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Sudip Barua

Assistant Professor (Medicine),
Southern Medical College, East
Nasirabad, Kulshi, Chittagong,
Bangladesh

Haripada Roy

Junior Consultant
(Cardiology), Kotalipara
Upazila Health Complex,
Kotalipara, Gopalganj,
Bangladesh

Sushanta Barua

Assistant Registrar,
Department of Cardiology,
NICVD, Dhaka, Bangladesh

Suchitra Basak

Department of Cardiology,
National Heart Foundation
Hospital & Research Institute,
Dhaka, Bangladesh

Fazlul Wahab Chowdhury

Senior Consultant, Feni
Diabetes Hospital, Feni,
Bangladesh

Corresponding Author:

Sudip Barua

Assistant Professor (Medicine),
Southern Medical College, East
Nasirabad, Kulshi, Chittagong,
Bangladesh

Anemic status of chronic heart failure patients

Sudip Barua, Haripada Roy, Sushanta Barua, Suchitra Basak and Fazlul Wahab Chowdhury

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Abstract

Background: Heart failure is a commonly encountered problem in our country. The causes of heart failure are variable. Anemia is a common association of almost all these cases. Anemia adversely affects the outcome of heart failure. The potentially morbid sequel of anemia during heart failure definitely demands attention. That is why in the recent times a lot of studies going on throughout the world relating anemia with heart failure.

Objective: The present study is intended to find out anemic status of chronic heart failure patients.

Method: This cross sectional observational study was conducted in the department of medicine & cardiology unit, Sir Salimullah Medical College (SSMCH), Dhaka over a period of one year from April 2015 to March 2016. Total 96 subjects, after fulfill the inclusion and exclusion criteria were selected. Heart failure patients were studied on the basis of demographic, clinical & radiological variables and severity of anemia of heart failure patients detected by Hb concentration.

Results: In this study among the 96 heart failure patients, mean age was found 48.5 ± 16.7 years. The highest incidence was in the (51-60) years of age group. Female were 64% and 36% were male. Among heart failure patients 69 (72%) were anemic and the rest had no anemia. Most common cause of heart failure was ischaemic heart disease (35 patients, 36.5%). This is followed by valvular heart disease (32 patients, 33.3%). Among 69 anemic patients 4(5.8%), 42(60.9%) and 23(33.3%) patients were observed in NYHA functional class-II, class-III & class-IV. In NYHA functional class II, all 4 patients (5.8%) were mildly anemic. No patients belongs to moderate and severe anemia. In NYHA functional class III, most of the patients 37(53.6%) were mildly anemic. Only 5(7.2%) patients were moderately anemic. No patients belongs to severe anemia. In NYHA functional class IV, most of the patients 17(24.6%) were moderately anemic. This is followed by severely anemic patients 3(4.3%). So severity of anemia significantly associated with severity of heart failure ($P < 0.001$).

Conclusion: In our study found that frequency of anemia is high in heart failure patients and severity of anemia was associated with degree of heart failure.

Keywords: Anemic status, heart failure, NYHA functional class

Introduction

Chronic heart failure (CHF) is one of the major health challenges in the 21st century. As might be expected from a chronic condition, which increases in prevalence with age, CHF is often accompanied by one or more co-morbid conditions. Many of these add to the patient's symptom burden and to the complexity of managing the CHF. In addition, a few common co-morbid conditions are related intimately to the CHF disease process itself and may be, at least in part, the consequence of the heart failure syndrome. They may also contribute to its progression. Renal impairment and anemia are the best-recognized conditions in this context and are frequently found together in the presence of CHF. There are multiple mechanisms by which anemia may arise in the CHF population. Iron deficiency anemia is relatively common in CHF and, given the potential for its correction, this type of anemia has been the focus of a great deal of clinical and research interest. In reports based upon clinical trials, the reported prevalence ranges from 10–25%, while in cohorts of patients in observational or registry-based studies, it appears to be higher, from 15–50%. This variation is unsurprising given the relatively selected nature of patients recruited to clinical trials in CHF. Heart failure is a commonly encountered problem in the medicine unit. The cause of heart failure is variable. Anemia is a common association of almost all these cases. It's well known that there is a reciprocal relationship between these two, that is, one might be a cause or effect of the other; in other words one condition might precipitate the other condition ^[1].

