

RELATIVE RETICULOCYTOPENIA, ERYTHROPOIETIN, AND KIDNEY FUNCTION IN PATIENTS WITH SICKLE CELL DISEASE.

Background:

The two key features of SCD are chronic hemolytic anemia and vaso-occlusion. Elevated reticulocyte counts are necessary to maintain stable hemoglobin levels. Inappropriately low reticulocyte levels could result from the decreased capacity of the bone marrow vs. decreased stimulation by erythropoietin. Relative reticulocytopenia (RR) has been defined by the Multi-Center Study of Hydroxyurea Follow-Up Study (MSH-FU) as reticulocytes $<250 \times 10^9/L$ despite hemoglobin $<9g/dl$. As previously reported in patients with SCD erythropoietin levels are elevated, but they are lower than expected for a healthy patient with chronic anemia.

Objective:

Investigate relationship between markers of kidney function, erythropoietin levels, and RR in patients with SCD. We hypothesize that patients with measured kidney damage will have RR due to decrease in erythropoietin levels and patients on disease modifying therapy (hydroxyurea) will have better reticulocyte responses.

Methods:

Data collected through retrospective chart review of patients with SCD disease followed at St. Christopher's Hospital, Philadelphia. Using EMR, we selected 100 patients who met inclusion criteria. Patients in the study had the diagnosis of Hb SS and Sbeta0. They had available laboratory parameters including CBC, reticulocyte count, kidney function and erythropoietin levels. To evaluate kidney function we used creatinine, cystatin C, GFR calculated based on cystatin C, urine microalbumin/creatinine ratio, and proteinuria. Patients were excluded if they were on chronic PRBC transfusion, had underlying kidney disease, or if labs were obtained during a disease exacerbation. A series of contingency tables with Spearman correlation and ANOVA tests were used to analyze the data.

Results:

One hundred patients were included in the study, with ages ranging from 1-28 years, mean age of 11.8 years, 47 females, and 53 males. Ninety-one patients had Hb SS disease and 9 Hb S beta0 thalassemia. Twenty-eight patients had RR. Using nonparametric correlations in patients with RR, erythropoietin levels were significantly negatively correlated with urine creatinine ($r = -0.621$, $p = 0.003$) and significantly positively correlated with GFR ($r = 0.420$, $p = 0.037$), although showed no significant correlations with cystatin C. A significant negative correlation was seen between erythropoietin and hemoglobin as well as between erythropoietin and age in both the RR and no RR groups (not seen with platelet $p = 0.065$ in no RR group). Patients on hydroxyurea had higher erythropoietin levels.

Conclusion:

In patients with SCD who have RR, erythropoietin levels inversely correlate with markers of kidney damage and directly correlate with GFR. Erythropoietin levels were inversely correlated with Hgb in both the RR and no RR groups.