Original Article ISSN (O):2395-2822; ISSN (P):2395-2814

Prevalence of Iron Deficiency Anemia in Patients with Chronic Heart Failure.

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Received: December 2017
Accepted: December 2017

ABSTRACT

Background: Introduction: Anemia is a frequent comorbidity of heart failure and is associated with poor outcomes. Anemia in heart failure is considered to develop due to a complex interaction of iron deficiency, kidney disease, and cytokine production, although micronutrient insufficiency and blood loss may contribute. Aim: To study the prevalence anemia in patients with chronic heart failure. **Methods:** In this prospective study, chronic heart failure patients were evaluated for anemia. Investigations included are complete blood count, peripheral smear, renal function test, ESR, CRP, serum ferritin and total iron binding capacity. **Results:** In our population, the prevalence of anemia was 38% of patients, and Iron deficiency anemia was detected in 11 out of 103 patients (11%). The prevalence of anemia of chronic disease was 27 out of 103 patients (26%), and the remaining patients (64%) had normal hemoglobin levels. **Conclusion:** Early diagnosis and treatment of anemia can improve Ejection Fraction in patients with CHF.

Keywords: Anemia; Cardiac failure; Iron deficiency

INTRODUCTION

Chronic heart failure (CHF) is frequently viewed as a multi-system disease which, exceeding the impairment of cardiac function, also affects the functional ability of other organs such as the kidneys and skeletal muscle. Anaemia and chronic kidney disease (CKD) are the common prevalent comorbidities in CHF, and they both confer an independent worse prognosis.[1] The diagnosis and treatment of these comorbidities by cardiologists will most likely rise over the years as mechanisms irrelevant to hemodynamic dysfunction, such as inadequate tissue oxygen supply and reduced oxygen use by the skeletal muscle, may underlie impaired exercise tolerance.[2] Estimates of the prevalence of anemia in patients with CHF and low ejection fraction range widely from 4% to 61% (median 18%).[3-6] Variability in estimated prevalence is partly attributable to use of inconsistent definitions of anemia in individual reports. The World Health Organization definition of anemia (hemoglobin concentration <13.0 g/dL in men and <12.0 g/dL in women) takes into account known gender difference in the distribution of hemoglobin values,[7] whereas the National Kidney Foundation defines anemia as hemoglobin ≤12 g/dL in men and postmenopausal women.[8] Anaemia in CHF can be the result of reduced glomerular filtration rate, reduced plasma flow, impaired erythropoietin (EPO) production, and haemodilution.[9] In up to 53% of out-patients with anemia and CHF due to systolic dysfunction, some haematinic deficiency can be found, although up to 27% of patients with CHF and without anemia can also have a haematinic deficiency.[1] In another study of 148 patients with anemia and CHF, most patients (57%) presented anemia of chronic disease, which was shown by an inadequate generation of EPO relative to the degree of anemia and a defective iron supply for erythropoiesis. Both these findings seem to be associated with elevated levels of inflammatory cytokines.[10]

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Aim

To study the prevalence anemia in patients with chronic heart failure.

MATERIALS AND METHODS

This prospective study was conducted in Department of Medicine at Tertiary care hospital. All cases of chronic heart failure of age 45 to 64 years were evaluated for anemia. Informed consent will be obtained for taking part in this study. Patient demographic information, medical history including

diagnosis of CHF will be obtained from the patient medical records using predesigned data collection forms. Investigations included are complete blood count, peripheral smear, renal function test, ESR, CRP, serum ferritin and total iron binding capacity.

RESULTS

We followed 103 patients that were referred for treatment of underlying heart failure. Mean patient age was 66.8 ± 9.3 years with an age range of 35 years to 90 years. Our study population consisted of 36% women and 64% men. Of the 106 patients, 69 patients (67%) had a history of myocardial infarction and 62 patients (60%) had a history of hypertension. Dilated cardiomyopathy, was the underlying cause of heart failure in 5 patients (4.5%), while valvular disease was the underlying cause in 1 patients (1%). The average hemoglobin level in patients at evaluation was 12.17 ± 1.82 mg/dl with a range of 8.5 to 17.6 mg/dl. The average ejection fraction at evaluation was 48.6 ± 5.73 with a range of 10%-36%. The average urea level was 45.13 ± 27.68 mg/dl and the average creatinine level was 1.24 ± 0.7 mg/dl. In our population, the prevalence of anemia was 38% of patients, and Iron deficiency anemia was detected in 11 out of 103 patients (11%). The prevalence of anemia of chronic disease was 27 out of 103 patients (26%), and the remaining patients (64%) had normal hemoglobin levels. We found that the prevalence of anemia increased with age until a patient reached age 72. The correlation between the increase in the frequency of anemia and an increase in age was caused most often by anemia of chronic disease. Conversely, Iron deficiency anemia prevalence decreased as age increased. Patients with anemia of chronic disease had the highest rate of mortality (23%), and patients with normal hemoglobin levels had the lowest mortality rate (4%).