Another study shows that anemia has a role to play in the prognosis and outcome of heart failure patients; it shows that there is definite association of anemia with mortality due to heart failure [2]. All these studies-occurred in Europe. In our setting the picture might be a bit different-different in set-ups, that is, the cut of value for anemia in our patients should be different, and the long-standing malnutrition of the patients and many more things may come into play to affect the outcome of the patients of heart failure either positively or negatively. As a result, a clinical study to assess the association of anemia with heart failure in our set up is indeed a timely and desired step. In one of the above-mentioned studies anemia is defined as haemoglobin level <12 g/dl in women and <13 g/dl in men [3]. For this study I've also taken this as the cut off value for anemia. Now comes the second key point of my study- 'heart failure'. Actually, it is a clinical term and for my study patients are diagnosed as heart failure on clinical basis with the help of some investigations which is mentioned in detail in the methodology section.

Materials and Methods

Study design: Cross-sectional observational study.

Study place: Department of Medicine & Cardiology unit, Sir Salimullah Medical college & Mitford Hospital, SSMCH, Dhaka, Bangladesh.

Study period: From April 2015 to March 2016 (1 Year).

Study population: Patients who fulfill "Framingham diagnostic criteria" of heart failure and admitted in SSMCH in the department of Medicine & Cardiology.

Sampling method: Admitted patients after meeting the inclusion and exclusion criteria a purposive sampling technique was applied

Sample size: Sample size is calculated by using the following equation: - Md. Mozammel Hoque, *et al.* [4].

$$n = \frac{z^2(p \times q)}{d^2}$$

Sample size determination: Calculated sample size is 138.29, On the basis of unknown prevalence but for financial constraint, limitation of time period and convenient purpose total 96 (Ninety-six) heart failure patients will be taken as study population.

Inclusion criteria

1. Age >18 years
2. Sex - both sexes
3. Patients who fulfill "Framingham criteria of heart failure". (2 major or 1 major in conjunction with 2 minor criteria).

Exclusion criteria

1. Age <18 years.
2. Patients not willingly interested to participate in the study.

Procedure of data collection: After admission, study patients were selected purposively from medicine and cardiology in patient department. Detailed history was taken from patients and his / her legal guardian. All the patients are included after details clinical examination having symptoms paroxysmal Nocturnal Dyspnoea, Bilateral ankle oedema and signs tachycardia (pulse rate - >120 beats/min). Jugular vein Distension, Hepatomegaly, crackles on the lung Auscultation and relevant investigations CBC, Hb%, chest X ray, ECG, Echocardiography etc detected. All the patients and his / her legal guardian was briefed about the Objectives of this study, risks and benefits, freedom from participating in the study and confidentiality. After taking written informed consent, the cases were selected on the basis of "Framingham Criteria" of heart failure. Confidentiality was maintained in all steps. All the information was kept in lock and key and no information was disclosed to others.

Data Collection Instrument: Structured questionnaire were made in English. The questionnaire were developed the selected variables according to specific objective. The questionnaire contained questions related to 1) Sociodemographic characteristics 2) Illness characteristics & other relevant information 3) Radiological & hematological parameter related to primary disease. A Check list was also developed. Necessary modification were done before finalized the questionnaire.

Data analysis: After collection, data editing and clearing was done manually and prepared for data entry and analysis by using computer SPSS version 22. The statistical tests used to analyze data were: ANOVA test, and FISHERS EXACT Test (modified chi-square test). For all analytic tests level of significant was set up at 0.05 & P value <0.05 was consider significant.

