

## ORIGINAL ARTICLE

### Characteristics and Outcome of Acute Heart Failure Patients in Egypt

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<b>Background</b>	The aim of this study is to define the characteristics, and outcome in hospitalized patients with acute heart failure [AHF] in a tertiary care hospital in Egypt.
<b>Methods</b>	107 Patients admitted with a diagnosis of systolic AHF, between January 2006 and January 2008 were enrolled in this retrospective registry. Demographics and outcome were recorded as documented in the patients' records.
<b>Results</b>	Mean age was 59.7±11.7 years, 87% were males, and 23% had new onset AHF. Coronary artery disease was the most common etiology [49.5%]. Hypertension [57.5%], Diabetes mellitus [52%], anemia [41.5%] and renal insufficiency [32%], valvular heart disease [15%] were common associated conditions. 66% of patients reported dyspnea, 83% had NYHA class IV dyspnea. Mean systolic blood pressure was 117±22 mm Hg, and mean diastolic blood pressure was 74±13 mm Hg. Bilateral basal rale was reported in 57%, while only 28% had bilateral lower limb edema. The mean length of stay was 6.3±5.7 days. The re-hospitalization rate was 20%, while the in-hospital mortality was 12%.
<b>Conclusions</b>	AHF is most prevalent among male patients with history of coronary artery disease, hypertension, diabetes and renal failure. High rates of co morbidities were a predictor of increased in hospital mortality.
<b>Keywords</b>	Acute heart failure, characteristics of heart failure patients and outcome of heart failure. (Heart Mirror J 2009; 3(2): 92-97)

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## INTRODUCTION

Heart failure [HF] is an increasing, global epidemic that results in significant health care expenditure, disability, and mortality. The crude incidence of heart failure (Unadjusted for age) ranges from 1 to 5 cases per 1,000 population per year and increases sharply with advancing age to as high as 40 cases per 1,000 population more than 75 years old (1).

Ironically, advances in the treatment of coronary artery disease [CAD] and acute ischemic syndromes, which have saved lives, have resulted in a growing population of survivors with left ventricular dysfunction who are destined to develop HF (2).

In developed countries, CAD, either alone or in combination with hypertension, seems to be the most common cause of HF. It is, however, very difficult to be certain what is the primary etiology of HF in patients with multiple potential causes (For example, CAD, hypertension, diabetes mellitus, atrial fibrillation, etc) (2). However, the etiology of HF is unknown in the developing countries in the absence of national registries.

There are several co-morbidities associated with HF. Several studies had addressed risk factors, including the National Health and Nutrition Examination Survey, USA. Male gender, older age, physical inactivity, overweight, diabetes mellitus, hypertension, valvular heart disease, and CAD were consistently reported as being associated with the risk of developing HF.

However, co morbid conditions were not fully studied in HF patients in Egypt.

Since 1968, heart failure as the primary cause of death has increased fourfold (3). The most dismal prognosis for patients with severe symptoms (New York Heart Association class IV) and CAD was an 18% and 43% survival rate at 1 and 3 years, respectively (4).

Several registries around the globe have published data about characteristics and outcome in patients with HF. The euro-heart failure survey I and II, aimed to assess the characteristics, etiology, management, and outcome

#### Abbreviations and Acronyms

HF	: Heart failure
AHF	: Acute heart failure
CAD	: Coronary artery bypass graft
ECG	: Electrocardiograph
NYHA	: New York heart association
MI	: Myocardial infarction
SBP	: Systolic blood pressure
DBP	: Diastolic blood pressure
COPD	: Chronic obstructive pulmonary disease
ACEI	: Angiotensin converting enzyme inhibitor
ARBs	: Angiotensin receptor blockers

in 3508 patients in 30 European centers, in relations to the acute heart failure [AHF] guidelines published by the European society of cardiology (5, 6).

Also, the acute decompensate heart failure national registry [ADHERE] defined characteristics, management and outcomes in heart failure hospitalizations in the United States of America. This study enrolled 159, 168 patients from 285 centers between 2002 and 2004 (7).

However, characteristics and outcome of HF patients is not well described in developing countries like Egypt. Documenting patients' characteristics and outcome might improve management of co morbidities associated with heart failure patients in Egypt as well as the disease outcome.

