INDUS JOURNAL OF BIOSCIENCE RESEARCH

Anaemia in Heart Failure Patients: is it Looked for and Treated?

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ARTICLE INFO

ABSTRACT

Objective: To evaluate the prevalence of anemia and corrective strategies in heart failure patients hospitalized for acute decompensation in the Cardiology Department of Hayatabad Medical Complex, Peshawar. **Methodology:** This retrospective study analysed 126 patients admitted between January 2024 and October 2024. Anemia was defined as hemoglobin levels <12 g/dL for males and <11.5 g/dL for females. Diagnostic parameters, such as serum ferritin and TIBC, and treatment strategies, including iron supplementation, were assessed. Statistical analysis included descriptive statistics and the Chi-square test for anemia and supplementation. **Results:** The study found that 42.9% of patients were anemic, with hemoglobin levels below the defined thresholds. The mean age of participants was 60.3 years, with 62.7% being male. Normocytic anemia (MCV >75 fL) was observed in 73% of patients, while 38.1% had hematocrit levels <35%. Serum ferritin and TIBC were not performed for any patient. Iron supplementation was administered to only 4.8% of patients (1.6% each for IV replacement, oral replacement, and transfusion), while 95.2% received no supplementation. The Chi-square test showed no significant association between anemia and supplementation (p = 1.0). **Conclusion:** Anaemia was highly prevalent among heart failure patients in this study, yet diagnostic and treatment strategies were significantly underutilized. Routine diagnostics for iron deficiency and standardized anemia management protocols are urgently needed to improve outcomes.

INTRODUCTION

Heart failure (HF) remains a prevalent and debilitating condition worldwide, significantly affecting the quality of life and leading to high mortality rates. Among its numerous comorbidities, anaemia stands out as a critical factor-influencing prognosis and therapeutic outcomes.

Anaemia affects up to 63.5% of patients hospitalized with acute decompensated heart failure (ADHF), as reported in a local study by Bhuromal S et al.[1] However Its Prevalence varies widely depending on the population studied and diagnostic criteria but often signals worse outcomes.[2] Recent meta-analyses have demonstrated that anaemia increases hospitalization rates by 22% and overall mortality by 43%, underlining the need for routine screening and intervention.[3] Anaemia in HF is often multifactorial, with causes including iron deficiency, inflammation, reduced erythropoietin production, and resistance to erythropoiesis-stimulating agents.

Iron deficiency anaemia (IDA) is prevalent in nearly 50% of HF patients globally, and its correction has shown improvements in exercise tolerance and quality of life.[4] Current guidelines emphasize the importance of routine screening for IDA and iron supplementation irrespective of Hemoglobin levels.[5] Contrary to the Guideline's Recommendations, local practices lag in Diagnosis and correction of IDA. In a local tertiary hospital-based study, anaemia was observed in a significant proportion of HF patients; yet corrective strategies were not consistently employed.[6] This Failure in International guidelines implementation is probably due to lack of resources and/or awareness.

Research in South Asia, including Pakistan, emphasizes the unique clinical challenges due to high rates of comorbid conditions such as diabetes and chronic kidney disease. These conditions not only exacerbate anaemia but also complicate its management.[7] Additionally, 30–50% of HF patients

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present with absolute or functional iron deficiency, regardless of their haemoglobin levels, further complicating management.1

Despite advances in understanding anaemia's role in HF, challenges persist. Studies have shown conflicting results regarding the benefits of correcting anaemia on clinical outcomes. For instance, erythropoiesis stimulating agents improve haemoglobin levels but do not consistently enhance survival or reduce HF-related hospitalizations.8,9 Similarly, iron supplementation has demonstrated improvements in exercise tolerance, yet its long-term impact on mortality remains uncertain.10

The rationale for this study stems from the urgent need to look for the prevalence of anaemia and its management strategies compared to the standard guidelines' recommendations. By focusing on hospitalized patients in the Cardiology Department of a tertiary care hospital, this research aims to fill a critical knowledge gap and highlight actionable strategies for improving patient outcomes in hospitalized heart failure patients.

MATERIALS AND METHODS
Study Design and Setting
This retrospective study was conducted in the Department of Cardiology at Hayatabad Medical Complex, Peshawar, from January 2024 to October 2024.

Sample Size and Sampling
The sample size was calculated using the WHO sample size calculator, assuming a prevalence of anaemia in heart failure patients as 63.5% based on a study conducted in Karachi, Pakistan.3 Using a 95% confidence interval and a 5% margin of error, the estimated sample size was determined to be 126 patients. All patients admitted with ADHF during the study period were screened for inclusion.