Results

In this study among the 96 heart failure patients, the above table shows the age distribution of the study population. Majority of the study patients belonged to 51 – 60, >60, 41-50, 31-40 and 20 – 30 years age group, which were 31.25%, 27.08%, 20.83%, 11.45% and 9.37% respectively. The mean age was found 48.5±16.7 years. Out of 96 heart failure patients, 61 (64%) were female and rest of them were male. The female to male ratio was 1.7:1. The above table shows the economic condition among the population under study. Most of the patient's economic conditions were found in lower income (96.9%) group. Only 3.1% patients were found in middle income group. Out of the 96 heart failure patients 69 patients were anemic, that is 72% of the patients were anemic and the rest had no anemia.

Table 1: Demographics status of the study population (n=96)

Age in years	Number	Percentage (%)
20 – 30	9	9.37
31 – 40	11	11.45
41 – 50	20	20.83
51 - 60	30	31.25
> 60	26	27.08

Mean \pm SD	48.5 \pm 16.7	
Range (min – max)	(18 – 90)	
Sex		
Male	61	64%
Female	35	36%
Income		
Lower (<10,000 taka/month)	93	96.9
Middle (10,000-2,00,000 taka/month)	3	3.1
High (>2,00,000 taka/month)	0	0
Type of patients		
Anemic (male<13gm/dl and female <12 gm/dl)	69	72
Non-anemic	27	28

Table 2: Distribution of the study patients according to etiological pattern of heart failure (n=96)

Risk factors	Number	Percent (%)
Ischemic heart disease	35	36.5
Valvular heart disease	32	33.3
Dilated Cardiomyopathy	15	15.6
Hypertensive heart disease	10	10.4
Atrial fibrillation	4	4.2

Table 2 shows the causes of heart failure among the population under study. Ischemic heart disease was found in 36.5% patients. Valvular heart disease was found in 33.3% patients.

Cardiomyopathical was found in 15.6% patients. Hypertensive heart disease was found in 10.4% patients. Finally, Atrial fibrillation was found only in 4.2% patients.

Table 3: Distribution of the study patients according to NYHA functional class (n=96).

NYHA class	Number	Percent (%)
Class I	0	0
Class II	7	7.3
Class III	61	63.5
Class IV	28	29.2

NYHA functional class I, class II, III and IV were observed 0.0%, 7.3%, 63.5% and 29.2% in study population.

Table 4: NYHA functional class among the anemic patients (n=69)

NYHA class	Number of anemic patients	Percent (%)
Class I	0	0
Class II	4	5.8
Class III	42	60.9
Class IV	23	33.3

NYHA functional class II, III and IV were observed 5.8%, 60.9% and 33.3% in anemic patients of the study population. No patients belong to NYHA functional class I.

Table 5: Distribution of the study patients according to their severity of anemia (n=69)

Grading of anemia	Number of anemic patients	Percent (%)
Mild (female - Hb% 10-11.9 gm/dl) (male – Hb% 10 – 12.9 gm/dl)	44	63.8
Moderate (Hb% 7- 9.9 gm/dl)	22	31.9
Severe (Hb% 4 - 6.9 gm/dl)	3	3.3

In this study we found that among 96 patients 69 patients had anemia. These anemic patients were categorized into three groups on the basis of the severity of anemia. Again severity

of anemia determined on the basis of hemoglobin concentration.

Table 6: Distribution of the study patients according to their morphological pattern of anemia (69 cases)

Types of anemia	Number of anemia	Percent
Normocytic	27	39.13
Microcytic	42	60.87
Macrocytic	0	0

Table-6 shows out of 69 anemic patients 42(60.87%) patients were found to have microcytic anemia. 27(39.13%) cases

were found normocytic anemia. No patient was found in pure macrocytic anemia.

Table 7: LV ejection fraction by the severity of anemia (n=69)

Grading of anemia	LVEF (%) Mean \pm SD	P value
Mild (female - Hb% 10-11.9 gm/dl) (male - Hb% 10 - 12.9 gm/dl)	45.6 \pm 11.6	0.03 ^s
Moderate (Hb% 7- 9.9 gm/dl)	40.2 \pm 7.3	
Severe (Hb% 4- 6.9 gm/dl)	33.2 \pm 4.9	

S = Significant ($P < 0.05$), P Value was calculated by ANOVA test and data were presented as mean \pm SD.