## METHODS

All patients admitted to a tertiary referral centers in Egypt with a diagnosis of acute, systolic heart failure between January 2006 and January 2008 were studied. This was a total of 107 patients. The study was conducted retrospectively from the patients' medical records. This data was collected as documented by the treating physician during history taking and clinical examination upon patients' admission to the facility.

The total in-hospital length of stay, heart failure related re-hospitalization rates during the index period of the study, and in hospital mortality were documented as stated by the hospital's medical records.

Renal insufficiency was defined as serum creatinine more than or equal to 177 micromol/L (2.0 mg/dl) in the present or the past, renal insufficiency that needed dialysis, or patients who had undergone kidney transplant (8).

Anemia was defined as hemoglobin less than or equal to 12.0 gm/dl in men and post-menopausal women (9).

### Study group

#### Inclusion criteria

- Patients hospitalized with acute decompensation of chronic, systolic heart failure. Systolic heart failure

was defined by an ejection fraction equal to or less than of 40%.

- Patients hospitalized with first presentation of heart failure that was documented during the index hospitalization by an echocardiography with an estimated ejection fraction equal to or less than 40%.

#### Exclusion criteria

- Patients with dyspnea of unknown etiology.
- Patients with ejection fraction above 40%.

## B. Methods

### 1. Detailed medical history

- Age and gender.
- Prior history of heart failure diagnosis.
- Prior hospitalization with heart failure.
- Chief complaint e.g. dyspnea, fatigue, ... etc.
- New York heart association classification of dyspnea, if applicable.
- History of associated co morbidities e.g. Coronary artery disease, hypertension, diabetes mellitus, valvular heart disease, chronic renal insufficiency .... etc.
- Prior drug therapy of heart failure.
- Prior device therapy of heart failure.

### 2. Complete clinical examination

- Blood pressure measurement.
- Lower limb edema.
- Complete cardiac examination including auscultation of the back of the chest for rales detections.

### 3. Laboratory investigations

- Complete blood count.
- Kidney function test.

### 4. Outcome

- In-hospital Length of stay.
- Re-hospitalization rates.
- In-hospital mortality with cause documentation.

## Statistics and Data management

Data was collected, revised, verified, and then edited on personal computer. Data was then analyzed statistically using SPSS statistics package version 15.

Quantitative data were presented in the form of mean + and or - standard deviation, while qualitative data were presented by number and percentage.

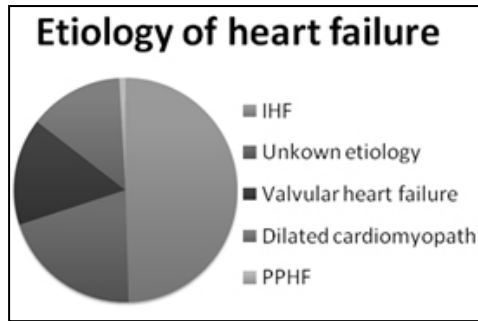
## RESULTS

The mean age was 59.7±11.7 years. The minimum age was 29 years and the maximum was 90 years. Male patients constituted 87.1% [94 patients] of the study population.

23.3% [24 patients] of the patients enrolled had new onset heart failure (De-novo heart failure), while 73.8% had acute decompensated chronic heart failure.

**Etiology**

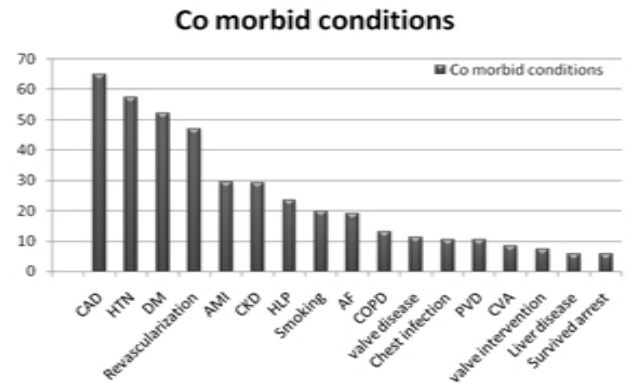
CAD was the most common etiology of heart failure representing 49.5% of cases [51 patients], 13.6% of patients [14 patients] had dilated cardiomyopathy. valvular heart disease was incremented as the etiology in 15.5% of the patients [16 patients], 0.9% had post partum cardiomyopathy, while 20% of patients [21 patient] did not have a specified etiology for heart failure. Figure (1) shows the etiologies of heart failure as was recorded in the study.



