2% patients on thrice weekly HD.

Previous studies on the impact of frequency of HD

treatments on Hb levels and ESA dose have shown inconsistent results.^[14,15,16] More frequent HD might reduce ESA requirements by improving the uremic environment, reducing inflammation and thereby lowering ESA resistance.^[16] Red blood cell survival might increase towards normal when the uremic toxin concentrations are lowered by more frequent HD, or survival might decrease when more frequent HD treatments damage red blood cells in the extracorporeal circuit.^[16] Blood loss due to residual blood remaining in the dialyzer at the end of each treatment might increase overall blood loss with more frequent treatments.^[16]

The prevalence of CKD and number of patients on dialysis is increasing in Kerala as well. Anemia is universally seen in ESKD patients in our part of the world also. Limited data is available regarding the prevalence and the patterns of anemia in ESKD patients from high ranges of Kerala. Ours is probably the first attempt for evaluating the profile of anemia in CKD in this part of Kerala. In a resource limited setting like this, many of the patients opt for twice weekly hemodialysis due to logistic and financial constraints. Periodic evaluation of Iron parameters and providing adequate dialysis may be of utmost importance in the treatment of anemia of CKD.

Our study had certain limitations also. First, our sample size was small and because of the pattern of study, a causal association between frequency of dialysis and anemia could not be confirmed. Second, more detailed investigations like Peripheral smear, Vitamin B12, and Folic acid were not tested.

CONCLUSION

Iron deficiency anemia is common among individuals with end-stage renal disease on maintenance hemodialysis, and hence regular monitoring of Iron studies should be performed. Providing adequate dialysis by probably ensuring thrice weekly dialysis in all patients may also help in management of anemia of ESKD.

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