Table-7 shows left ventricular ejection fraction of the anemic patients by the severity of anemia. The table depicts that the mean LVEF is decreasing when the grading of anemia is

increasing which is statistically significant ($p = 0.03$) by ANOVA test.

Table 8: Association between anemic status and classes of heart failure (n = 96)

Anemia	NYHA functional class			Total	P value
	Class II No. (%)	Class III No. (%)	Class IV No. (%)		
Anemic	4 (4.2)	42 (43.8)	23 (24.0)	69 (71.9)	0.04 ^s
Non-anemic	3 (3.1)	19 (19.8)	5 (5.2)	27 (28.1)	
Total	7 (7.3)	61 (63.5)	28 (29.2)	96(100.0)	

S= Significant ($P < 0.05$), P value was calculated by Fisher's exact test (Modified Chi-square test) for cell frequency < 5 .

The above table shows the anemia by NYHA functional class in terms of heart failure. The table projects that out of 69 (71.9%) anemic patients, 42 (43.8%) belongs to NYHA class III followed by NYHA class IV 23 (24.0%) patients and NYHA class II 4 (4.2%) patients. On the other hand, out of

27 (28.1%) non anemic patients, 19 (19.8%) belongs to NYHA class III followed by NYHA class IV 5 (5.2%) patients and NYHA class II 3 (3.1%) patients. There is a significant association between anemia and heart failure.

Table 9: Association between severity of heart failure and severity of anemia (n = 69)

Grading of anemia	NYHA functional class			Total	P value
	Class II No. (%)	Class III No. (%)	Class IV No. (%)		
Mild (female- Hb% 10-11.9 gm/dl) (male - Hb% 10-12.9 gm/dl)	4 (5.8)	37 (53.6)	3 (4.3)	44 (63.8)	$< 0.001^s$
Moderate (Hb% 7-9.9 gm/dl)	0	5 (7.2)	17 (24.6)	22 (31.9)	
Severe (Hb% 4-6.9 gm/dl)	0 (0.0)	0 (0.0)	3 (4.3)	3 (4.3)	
Total	4 (5.8)	42 (60.9)	23 (33.3)	69(100.0)	

S= Significant ($P < 0.05$), P value was calculated by Fisher's exact test (Modified Chi-square test) for cell frequency < 5 .

The above table expressed the severity of anemia by NYHA functional class in terms of heart failure. The table depicts that out of 44(63.8%) mildly anemic patients, 37(53.6%) belongs to NYHA class III followed by NYHA class II 4(5.8%) patients and NYHA class IV 3(4.3%) patients. Again, out of 22(31.9%) moderately anemic patients 17(24.6%) belongs to NYHA class IV followed by NYHA class III 5(7.2%) patients. Finally, out of 3(4.3%) severely anemic patients belongs to NYHA class IV. There is a statistically significant ($p = < 0.001$) association between severity of heart failure and severity of anemia.

Discussion

The principal objective of this study is to find out anemic status of chronic heart failure patients admitted in medicine and cardiology units in SSMCH. As in other cardiovascular disease aging is associated with an increased risk for development of Cardiac failure. All patients in this series were above 20 years, the highest incidence was in the (51 – 60) years of age group. Mean age was found 48.5 ± 16.7 years. The prevalence of heart failure which is predominantly disease of the elderly in develop countries [5, 6]. But heart failure in the south Asia region is relatively disease of younger. In our study out of 96 heart failure patients 61(64%) were female and 35(36%) were male. This female preponderance was also shown [7]. Most of the patients in this