**Figure 1:** IHF: ischemic heart failure, PPHF: post partum heart failure

**Clinical characteristics and co morbid conditions**

65% of patients had concomitant CAD with varying degrees of severity [69 patients], 57.5% of patients had hypertension [61 patients], 52% had diabetes mellitus [56 patients], 47% had a history of revascularization [49 patients], 41.5% had anemia [32 patients], 34% of patients had renal failure [34 patients], 29% had myocardial infarction [31 patients], 24% had hyperlipidemia [25 patients], 19.8% of patients [21 patients] had a history of smoking, either as current smokers or ex-smokers, 19% of patients had atrial fibrillation [20 patients], 13% of patients had COPD [14 patients], 18.9% had primary valvular heart disease whether operated upon or not [20 patients], 10% had peripheral vascular disease [11 patients], 10% had concurrent chest infection [11 patients], 8.5% had cerebrovascular accident [9 patients], 7.5% of patients had valvular surgeries [8 patients], 5.7% had survived a cardiac arrest [6 patients], 5.7% had liver disease [6 patients], 2.8% were chronic hepatitis C virus carriers [3 patients], 2.8% had active malignancy [3 patients], and lastly, 1.8% had thyroid disease [2 patients]. Figure (2) shows the co morbid conditions as documented in the study.



**Figure 2:** HTN: hypertension, DM: diabetes mellitus, AMI: acute myocardial infarction, CKD: chronic kidney disease, HLP: hyperlipidemia, AF: atrial fibrillation, COPD: chronic obstructive pulmonary disease, PVD: peripheral vascular disease and CVA: cerebrovascular accident

**Clinical presentation**

66% of patients presented by dyspnea [68 patients] as main complaint, while 22% reported fatigue [23 patients], and 10.8% reported chest pain [11 patients], New York heart association [NYHA] functional assessment was performed in 80% of patients presenting with dyspnea. 83% of patients reported NYHA class IV, 17% reported NYHA class III, while 4% reported NYHA class II.

Mean systolic blood pressure [SBP] was 117±22 mm Hg. It ranged between 50 mm Hg and 240 mm Hg.

SBP in the range of 90-140 was reported in most of the patients [91%], while SBP blood pressure below 90 mm Hg was documented in 4.7% of patients. SBP above 140 mm Hg was documented in 4.7% of patients.

Mean diastolic blood pressure was 74±13 mm Hg. It ranged between 30 mm Hg and 140 mm Hg.

Fine bilateral basal rale was documented in 57% of patients. 28% of patients had bilateral lower limb edema.

Prior to hospital admission, only 12% of patients were initiated on angiotensin converting enzyme inhibitor [ACEI], or angiotensin receptor blockers [ARBs] and beta-blockers.

**Outcome**

19.6% of patients [21 patients] were readmitted during the 2 years period of the study.

The mean hospital stay was 6.6±5.3 days. The minimum hospital stay was 1 day and the maximum hospital stay was 34 days.

12.1% of patients died during hospitalization [13 patients]. 5.9% of the study population died because of cardiogenic shock [6 patients], while 0.9% patient died of pulmonary edema. [Only 1 patient]. 6 patients representing 5.9% of the study population sustained sudden cardiac death. Figure (3) shows the morbidity and in-hospital mortality data of this study.

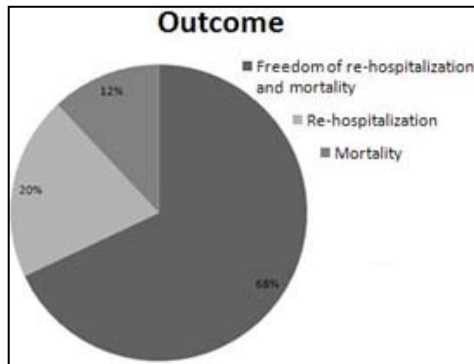


Figure 3: Morbidity and mortality outcome data in percentage.

