

# Management of Anemia among Chronic Hemodialysis Patients: Monocentric Study of Morocco

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**Abstract:** One of the most common complications associated with chronic renal failure is anemia, which can lead to clinical disturbances and may also potentiate other underlying cardiac complications, such as left ventricular hypertrophy and arrhythmia. The purpose of this work is to report the means of anemia management for chronic hemodialysis patients in the Nephrology and Dialysis department of the Rabat Military Hospital of Morocco. **Methods:** This was a single-center retrospective study conducted in the Department of Renal Dialysis and Renal Transplantation at the Mohammed V Military Training Hospital in Rabat from March 1, 2017 to March 1, 2018 for all our chronic hemodialysis patients. **Results:** During the study period, records of 40 chronic hemodialysis patients were analyzed. The mean age of the patients was 50 years  $\pm$  16.55 years with extremes ranging from 20 to 85 years, sex ratio (m / f) was 1.1. Average seniority in hemodialysis was 60 months. 89% of the included patients received treatment with subcutaneous erythropoiesis stimulating agents. Correction of iron deficiency was performed in 42% of patients with injectable iron. **Conclusion:** The management of anemia is based essentially on the prescription of stimulating agents erythropoiesis thus avoiding transfusions and overloads martial.

**Keywords:** anemia, chronic kidney disease, hemodialysis, erythropoiesis stimulating agents

## 1. Introduction

Anemia is a common complication of chronic kidney disease (CKD). It is associated with adverse clinical outcomes and poor health-related quality of life.

The high authority of health defines anemia for the first time in 1968 as hemoglobin (Hb) less than 12g / dl in women or less than 13g / dl in men [1]. Anemia in CKD is multifactorial, due to erythropoietin deficiency, uremia-induced erythropoiesis inhibition, decreased red cell lifespan, and an imbalance in iron homeostasis. Initially, the only way to correct anemia was through repeated transfusions. But for about twenty years, erythropoiesis stimulating agents (ESAs) have improved the management of anemia and its symptoms, and reduced the number of transfusions in patients with chronic renal failure, while contributing to the improvement of the quality of life of patients [2].

Hemodialysis patients frequently have a real iron deficit due to blood loss in the hemodialysis circuits, numerous blood tests and intestinal absorption of iron which is also disrupted by several treatments often administered in case of hemodialysis (proton pump inhibitors, phosphate chelators[3].

This study was conducted in a cohort of 40 Moroccan hemodialysis in our department over a period of 12 months to evaluate the means of therapeutic management of anemia in our chronic hemodialysis.

## 2. Patients and Methods

This was a retrospective single-center study conducted in the renal dialysis and renal transplant department of the Mohammed V military training hospital in Rabat from

March 1, 2017 to March 1, 2018 for all chronic hemodialysis patients. Inclusion criteria were: adult dialysis patients (over 18 years of age), chronic hemodialysis for more than one year, dialysis at 3 sessions per week, 4 hours each, using an arterio venous fistula.

At least monthly patients had a blood count and a martial assessment (serum iron, ferritinemia, saturation coefficient of transferrin) and an inflammatory and phosphocalcic balance.

The study excluded chronic hemodialysis patients with intercurrent hemorrhagic events during the study year (active digestive bleeding, persistent inflammatory biologic syndrome, arteriovenous fistula or postoperative fistula).

We determinate for all patients who complied with the inclusion criteria : age, gender, causal nephropathy, hemodialysis parameters (sitting time, number of sessions, duration of dialysis, quality of vascular access, dose dialysis (Kt / v), dry weight in dialysis); the use of erythropoiesis stimulating agents, the concept of blood transfusions and its frequency.

Biological parameters were specified: elements of the blood count (NFS), iron status (ferritin and transferrin saturation factor (CST)), C-reactive protein (CRP) and phosphocalcic balance (calcium, phosphorus and parathyroid hormone).

We selected the following thresholds for our patients: as anemia, Hb levels below 11g / dl, normal if the Hb level is between 11-13g / dl and high if the Hb > 13g / dl; for CSE: normal value if between 20-40%; high if the CST > 40% and low if the CST < 20%; for ferritin: normal if value between 100-500ng/ml, high if the value > 500ng/ml, and low if the value is < 100ng / ml.

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The statistical study was carried out by SPSS software 13.0 (Statistical Package for the Social Sciences).

### 3. Results

During the study period, records of 40 chronic hemodialysis patients were analyzed. The mean age of the patients was 50 years  $\pm$  16.55 years with extremes ranging from 24 to 85 years, The sex ratio (H / F) was 1.1. The average seniority in hemodialysis was 60 months.