study belongs to lower economic status 96.9% (93 patients). In one of the study Howkins, N.M *et al.*, [8], also shown that socio economic deprivation is a powerful predictor of heart failure development and adverse outcomes. In our study showed that among 96 heart failure patients as many as 69(72%) patients were anemic, and the rest of the patients had no anemia. Association of anemia in heart failure patients is also reported by Carlos, C., *et al.* and komajda, M [9, 10]. In their studies the incidence of anemia in heart failure patients more than 50%. Nearly similar pattern of Incidence of anemia reported by silverberg, DS., *et al.*, [11]. in patients with Congestive cardiac failure. This very high incidence of anemia in our country may be multifactorial. The patients of heart failure in this study shown that common cause was ischemic heart disease (35 patients, 36.5%), This is followed by valvular heart disease (32 patients 33.3%), Dilated cardiomyopathy (15 patients, 15.6%) and hypertensive heart disease (10 patients, 10.4%) & Atrial fibrillation (4 patients 4.2%). Ischemic heart disease and valvular heart disease constitute more than 50% causes of heart failure. In their study primary causes of heart failure were coronary artery disease (59%) and valvular heart disease 31%. Again, in developed countries coronary heart disease and Hypertensive heart disease were the most common cause of heart failure, similar pattern of etiology was reported by Murry, MC, JJ., pletfer, MA *et al.* [12]. The only difference between our

observation and their observation is that we have relatively high incidence of valvular heart disease, where as in developed countries its incidence is much lower. Most of the study patients were observed in NYHA functional class III and IV. In this class 61(63.5%) and 28(29.2%) patients were symptomatic. Only 7(7.3%) patients observed in class II which were mildly symptomatic or asymptotic. No patients observed in NYHA functional class I. On the other hand, among the anemic patients 0(0.0%), 4(5.8%), 42(60.9%) and 23(33.3%) patients were observed in NYHA functional class I, class II, III and IV. Nearly similar pattern of observation reported by several studies [11, 13, 14]. In this study shown that prevalence of anemia going from 0.0% in class I, 36.4% in class II, 52% in class III and 65.9% in class IV. In this study we have found that among 96 patients of chronic heart failure, 69 patients had anemia. Again among 69 anemic patients 44 patients (63.8%) were mildly anemic, 22 (31.9%) patients were moderately anemic and 3(3.3%) patients were severely anemic. A study reported by Bartisol, LL; *et al.*, [15] showed that syndrome of chronic heart failure draw more attention while develop mild to moderate anemia. Our study shown morphologically out of 69 anemic patients 42 patients observed in microcytic anemia and 27 patients were found in normocytic anemia, similar observation [16]. In this study shown that most of the heart failure patients belong to microcytic & normocytic anemia. No patients observed in macrocytic anemia. This study high lighten, that mean LVEF is decreasing when severity of anemia is increasing. Among heart failure patients in case of mean LVEF $45.6 \pm 11.6\%$ were mildly anemic. This is followed by mean LVEF $40.2 \pm 7.3\%$ were moderately anemic and mean LVEF $33.2 \pm 4.9\%$ were severely anemic. The finding was consistent with the result of study done by Horwich, TB., *et al.*, [17]. In this study it is shown that decrease ejection fraction precipitate systolic heart failure and increase severity of anemia. This study also shown that in patients with advance heart failure mean left ventricular ejection fraction (LVEF) <40% and NYHA functional class III or IV associated with lower Hb quartiles. The result of the present study expressed the severity of anemia by NYHA functional class in terms of heart failure. This study depicts that Among 69 anemic patients 4(5.8%), 42(60.9%) and 23(33.3%) patients were observed in NYHA functional class-II, class-III & class-IV. In NYHA functional class II, all 4 patients (5.8%) were mildly anemic. No patients belong to moderate and severe anemia. In NYHA functional class III most of the patients, 37(53.6%) were mildly anemic. Only 5 (7.2%) patients were moderately anemic. No patients belong to severe anemia. In NYHA functional class IV, most of the patients 17(24.6%) were moderately anemic. This is followed by severely anemic patients 3(4.3%). So, there is significant association between severity of heart failure and severity of anemia. This was proven by Donald S., *et al.*, [18] who demonstrated that chronic heart failure worsned, if the mean Hb concentration decreased from 13.7 gm % in mild chronic heart failure (NYHA class – I) to 10.9 gm% in severe chronic heart failure (NYHA classes – IV).

Conclusion

In our study found that frequency of anemia is high in heart failure patients and severity of anemia was associated with degree of heart failure.

