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RESEARCH NOTE

The prevalence and clinical significance of anemia in patients hospitalized with acute heart failure [version 1; peer review: 2 approved with reservations, 1 not approved]

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Abstract

Abstract

In a cohort of patients hospitalized with acute heart failure (AHF) the prevalence of anemia and the existence of a correlation between anemia and the severity of the clinical picture were assessed.

Methods. 50 consecutive patients (34 men, 16 women, mean age 67.5 years) hospitalized with AHF were enrolled. Statistical analysis was performed using a chi-square test, for studying univariate correlation between anemia and the presence of diverse parameters reflecting the severity and prognosis of AHF ($\alpha=0.05$).

Results. 21 patients (14 men, 7 women, mean age 69.6 years), representing 42%, had anemia ($Hb < 12$ g/dl) at admission. Comparing patients with and without anemia there were no significant differences regarding age, gender, presence of atrial fibrillation ($p=0.75$), diabetes ($p=1$), ischemic heart disease ($p=0.9$), ejection fraction $< 35\%$ ($p=1$), hypotension at admission ($p=0.34$), tachycardia > 100 b/min at admission ($p=0.75$), creatinine level > 1.5 mg% ($p=0.12$), and need of high dose of loop diuretic > 80 mg/day ($p=0.23$).

Conclusions. Anemia is a frequent finding in patients hospitalized with AHF. The presence of anemia was not correlated with other factors related to AHF severity and prognosis. This fact suggests its independent role in influencing the clinical picture and prognosis.

Keywords

acute heart failure , prognosis , anemia

Open Peer Review

Approval Status

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version 2			
(revision)			
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version 1			
26 May 2016			

1. **José Machado**, University of Minho, Braga, Portugal

2. **Manfred Seeberger** , Klinik Hirslanden, Zürich, Switzerland

3. **Norbert Jost**, University of Szeged, Szeged, Hungary

Any reports and responses or comments on the article can be found at the end of the article.

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Competing interests: No competing interests were disclosed.

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Anemia (Hb<12 g/dl or Ht<35%) is relatively frequent in patients with heart failure (HF). In a population of patients with newly diagnosed HF the prevalence of anemia was 17%¹. The presence of anemia is related to the severity of functional class (from 9% in NYHA class I to 79% in class IV)². In acute heart failure (AHF) anemia, regardless of its etiology, could be an important extracardiac factor of decompensation; its diagnosis, evaluation and treatment being an important part of management. Also, the presence of anemia proved to be an important prognostic factor during the in-hospital and post-discharge period³.

The aim of this study was to assess a cohort of patients hospitalized with AHF for (1) the prevalence of anemia and (2) the existence of a correlation between anemia and the severity of the clinical picture.

Methods

We collected data from 50 consecutive patients (34 men, 16 women, mean age 67.5 years) hospitalized with AHF (acute decompensated heart failure in 36 cases). At admission, all the patients signed the general consent form used at our institution, agreeing with anonymous data collection and usage for scientific purposes. Approval of the hospital ethical committee (permit number: 3865/01.03.2016) was obtained for data processing and publication. Exclusion criteria were: recent (<1 month) acute coronary syndrome, and advanced renal disease on hemodialysis. At admission and during hospital stay routine (part of usual care) clinical and paraclinical data were recorded in a dedicated

database: demographic data, clinical diagnosis, triggering factors of decompensation, signs and symptoms at admission, ECG data, echocardiographic data, laboratory parameters at admission, and treatment data. Statistical analysis was performed using a chi-square test (MS Excel 2010) for studying univariate correlation between anemia and the presence of diverse parameters reflecting the severity of AHF ($\alpha=0.05$).

Results

Dataset 1. Patient data

<http://dx.doi.org/10.5256/f1000research.7872.d122902>

Please see legend.csv for a description of the data

21 patients (14 men, 7 women, mean age 69.6 years), representing 42% of the cohort, had anemia (Hb<12 g/dl) at admission. The most common forms were chronic simple anemia (8 patients) and renal anemia (6 patients). We did not find significant differences between the two groups of patients, with and without anemia, with regards to gender ($p=1$) and age ($p=0.57$). Also, there were no significant differences regarding the presence of atrial fibrillation ($p=0.75$), diabetes ($p=1$), ischemic heart disease ($p=0.9$), ejection fraction < 35% ($p=1$), hypotension (systolic BP <90 mmHg) at admission ($p=0.34$), tachycardia>100 b/min at admission ($p=0.75$), creatinine level >1.5mg% ($p=0.12$), and need of high dose of loop diuretic >80 mg/day ($p=0.23$).

Table 1. The distribution of diverse parameters in patients with and without anemia. P values represent the results of a chi-square test ($\alpha=0.05$).