Inclusion and Exclusion Criteria
Patients aged 18 years and older diagnosed case of heart failure with reduced ejection fraction (HFrEF) and hospitalised for Acute Decompensated Heart Failure (ADHF) according to the European Society of Cardiology guidelines were included. Anaemia was defined as patients with haemoglobin levels below 12 g/dL for both male and female patients. Exclusion criteria comprised patients with hematologic malignancies, chronic inflammatory disorders, severe liver disease, or those who received a blood transfusion within three months before admission. Pregnant patients and those with incomplete medical records were also excluded.

Data Collection Procedure
Data were collected from patient medical records, including demographic information, clinical history, laboratory results, and treatment details. Specific variables of interest included hemoglobin levels, iron

studies (serum ferritin and transferrin saturation), and treatments initiated for anemia. Data regarding patient outcomes, including length of stay, rehospitalisation, and mortality, were also extracted. Anemia was classified according to World Health Organization criteria, and iron deficiency was identified as ferritin levels <100 µg/L or ferritin levels of 100–300 µg/L with transferrin saturation <20%.

Definitions and Assessment Criteria
Anaemia was defined as haemoglobin levels <12 g/dL for Male and <11.5g/dl for Female patients. Acute decompensated heart failure was diagnosed based on clinical criteria, including symptoms such as NYHA IV dyspnoea and orthopnoea fatigue, alongside radiographic and echocardiographic evidence of volume overload or cardiac dysfunction.

Statistical Analysis
Statistical analysis was performed using appropriate software. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. The prevalence of anemia and iron deficiency was calculated with a 95% confidence interval. Significance testing was performed where applicable, with a p-value of <0.05 considered statistically significant.

Ethical Considerations
The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Approval was obtained from the Ethical and Research Committee of Hayatabad Medical Complex, Peshawar, before the study's commencement. Patient confidentiality was maintained, and informed consent was obtained from all participants during hospitalization, allowing for retrospective data usage.

RESULTS
Overview and Patient Count
This study analysed 126 patients admitted to the Cardiology Department of Hayatabad Medical Complex, Peshawar, between January 2024 and October 2024. The demographic characteristics, anemia prevalence, diagnostic evaluations, and treatment strategies were assessed to determine the prevalence of anemia and its management among heart failure patients.

Demographic Characteristics
The mean age of the participants was 60.3 years (±13.9), ranging from 18 to 95 years. Male patients constituted 62.7% (n=79) of the total, while females comprised 37.3% (n=47).

Table 1
Demographic Characteristics (n=126)

Characteristic	Value
Total Patients	126
Mean Age (years)	60.3 ± 13.9
Male (%)	62.7
Female (%)	37.3

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Prevalence of Anemia

Hemoglobin levels were below the threshold for anaemia in 54 patients (42.9%), while 72 patients (57.1%) had levels above the threshold. Figure 1 illustrates this distribution.

Figure 1

Distribution of Haemoglobin Levels
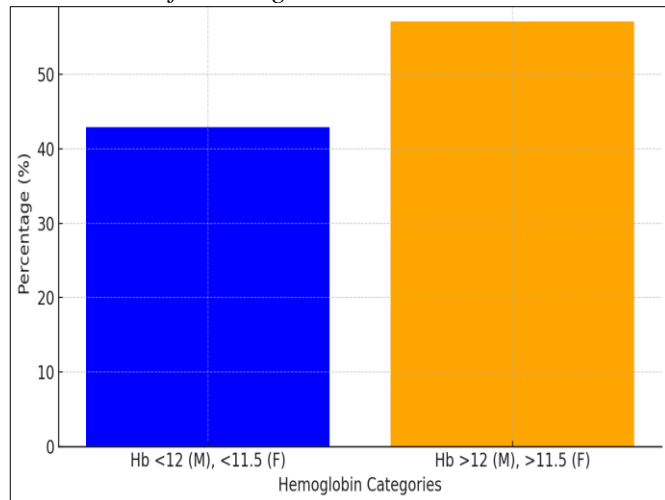
Hematological Parameters

The majority of patients (73%) had normal Mean Corpuscular Volume (MCV >75 fL), indicative of normocytic anemia. Additionally, hematocrit levels were below 35% in 38.1% of the patients, suggesting anemia severity in a subset of individuals.

Table 2

Haematological Parameters (N=126)

Parameter	Below Cutoff (%)	Above Cutoff (%)	p-value
Mean Corpuscular Volume (<75 fL)	27	73	N/A
Haematocrit (<35%)	38.1	61.9	N/A

Iron Deficiency and Supplementation

Serum ferritin and Total Iron-Binding Capacity (TIBC) tests were not conducted for any of the participants, indicating a significant gap in diagnostic evaluations. Despite the high prevalence of anemia, only 5% of patients (n=6) received any form of iron supplementation. Of these, 2 patients each received IV replacement, oral supplementation, or blood transfusions.