Recommendations

On the basis of the findings of this study we recommend the

following suggestions: -

1. In heart failure patients anemia is common. So, large scale hospital and community-based study regarding hemoglobin level need to be carried out in future.
2. For the management purpose type of anemia should be addressed & treat accordingly
3. Treatment of cause and its correction should be done properly in heart failure patients.

Limitations

This study was not without limitation. The limitations of the studies were as follows:

- This study was conducted in a tertiary hospital only and may not reflect the actual situation of the country.
- The sample size was small and study period was short, so may not give the actual conclusion.

Conflict of Interest

Not available

Financial Support

Not available

References

1. Robbins SL, Cortan RS, Kumar V, editors. Pathological basis of diseases. 8th ed. China: Elsevier; c1984. p. 1023.
2. Schamroth L. An introduction to electrocardiography. 7th ed. New York; c1995. p. 457.
3. Mauro T, Ugo L, Fracesca G, Angle R. Prevalence, incidence and types of mild anaemia in the elderly. The health and anaemia. Journal of European Haematology Association. 2010;95:1849-1856.
4. Hoque MM. Sample size calculation. abc of research methodology and biostatistics. 1st ed. Parash Publishers; c2009. p. 216.
5. Reddy S, Bhal A, Talwar KK. Congestive heart failure in Indians: How do we improve diagnosis & management. Indian Journal of Medical Research. 2010;132(5):549-560.
6. Mosterd A, Amo HW. Clinical epidemiology of heart failure. British Medical Journal. 2007;93(9):1137-1146.
7. McSwain M, Martin TC, Amaraswamy R. The prevalence, etiology, and treatment of congestive cardiac failure in Antigua and Barbuda. West Indian Medical Journal. 1999;48(3):137-140.
8. Howkins NM, Jhwnd PS, McMurray JJ, Capewill S. Heart failure and socioeconomic status: Accumulating evidence of inequality. European Journal of Heart Failure. 2012;14(2):138-146.
9. Carlos C, Soledad J, Palmo G. Anaemia in heart failure: Pathophysiology, pathogenesis, treatment, and incognita. Journal of the Society of Cardiology of Spain. 2007;60:8.
10. Komajda M, Anker SD, Charles WA, *et al.* The impact of new onset anaemia on morbidity and mortality in chronic heart failure: Results from COMET. European Heart Journal. 2006; 27:1440-1406.
11. Silverberg DS, Wexler D, Blum M, *et al.* The use of subcutaneous erythropoietin and intravenous iron for the treatment of the anaemia of severe, resistant congestive heart failure improves cardiac and renal function and functional cardiac class and markedly reduces hospitalization. Journal of the American College of Cardiology. 2000;35:1737-1744.

12. Murry MC, Pfeffer MA. Heart failure. *Lancet*. 2005;365(9474):1877-1889.
13. Tanner H, Moschoritis G, Kuster GM, *et al*. The prevalence of anaemia in chronic heart failure. *International Journal of Cardiology*. 2002;86:115-121.
14. Wisniacki N. Is anaemia a cause or consequence of heart failure in the elderly. *International Journal of Cardiology*. 2001;85(Suppl I):4.
15. Bartisl L. Anaemia in heart failure. *Journal of the Department of Internal Medicine Bratislava, Slovakia*. 2004;105(12):419-423.
16. Stuart D, Katm MD, Tang Vi-Da. Anaemia in chronic heart failure: Prevalence, etiology, clinical correlates, and treatment options. *Journal of the American Heart Association*. 2006;113:2454-2461.
17. Horwich TB, Fonarow GC, Hamilton MA, MacLellan WR, Borenstein J. Anaemia is associated with worse symptoms, greater impairment in functional capacity, and a significant increase in mortality in patients with advanced heart failure. *Journal of the American College of Cardiology*. 2002;39(11):1780-1786.
18. Silverberg DS, Wexler DV, David S, Blum M, *et al*. The effect of correction of mild anaemia in severe, resistant congestive heart failure, using subcutaneous erythropoietin and intravenous iron: A randomized controlled study. *Journal of the American College of Cardiology*. 2001; 37:7.

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