Parameter	Nr. of patients with anemia	Nr. of patients without anemia	P value
Age>70 years	12	14	0.57
Male gender	14	20	1
Atrial fibrillation	11	15	0.75
Diabetes	8	11	1
Ischemic heart disease	10	14	0.9
Left ventricular EF<35%	9	13	1
SBP <90 mmHg at admission	7	6	0.34
Tachycardia (HR>100 b/min)	5	9	0.75
Creatinine >1,5 mg%	9	6	0.12
Need for >80 mg/day furosemide	10	8	0.23

Discussion and conclusions

There is general agreement that anemia is a good predictor of prognosis in patients with acute and chronic HF. Anemia is associated with increased mortality, however there are conflicted data whether this is an independent predictor or reflects the progression of HF and/or is related to the presence of more frequent comorbidities^{1,4,5}. In the setting of AHF, anemia could also serve as a precipitating factor of decompensation.

In our cohort of patients the presence of anemia was not correlated with other factors related to AHF severity and prognosis. This fact suggests its independent role in influencing the clinical picture and prognosis.

Data availability

F1000Research: Dataset 1. Patient data, [10.5256/f1000research.7872.d122902](https://doi.org/10.5256/f1000research.7872.d122902)⁶

Consent

Written informed consent for publication of their clinical details was obtained from the patients.

Author contributions

AF and ZF: study design, data collection, data processing and statistical analysis, manuscript preparation; IK: study design, data collection; LM: data processing and statistical analysis; EN: data processing and statistical analysis, manuscript preparation.

Competing interests

No competing interests were disclosed.

Grant information

The author(s) declared that no grants were involved in supporting this work.

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Current Peer Review Status: ? X ?

Version 1

Reviewer Report 02 November 2016

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Norbert Jost

Department of Pharmacology and Pharmacotherapy, University of Szeged, Szeged, Hungary

- **Title and Abstract:**

More or less acceptable. I would suggest adding some details about the general life quality of the patients.

- **Article content:**

Please give details about the general conditions of the patients including: i) data about other diseases (cardiac and not cardiac as well); ii) status when they arrived at the hospital and how was their status when leaving the hospital; was there post hospitalization care or not, and if yes what were the results.

- **Conclusions:**

Insufficiently short. Please supplement with information and comments about some comparative details of other studies in this field.

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Reviewer Report 04 July 2016

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Manfred Seeberger

Department of Anaesthesiology and Intensive Care Medicine, Klinik Hirslanden, Zürich, Switzerland

The authors have assessed the prevalence of anemia in a cohort of 50 patients hospitalized with acute heart failure (AHF), and also assessed the existence of a correlation between anemia and the severity of the clinical picture. They found anemia in 21/50 patients but no correlation of anemia with other factors related to severity and prognosis of AHF. They conclude that this finding is suggestive of an independent role of anemia in influencing the clinical picture and prognosis of AHF.

The study by Frigy *et al* may serve as an interesting pilot study for a larger prospective study. However, the current sample size is insufficient for drawing any reliable conclusion on the prevalence of anemia in patients with AHF, and on the influence of anemia on course and outcome of AHF. Given the small sample size, it is not meaningful to perform multiple statistical analyses. And the small sample size should keep the authors from rejecting a possible correlation between anemia and other factors related to severity and prognosis of AHF. And the final conclusion remains unclear to me: why does the lack of statistical correlation between anemia and other factors related to severity and prognosis of AHF suggest an independent role of anemia in influencing prognosis of the disease? The authors have not studied prognosis and outcome at all.

The authors need to define the study question more specifically: what is (are) the outcome(s) they are looking for in the population of patients with acute heart failure? Based on a specific study question and hypothesis, the authors need to perform a sample size calculation. It will be interesting to read the results of that adequately sized study.

The authors have raised an interesting question. However, they need to define a more specific study hypothesis and calculate the sample size needed for analyzing that hypothesis. The current study design and sample size does not allow for drawing any reliable conclusions.

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Reviewer Report 07 June 2016

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José Machado

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This article addresses the prevalence of anemia amongst patients hospitalized with acute heart failure (AHF) and the existence of a correlation between anemia and the severity of the clinical picture. The manuscript is well written, but I have some concerns on certain points. Below are more specific comments by section:

- Introduction: More information about the purpose of the topic addressed would provide welcome context, i.e. the relevance of the study conducted. A bit more detail about anemia and acute heart failure would also be helpful in order to understand better the relevance of the potential correlation addressed;
- Methods: There may be some reservations concerning the data size: a small sample of data was used in order to conduct this study. On the other hand, more information regarding the methods used and how the study was specifically conducted would also be insightful;
- Discussion and conclusions: A poor discussion and conclusions are presented. Thereby, the results should be discussed in more detail, i.e. the results presented in Table 1. For instance, a more specific discussion could be done regarding the most relevant parameters presented in Table 1, i.e. parameters in patients with and without anemia.

Overall, I consider this study interesting but more information regarding certain topics seems undoubtedly needed in order to complete and clarify some crucial points addressed throughout this paper.

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

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