

Characteristics and in-hospital mortality of patients hospitalized due to acute heart failure at a single cardiology center

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Abstract: Acute heart failure is a major and increasing cause of hospital admissions and associated with significant morbidity and mortality. **Aim:** to describe the clinical characteristics, management and in-hospital mortality in patients admitted with acute heart failure to a single cardiology centre during one-year period. **Methods:** a retrospective study of patients hospitalized to Tajoura National Heart Center during the period from January to December 2005, medical records of all patients with a primary discharge diagnosis of acute heart failure were revised and relevant data extracted and analyzed. **Results:** 103 patients were included (mean age of 66 years and 67% were men). Out of them, 10.7% had a previous history of heart failure and presented with acute decompensation. The most common concurrent diseases were; diabetes (59.2 %), arterial hypertension (47.6%), renal impairment (29.1%) and chronic obstructive pulmonary disease (22.3%). Their mean presenting systolic blood pressure was 120 ± 25 mmHg, 36.9% had hyponatremia (< 135 mEq/L and according to the WHO criteria, 42.7% were anemic. The mean left ventricular ejection fraction was 56%, 74.8% had dilated cardiomyopathy and 46.6% had ischemic heart disease. The mean hospital stay was 8.6 days and the in-hospital mortality was 18.4%. Mortality was statistically associated with female gender, renal impairment, acute decompensation and low presenting systolic blood pressure. On discharge 71.4% of the patients were prescribed renin-angiotensin system blockers, 44% beta-blockers and 59.5% mineralocorticoid antagonists. Compared with European and American patients, our patients were of younger age and higher ratio of males and more De Novo presentation. The in-hospital mortality was higher and could be due to the high prevalence of known mortality risk factors (diabetes, low systolic BP, anemia, hyponatremia). Up on discharge, there was less prescription of renin-angiotensin system and beta-blockers, and more prescription of statins, anti-platelet drugs and amiodarone. In conclusion, we need to have a higher awareness of heart failure and its risk factors at the primary care level as well as local guidelines for the proper management of acute heart failure.

Keywords: Heart failure, mortality, hospitalized patients, risk factors, Libya

Introduction

Heart failure is a major clinical and public health problem associated with significant mortality, morbidity and healthcare expenditures. Hospitalization rates for heart failure have increased considerably particularly among those aged > 65 years (1-3). Observational studies have identified several poor prognostic factors in patients admitted with acute heart failure (AHF) including older age, ischemic heart disease, diabetes, renal impairment, anemia, low systolic blood pressure (SBP) on admission and hyponatremia (4-10). The aim of this paper was to assess the clinical characteristics, management, and in-hospital mortality among patients admitted with AHF to Tajoura National Heart Center during one-year period.

Materials and Methods

We conducted a retrospective study of all patients hospitalized with the principal diagnosis of AHF at Tajoura National Heart Center from January to December 2015. After obtaining the ethic committee approval, the medical records were revised and relevant data was extracted and analyzed.

Statistical analysis: Data was analyzed and performed using the SPSS software (Statistical Package for the Social Sciences, version 16.0 (SPSS Inc, Chicago, Ill, USA). Continuous variables are demonstrated as means (\pm SD), and categorical variables as numbers and percentages. Categorical variables were analyzed by chi-square test & student's t-test was used for continuous variables. P value < 0.05 was considered significant.

Results

During the study period, 103 patients admitted with the primary diagnosis of AHF (**Table 1**), their mean age was 66 ± 15 years (range from 23 to 100 years) and 67% were men. Eleven patients (10.7%) presented with acute decompensated heart failure (ADHF). The most common concurrent diseases were diabetes and arterial hypertension (59.2% and 47.6%, respectively), 29.1% had renal impairment and 43.5 % of the males were current or ex-smokers. On admission, the mean pulse and systolic blood pressure (SBP) were 92 ± 26 beats per min and 120 ± 25 mmHg. The mean serum sodium (Na), potassium (K) and hemoglobin (Hb) were 134 ± 6.6 mEq/L, 4.26 ± 0.75 mEq/L and 11.5 ± 1.9 g/L, respectively. According to the WHO criteria (Hb < 13 in men and < 12 in women 57 patients (55.3%) were anemic. Left ventricular ejection fraction (EF) mean value was $56 \pm$