Figure 2

Iron Supplementation Distribution
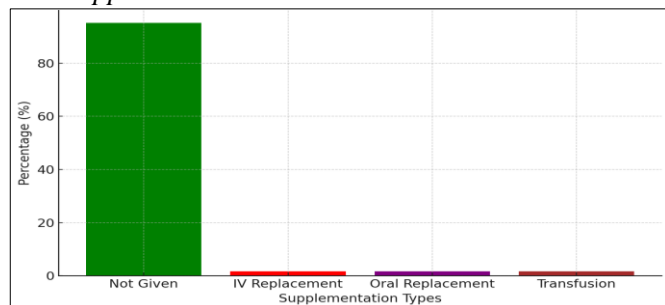
Relationship between Anaemia and Supplementation

The cross-tabulation between hemoglobin levels and supplementation status revealed that 88.9% of anemic patients received no supplementation, while 11.1% received some form of treatment (IV, oral, or transfusion). However, the Chi-square test demonstrated no statistically significant relationship between anemia status and supplementation ($\chi^2 = 0.0$, p = 1.0).

Table 3

Haemoglobin Levels and Iron Supplementation (N=126)

Supplementation Type	Hb <12 for M, <11.5 for F (%)	Hb >12 for M, >11.5 for F (%)	Total (%)
Not Given	88.9	100	95.2
IV Replacement	3.7	0	1.6
Oral Replacement	3.7	0	1.6
Transfusion	3.7	0	1.6

DISCUSSION

This study highlights the high prevalence of anemia among patients hospitalized with acute HF in a tertiary care hospital of a developing country. Hemoglobin levels below the defined threshold were present in 42.9% of patients, and 95.2% of patients did not receive any iron supplementation. These findings underscore gaps in anemia diagnosis and management, even in tertiary care settings. Despite it proved significance in multiple recent trials.[16,17] diagnosis as well treatment of anaemia and iron deficiency are far behind the guideline recommendations globally.[18]

Anaemia is a well-established comorbidity in HF, with prevalence rates ranging from 4% to 70%, depending on the study population and diagnostic criteria.[1] A systematic review revealed anemia as an independent predictor of mortality and hospitalizations in HF patients, with a 43% increased risk of death and 22% increased risk of rehospitalization.[4]

Globally, studies such as one from the United States reported a stable anemia prevalence of 21.3% among HF patients over a decade.[1] Similarly, a meta-analysis from Sub-Saharan Africa identified anemia in 49.5% of HF patients, predominantly linked to malnutrition and chronic inflammatory states.[19]

There is limited data available specifically on anemia prevalence and management among HF patients in Pakistan. This study provides a significant contribution to filling this gap.

A study conducted in Karachi found anemia in 63.5% of HF patients, primarily affecting males and those over 60 years old.[3]

While studies addressing anaemia prevalence in HF exist, this study highlights specific gaps in iron deficiency testing and anemia correction strategies, which are underreported in local research.

The findings from this study align with international research highlighting the high burden of anemia in HF

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patients. However, unlike studies from developed nations where iron deficiency is systematically addressed,9 this study emphasizes diagnostic and treatment gaps in Pakistan. The lack of serum ferritin and TIBC testing in all patients reflects the unavailability of routine iron deficiency diagnostics, which has been well-addressed in studies conducted in Nepal.7

The prevalence of anaemia in 42.9% of the study population is consistent with global data. However, the lack of any diagnostic testing for iron deficiency and the minimal use of supplementation are alarming. Anemia management protocols, including IV iron and oral replacement therapies, are underutilized, and this contributes to poor outcomes such as rehospitalisation and higher mortality risk, as documented in previous studies.4

Study Limitations

This study has several limitations that should be acknowledged. Firstly, the retrospective design restricts the ability to establish causality between anemia correction strategies and patient outcomes, as the analysis is limited to previously recorded data. Secondly, there were significant diagnostic gaps, particularly the absence of serum ferritin and TIBC measurements, which restricted the ability to determine the etiology of anemia and identify iron deficiency. Finally, the study was conducted at a single tertiary care center, which limits the generalizability of findings to other healthcare settings within Pakistan.

Future Directions

Future research should focus on addressing the limitations highlighted in this study. Prospective studies are crucial to evaluating the impact of various intravenous iron supplementation on outcomes in heart failure patients within Pakistan. Additionally, routine implementation of diagnostic tests such as serum ferritin and TIBC should be encouraged to enable more accurate identification and management of iron deficiency anemia. Furthermore, multicenter studies are necessary to explore regional variations in anemia prevalence and management practices, ensuring broader applicability and the development of more comprehensive guidelines tailored to local needs.

CONCLUSION

This study highlights the significant burden of anemia in heart failure patients admitted to a tertiary care Hospital. There is significant gap between the guideline's recommendations and real-world clinical practice that needs to filled. Despite this high prevalence, diagnostic evaluations for iron deficiency, such as serum ferritin and TIBC, were not performed, and iron supplementation strategies were underutilized, with majority of patients receiving no treatment. These findings emphasize critical gaps in anemia diagnosis and management protocols.

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