Table 1: Distribution of Anemia.

Type of anemia	Number of patients	EF	Hb Level	TIBC	Ferritin
Iron deficiency anemia	11	42.63 ±9.56	9.56 ± 0.89	466.47 ±155.97	88 ± 139.72
Anemia of chronic disease	27	40.19 ±8.45	10.58 ±0.99	200.16 ±117.75	296.67 ±123.60

DISCUSSION

Decreased hemoglobin in patients with CHF has repeatedly been shown to be independently connected with increased risk of hospitalization and all-cause mortality.[11-15] These findings in a different array of CHF populations are remarkably concordant and commonly, suggest a linear association between decreased hemoglobin and increased mortality risk. In studies that analyzed hemoglobin as a continuous variable, a 1-g/dL decrease in hemoglobin was independently correlated with significantly increased mortality risk. The potential mechanisms associating anemia to increased mortality risk in CHF have not been described but may be related to changes in ventricular filling conditions and cardiac structure, altered neurohormonal activation, or decreased free radical scavenging capacity. It is also possible that anemia is a marker of more severe underlying myocardial disease. Anemia occurs when there is a deficiency in new erythrocyte production relative to the rate of removal of aged erythrocytes. Erythropoietin, a 30.4 -kDa glycoprotein growth factor generated primarily by kidney, is the crucial ingredient of the homeostatic system for regulation of red blood cell mass and tissue oxygen delivery.[16-19] Erythropoietin prevents the programmed cell death of erythrocyte progenitor cells and thereby stimulates their proliferation, maturation, and terminal differentiation.[18] Any irregularity that reduces renal secretion of or bone marrow response to erythropoietin may end in anemia. Iron deficiency is present in <30% of anemic patients with CHF, so the preponderance of observed anemia is normocytic, often classified as anemia of chronic disease. The clinical utility of blood transfusion in anemic cardiovascular disease populations is controversial. According to the guidelines from the American College of Physicians and the American Society of Anesthesiology, the "transfusion threshold" for patients without known risk factors for cardiac disease is a hemoglobin level in the range of 6 to 8 g/dL.[20] In 78 974 old patients hospitalized with acute myocardial infarction, blood transfusion was associated with a significantly lower 30-day mortality rate among patients with a hematocrit ≤30% on admission.[21] Blood transfusion may be associated with other adverse effects including immunosuppression with an increased risk of infection, sensitization to HLA antigens, and iron overload.[22,23] Given this profile of risks and benefits, transfusion may be considered as an acute treatment for severe anemia on an individualized basis but does not appear to be a viable therapeutic strategy for the long-term management of chronic anemia in CHF.

CONCLUSION

In our population, the prevalence of anemia was 38% of patients, and Iron deficiency anemia was identified in 11 out of 103 patients (11%). The prevalence of anemia of chronic disease was 27 out of 103 patients (26%), and the remaining patients (64%) had normal hemoglobin levels. Although the mechanisms associated with the development of anemia in heart failure are complicated, some of which remain to be scientifically proven, the weight of data implies that it is likely due to a complicated

interaction of underlying iron deficiency, defective epoetin production, epoetin resistance, and activation of the renin-angiotensin-aldosterone system, along with the presence of underlying chronic kidney disease and activation of proinflammatory cytokines.

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How to cite this article: Ilango C, Kumar PA, Anandan H. Prevalence of Iron Deficiency Anemia in Patients with Chronic Heart Failure. Ann. Int. Med. Den. Res. 2018; 4(2):ME01-ME03.

Source of Support: Nil, **Conflict of Interest:** None declared