ORIGINAL ARTICLE

FREQUENCY OF ANAEMIA AND RENAL INSUFFICIENCY IN PATIENTS WITH HEART FAILURE

Muhammad Khan, Waqas Jehangir, Muhammad Salman Daood, Ahmad Khan, Nadeem Hayat Mallick

Punjab Institute of Cardiology, Lahore, Pakistan

Background: Heart Failure (HF) is a common disease with a high mortality rate. Anaemia and renal failure (RF) are often present in patients with HF and associated with worse prognosis. Objective of study was to evaluate the prevalence of anaemia and RF in patients with HF. **Methods**: Patients admitted in Punjab institute of cardiology Lahore with diagnosis of heart failure were enrolled from February, 2008 to December, 2008. Anaemia was defined as haemoglobin levels <13 mg/dl for men and 12 mg/dl for women. Renal function was assessed by the glomerular filtration rate (GFR), calculated by the simplified formula of the MDRD (Modification of Diet in Renal Disease) study. **Results**: Of the 276 patients included in this study, 42.03% (116) had anaemia and 38.40% (106) had moderate to severe renal failure (GFR <60 ml/min). **Conclusion:** The prevalence of anaemia and renal failure was high in this population and was associated with the severity of the HF (functional classes III and IV).

Keywords: Heart failure, anaemia, renal insufficiency

INTRODUCTION

Heart failure (HF) is a frequent clinical condition and is associated with high morbidity and mortality.[1] Anaemia is a frequent complication of chronic kidney disease (CKD) and is primarily due to failure of erythropoietin production to respond to decreased haemoglobin concentration The onset of anaemia during the progression of CKD is variable, but it is common after serum creatinine reaches 1.5 mg/dl and increases in prevalence with decreasing creatinine clearance. CKD and anaemia are independent risk factors for mortality among patients with heart failure due to left ventricular dysfunction. Anaemia and renal in-sufficiency (RI) are frequent comorbidities found in patients with HF and are associated with higher severity of heart disease and worse prognoses.[2,3]

Out of total 276 HF patients included in this study, 106 (38.40%) patients had anaemia and 116 (42.03%) patients had moderate to severe RI.

These conditions are patho-physiologically interconnected, forming the Cardiorenal Syndrome (CRS), whereby each component (anaemia, RI and HF) is capable of causing or overstimulating the other, resulting in a vicious cycle.[4–6] The aim of this study is to describe the prevalence and evaluate the association between anaemia and RI in patients with HF admitted in Punjab Institute of Cardiology Lahore.

MATERIAL AND METHODS

This was a cross-sectional study in patients admitted at Punjab institute of cardiology Lahore. Patients admitted with diagnosis of heart failure from February 2008 to December 2008 were included in this study. Informed consent was obtained before participation from all patients as well as approval of ethical committee of hospital was taken before starting study.

HF was diagnosed by the attending physician, using clinical data and clinical examination. Renal function was evaluated through the estimated glomerular filtration rate (GRF) calculated by the Modification of Diet in Renal Disease (MDRD) simplified equation [GRF (ml/min/1.73 m^2)=186× (Serum Creatinine)$^{-1.154}$ ×year of age$^{-0.203}$ ×(0.742 if woman). Statistical analyses were performed using SPSS-11. Categorical data were presented as percentages. Continuous variables were expressed as mean and standard deviation.

RESULTS

Two hundred and seventy-six patients consecutively admitted in the hospital during the period were included in this study. Clinical and demographic characteristics of this population are summarised in Table-1. Two hundred and twenty-two 80.43% of total heart failure population have either renal insufficiency or anaemia. Further analysis of the patients showed that 116 (42.03%) had anaemia and 106 (38.40%) had moderate to severe renal failure (GFR <60 ml/min).

Table-1: Clinical and demographic features of patients included in study (n=276)

Characteristics	n (%)
Male	155 (56.16)
Mean Age in years	54.4
Hypertension	108 (39.13)
Diabetes mellitus	105 (38.04)
ACE-I use	130 (47.1)
ARB use	9 (3.26)
Diuretics use	21 (7.61)
NYHA class I	80 (28.99)
NYHA class II	72 (26.08)
NYHA class III	55 (19.93)
NYHA class IV	69 (25.00)

DISCUSSION

The prevalence of anaemia and RI In previous studies varied from 40% to 69.7%, depending on diagnostic criteria used and study population.[8,9] Characteristics of the studied population are important factors as many studies reveal a higher prevalence in older patients and in those with NYHA functional class IV.[2,8] Silverberg *et al,* found that patients with functional class IV (NYHA) were more affected by anaemia, 79.1% versus 9.1% in patients with FC I.[6] In non-hospitalised patients this prevalence varies from 4% to 23% and is usually associated with chronic renal failure, advanced age and more severe symptoms.[9,11]