The initial nephropathy was unknown in 48% of cases, glomerular in 21% of cases, interstitial tubulo in 12.8%, diabetic in 10.25% of cases and vascular in 8% of cases.

89% of the included patients received treatment with erythropoiesis stimulating agents.

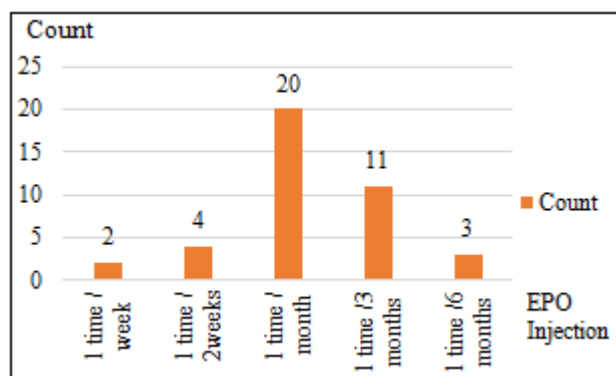


Figure 1: EPO administration

Correction of iron deficiency was performed in 25% of patients with injectable iron and we adopted an average use of intravenous iron for in-center hemodialysis patients at 100–200 mg/month.

The average Hb rate of the patients was within the range 10 g/dl  $\pm$  1.9. The respective averages of ferritin and CST were within the range 980ng/l  $\pm$  330.52 (range 41.5 to 1302) and 23.16%  $\pm$  19.12 (range 16.30 to 88.30).

Chronic inflammatory syndrome was found in 18.2%, and hyperparathyroidism in 36% of patients.

The use of blood transfusion was necessary in 3 patients (1 patient for digestive bleeding on gastric angiodysplasias and 2 patients followed for a viral hepatitis C positive).

### 4. Discussion

Classically advanced causes of anemia in CKD are erythropoietin (EPO) deficiency, decreased life span of erythrocytes, inhibition of erythropoiesis by uremic toxins and martial deficiency. The efficacy of recombinant human EPO in correcting CKD anemia suggests that EPO deficiency is the main mechanism of this anemia. However, there is also resistance to EPO [4]. In our study, all patients had a positive response to EPO (100%).

The existence of an inflammatory syndrome in CKD patients has been clearly associated with a decrease in hemoglobin levels [5].

The direct toxic effect of parathyroid hormone (PTH) on erythroid stem cells and the indirect effect by bone marrow fibrosis has been reported in many publications. Studies of these mechanisms have yielded disparate findings, indicating that the role hyperparathyroidism in CKD anemia is relatively minor compared to other factors such as iron deficiency and inflammation [6].

Iron deficiency is present in 25 to 37.5% of chronic renal failure patients with anemia. It is due to an increased use of iron in erythropoiesis which can quickly deplete the martial stock, further reduced by digestive malabsorption, occult digestive bleeding, or by blood loss during dialysis. What makes the need for iron supplementation necessary in this population [7,8], it was found in 25% of our patients.

Under dialysis is a cause of resistance to EPO; an optimal dialysis dose was observed in all our patients (standardized dialysis dose or Kt / v > 1.4).

The dose of erythropoiesis stimulating agents (ESAs) was adjusted according to the evolution of hemoglobinemia under treatment. During the initial phase of correction, the ESAs was administered once a week with close monitoring of the NFS, and during the maintenance phase and once the hemoglobin is stabilized, the ESAs is administered every month or every 3 months.

The availability of erythropoietin alpha for the presence of medical insurance in our military patients has made it possible to permanently and effectively correct anemia in association with the correction of the factors of resistance to the EPO. On the other hand, in some studies, exorbitant costs of ESAs limit their use outside any insurance system [9] and would therefore lead to the frequent use of iterative blood transfusions and repeated iron supplementation.

The interest of this work is to show the importance of anemia management of the IRCT is to recall the importance of correcting other causes of anemia, and to seek and treat the possible factors of resistance to ESAs action, before its possible prescription. Moreover, the effectiveness of such therapy can be obtained only through the respect of recommended regimens of prescription and follow-up. In addition, special attention is paid to other factors involved in chronic hemodialysis anemia and to factors of resistance to erythropoietin, especially as it is a high-cost therapy.

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### 5. Conclusion

Treatment of anemia in CKD before the advent of ESAs relied on routine blood transfusions, the interest of this work is to demonstrate the importance of treatment anemia in Moroccan hemodialysis with ASEs and to seek and treat the

possible factors of resistance to ESAs action, before its possible prescription. The effectiveness of such therapy can be obtained only through the respect of recommended regimens of prescription and follow-up.

## 6. Disclosure

The authors report no conflicts of interest in this work.

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