## DISCUSSION

### Clinical demographics

The mean age of patients enrolled in this study was 10 years younger than the mean age of HF patients worldwide. [Mean 60 years versus about 70 worldwide] (6, 7). Also, in our study, majority of the patients were males which is again significantly higher than the percentage of males in the ADHERE and EHFS II. This will be explained later on in the text.

Nevertheless, It is very difficult to be certain what is the primary etiology of heart failure in patients with multiple potential causes, such as CAD, hypertension, diabetes mellitus, etc., (2). In our study, we referred to the heart failure etiology as that diagnosed by the treating physician.

CAD was the most common cause of heart failure, where ischemic heart failure represented almost half of the study population. This was documented as a well in the larger ADHERE and EHFSII.

Unknown etiology was the second most common cause in our study, while valvular and dilated cardiomyopathies were less common.

This was matching the data from a population study of 151,000 people in west London. In this study, CAD-with or without myocardial infarction-represented 36% of heart failure patients, followed by unknown etiology in 34% of patients, followed by hypertension and valvular heart disease consequently (1).

Indeed, two thirds (65%) of our patients had concomitant CAD whether undergone revascularization or not. It seems that the incidence of CAD occur in Egypt at an age younger than the average age for CAD patients in

the USA and Europe. The mean age for CAD patients in the studied center was 54 years.

Also, patients with CAD and HF have a grave prognosis representing the dismal prognosis of both conditions (4), This had an impact on the outcome of these patients.

In the Framingham Heart Study, almost 20% of those suffering a myocardial infarction [MI] developed heart failure within 6 years (10). In our study, almost one third of patients sustained MI and developed HF, in spite of all the recent advances in the arena of management of myocardial infarction.

Hypertension is associated with an increased risk of HF, although the relative risk is lower than for MI (11). But, because the prevalence of hypertension is much higher than MI, the proportion of cases of heart failure in the population that might be attributed to hypertension is higher. In this study we did not suggest a direct cause and effect relationship between hypertension and heart failure, because again this is difficult to proof, since hypertension can have burnt out by the time of development of heart failure (12).

Another interesting point is that the lower incidence of hypertension in this registry in comparison to ADHERE and EHFS II. For instance, systolic blood pressure values above 140mm Hg was recorded in only five percent of our patients' population. However, the same value of blood pressure was recorded in about half the ADHERE enrollees. This can be explained by the fact that the hypertension is a disease of an ageing population with hypertension occurring in half to two thirds of people older than 65 years (13).

Unfortunately, this cannot be naively interpreted as good news, since in this subset of patients; all medications such as beta blockers and ACEI may cause a decrease in blood pressure limiting the physicians' ability to achieve the target doses of medications.

Another important component of these patients' profile is the renal insufficiency which affected more than one third of the patients. This was further demonstrated in the mean serum creatinine which was 1.5 mg/dl in out study versus 1.0 mg/dl in the ADHERE registry.

It is not clear if this renal insufficiency was a primary renal condition because of the high incidence of diabetes mellitus or renal artery stenosis in patients with high incidence of atherosclerotic CAD, or it is secondary to cardio-renal syndrome [Defined as a clinical state wherein the volume overload of HF is resistant to treatment, because of progressive renal insufficiency (14)]. Worsening renal function during treatment for AHF occurs in approximately 25 to 45 percent of the patients admitted with AHF, resulting in longer lengths of stay and higher post-discharge mortality (14).

Yet again, the reason for the renal insufficiency remains to be clarified in these patients' population.

All of these co morbidities lead to a high incidence of anemia, affecting 41.5% of our patients versus 15% of patients of the EHFS II. This anemia had its known implications whether on precipitation of decompensation or its association with poorer prognosis. In a recent review, 28 large prospective studies of HF (15) found that anemia was an independent predictor of mortality.