Many studies have associated anaemia to adverse clinical events in patients with HF.[2,8,12,13] Sales *et al* observed 16.8% mortality in patients with anaemia *versus* 8% in patients without anemia.[2] Anand *et al* found 28% and 16% mortality in anaemic and non-anaemic patients, respectively, with hospitalisation rates of 56% and 33%, during a mean follow-up period of 12 months.[11] Each 1 g/dl of higher serum haemoglobin is associated with a reduction of 15.8% and 14.2% in risk of death and hospitalisation, respectively.[11] This influence does not depend on the type of HF according to the systolic function (preserved *vs.* deteriorated).[13,14] However, the link between anaemia, HF and events is not clear, because anaemia may only be a marker of increasing severity of HF or merely yet another co morbidity, giving patients a poor prognosis.[15]

In our study out of 276 patients, 42.03% had anaemia and 38.40% had moderate to severe renal failure (GFR <60 ml/min). Only 54 of patients (19.56%) evaluated had normal renal function. Chronic RI is common co morbidity in HF patients; it is associated with the disease severity, poorer prognosis and higher prevalence of anaemia. Almost 40% of patients with HF have RI and more than 64% of those who go to nephrologists with kidney failure have HF, most of them with anemia.[10,16] Heart disease is a major problem in chronic kidney failure patients, being the cause of death in 43.6% of cases.[17] For O'Meara *et al*[12], more than 50% of patients with HF and anaemia have GFR below 60 ml/min compared to only 30% of those without anaemia. Research shows that RI is an independent risk factor of mortality and hospitalization in patients with HF.[3]

Renal function must be accurately assessed using equations that estimate GFR from serum creatinine. International guidelines suggest the use of two formulas: Cockcroft-Gault or the simplified MDRD equation.[7] The use of serum creatinine as an isolated parameter to evaluate renal function is not recommended due to its low sensitivity in the early stages of RI. Direct measurement of GFR through creatinine clearance would be the ideal method, although it is not superior to estimated GFR due to frequent errors in the 24-hour urine collection and daily variations in creatinine secretion, which is why this method is not routinely used.

The association of HF, anaemia and CRF is responsible for faster progression of cardiac and renal diseases. Currently, mechanisms that lead to anaemia in patients with HF are being studied to find treatments that can correct this complication and improve prognosis of these patients. Malnutrition, malabsorption and chronic gastrointestinal bleeding are common causes of anaemia in HF patients, accounting for about 1/3 of the cases.[18] Excluding these situations, the mechanism involved in the development of anaemia is generally related to deficient erythropoietin production.[19] Reduced haemoglobin concentration, in these cases, can also be caused by haemodilution resulting from the activation of the renin-angiotensin-aldosterone system (RAAS), which worsens prognosis.[20,21]

Erythropoietin produced by renal cells is the main regulator of red blood cells formation and deficient production is the main cause of anaemia associated with isolated RI or in patients with concomitant HF and RI.[18] Anaemia in patients with CRS can be explained mainly by hypervolemia and haemodilution and by changes in the pathways of erythropoiesis, either in production or effect of erythropoietin or changes in iron metabolism, both caused by the presence of pro-inflammatory cytokines.

Studies in literature have evaluated the impact of anaemia correction on the prognosis of patients with HF. Some authors have suggested that treatment with erythropoietin analogues and intravenous iron can improve LVEF, FC and RI in patients with HF and anaemia, as well as decrease hospitalization rates and improve quality of life.[10,22,23] Published studies, however, are limited by sample size, and there is no consensus regarding the need for aggressive treatment of anaemia in HF patients, especially in those with mild anaemia and without RI.[15] In patients with moderate-to-severe anaemia and concomitant RI, treatment with erythropoietin and iron supplements is recommended to keep Hb greater than 12.0 g/dL.[9] It is important that all patients be evaluated for potentially reversible causes of anaemia, such as iron deficiency and occult blood loss, and receives adequate treatment. Silverberg *et al.* showed that anaemia is still poorly investigated, recognised, and treated by cardiologists in the follow-up of non-hospitalized HF patients. These authors advocate cooperation between cardiologists and nephrologists to improve this data.[19]

The results of the present study must be considered within the context of certain limitations. At

the time of data collection, other associated conditions that could possibly alter the levels of Hb and creatinine, such as sickle cell anaemia, malnutrition, intestinal parasitic infections GI bleed or obstructive uropathy, were not considered. We did find, however, a frequency of anaemia and RI similar to previous data found in other populations. Nevertheless, this study is of vital importance as it highlights the relevance of investigating the presence of these conditions in HF patients of our set up, since the majority of published studies were carried out in western population.

CONCLUSION

The results of this study demonstrated the high prevalence of anaemia and RI in our population, similar to those found in international literature. Patients with these conditions were more decompensated (NYHA FC III and IV). Further prospective studies specifically evaluating anaemia and renal function in patients with HF are needed to provide more knowledge on these factors and their importance in HF severity and prognosis.

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Address for Correspondence:

Dr. Waqas Jehangir, House No. 444-D, M. A. Johar Town, Lahore, Pakistan. **Cell:** +92-333-4921202
Email: doctors202@yahoo.com, doctors202@hotmail.com