Another significant difference in demographics between our data and comparable studies is the incidence of thyroid disease. It was reported in about ten times less (1.8%) in the patients of this study in comparison to the larger ADHERE registries. This has to be further investigated, since this can be merely a real lower incidence of the disease process or a lower incidence of the disease detection. Under diagnosis of thyroid disease in the HF patients might have a deleterious effect on the patients' management strategies and consequently prognosis.

An interesting point that has to be demonstrated is the relatively low incidence of significant, primary valvular disease, in comparison to the European data, where 15.2% of our patients had primary valvular disease whether neglected or operated upon. This was considered to be causal relation to heart failure in these patients' cohort. While in the EHFS II, 26.8% of patients had valvular heart disease as a cause of heart failure. Such a finding should not be over looked in a country with a relatively low socio-economic status.

This can be justified on closer studying of this subset of patients in this specific, private center being patients of relatively high socio-economic status with higher incidence of CAD and a lower incidence of valvular heart disease. Also the nature of the pathological process that caused valvular heart disease in Egypt might be different than the pathological process causing the same disease in Europe. Where in Egypt, rheumatic heart disease is the most common cause of valvular heart disease, while in Europe; degenerative valvular disease might be the most common culprit pathology.

One of the important facts that can be retrieved from this study is the global mismanagement of heart failure patients prior to admission especially in adherence to the published guidelines where only a small proportion [12%] was started on ACEI and beta blockers prior to their hospitalization. This may reflect either a lack of knowledge of management guidelines or a lack of adherence to the available evidence.

In this study, less patients in this registry had a documented history of dyspnea, in comparison to the ADHERE, however, most of the patients [85%] had a class IV NYHA functional assessment versus half of the patients in the ADHERE. This fact had a massive impact on the patients' management and prognosis that will be demonstrated during this discussion.

## Outcome

The mean length of stay in this study was 6.7 days, while in the EHFSII, it was 9 days. However, in the ADHERE registry; the mean length of stay was 5.8 days.

The re-hospitalization rate in this study, was only 20% in 2 years versus 23% for a 6 month follow up in the ADHERE registry.

However, the ADHERE was a nation wide registry versus our single centered registry, therefore patients might have had decompensations, but were admitted in other hospitals. Also, this might be explained by the higher index of hospitalization that might have been adopted in this institute. Whether this is the case or not, further larger scale studies have to be carried out.

In-hospital mortality varied dramatically in this study from the corresponding studies.

Whereas in this study, the in-hospital mortality was 12%; it was recorded to be 6.7% in EHFS II. The ADHERE registry even had a lower mortality rates reaching about 3.9% of the patients.

These mortality rates brings a very important question about the pattern of management that lead us to have a 2 fold increase of mortality in comparison to Europe and 3 fold increase in comparison to the united states. The following reasons can summarize this mortality discrepancy:

1. The higher incidence of diabetes mellitus, ischemic heart disease, renal failure and anemia.
2. The long standing mismanagement of heart failure patients with low rates of prescription of evidence based medications prior to hospitalization.
3. Higher index for hospitalization of heart failure patients, with most patients at a worse functional class then comparative data.
4. Possible inadequate management of those high risk patients might be incremented as well as a possible reason for the significant in-hospital mortality.

## Limitations

This study included a total of 107 patients in only one tertiary, highly equipped referral center, so it does not reflect the practice in Egypt. Also, this is a retrospective study for which not all the eligible patients might have been included.

This study was conducted on all the patients who had discharge diagnosis of systolic heart failure, ignoring all patients who had sustained an acute coronary syndrome with subsequent impaired contractility and a discharge diagnosis of acute coronary syndrome. Also, this study did not enroll patients with diastolic dysfunction which is a poorly studied cohort of patients.

Last, but not the least, this study did not include the intensive care stay and the need for mechanical ventilation as an endpoint to assess the outcome.

Therefore, defining the characteristics of general population of HF patients is beyond the scope of this article. Also, defining long term outcome of HF patients is beyond the scope of this article. Subgroup analysis of different groups of patients such as renal insufficiency is beyond the scope of this article.

### Conclusions

AHF is most prevalent among male patients with history of coronary artery disease, hypertension, diabetes and renal failure. High rates of co morbidities were a predictor of increased in hospital mortality.

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