4% (20 - 76%) and 54.4% of the patients having EF values $\leq 40\%$. Natriuretic peptide level was not measured. The most common underlying cardiac disease was dilated cardiomyopathy (DCM) in 74.8% had valvular heart disease 55.3%, ischemic heart disease (IHD) in 46.6% and atrial fibrillation (AF) in 39.8%. The mean hospital stay of 8.6 days (2 - 29 days) and the in-hospital management included inotropic therapy in 24.2%, mechanical ventilation in 9.7% and hemodialysis in 1%. Nineteen of the patients with AHF died in the hospital (18.4%). Comparison of patients who died with those who survived

Table 1: Clinical characteristics of the acute heart failure study patients

Parameter	Number and percentage / mean value
Age (years)	66 \pm 15 (23-100)
Gender (male)	69 (67%)
Duration of hospital stay (days)	8.6 \pm 6 (2-29)
Known heart failure (ADHF)	11 (10.7%)
Cardiac disease	
Dilated CMP	77 (74.8%)
Ischemic heart disease	48(46.6%)
Arrhythmia	76 (75.8%)
Atrial fibrillation	41 (39.8%)
Valvular disease	57 (55.3%)
Concomitant non – cardiac disease	
Diabetes	61 (59.2%)
Treated Hypertension	49 (47.6%)
Renal dysfunction	30 (29.1%)
Hyperlipidemia	6 (5.8%)
Smoker (in male patients)	30 (43.5%)
Findings at presentation	
SBP (mmHg)	120 +/- 25 (60-180)
SBP< 110	49 (47.5%)
Pulse (b/min)	92 +/- 26
Serum Sodium <135	38(36.9%)
Serum Hb (g/L)	11.5 +/- 1.9
Anemia by WHO	44(42.7%)
Left ventricular ejection fraction $\leq 40\%$	56(54.4%)
Treatment	
Inotropes	25 (24.2%)
Mechanical ventilation	10 (9.7%)
hemofiltration	1 (1%)
In-hospital mortality	19 (18.4%)

ADHF = acute decompensated heart failure, CMP = cardiomyopathy, COPD = chronic obstructive airway disease, SBP= systolic blood pressure, n = 103.

Table 2 shows that deaths were higher among females (P = 040), and in patients with renal impairment (P = 016), ADHF (P = 000), and with lower presenting systolic BP (P = 007). Comparison of patients who died with those discharged alive shows more deaths among females (P = 040), patients with renal impairment (P = 016), ADHF (P = 000) and with having a lower systolic BP on admission (P = 007).

Table 2: Comparison of clinical characteristics of AHF patients who were discharged alive versus those who died in hospital

Parameter	Patients discharged alive (n = 69)	Patients who died in the hospital (n = 34)	P value
Age (years)	65.3	69.6	0.273
Gender (female)	24	10	0.040
Duration of hospital stay (days)	8.9	8.5	0.783
De novo heart failure	80	11	0.000
Concomitant disease			
Diabetes	49	12	0.453
Hypertension	38	11	0.229
Renal impairment	20	10	0.016
COPD	17	6	0.284
Findings at presentation			
Systolic BP on admission (mmHg)	128	102	0.007
SBP \leq 110 (mmHg)	37	12	0.125
Pulse (bpm)	84	94	0.143
Serum K (meq/L)	4	4.3	0.134
Serum Na \leq 135 (meq/L)	32	6	0.807
Serum Hb (g/L)	10.9	11.6	0.191
Anemia by WHO	35	10	0.223
Creatinine (mg/dl)	1.85	1.33	0.520
LVEF \leq 40%	22	5	0.437
Reported values are means \pm SD or n (%)			

LVEF = left ventricular ejection fraction

Table 3 shows the medications prescribed to the patients while in the hospital. Angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin receptor blocker (ARBs) prescribed in 71.4%, beta- blockers in 44%, mineralocorticoid receptor antagonists (MRAs) 59.5%, aspirin 57%, Clopidogrel 38%, vitamin K antagonist 28.5 %, Hydroxy-3-methylglutaryl-coenzyme A reductase inhibitors (statins) 68%, digoxin 26%, oral nitrates 31%, diuretic (Frusemide) in 94 % and amiodarone in 19%.

Table 3: Medications prescribed for the discharged patients (n=84)

ACEI/ ARBs	60 (71.4%)
Beta blockers	37 (44%)
Mineralocorticoid antagonist	50 (59.5%)
Aspirin	48 (57%)
Clopidogrel	32 (38%)
Vit K antagonist	24 (28.5%)
Lipid regulating drugs (Statins)	57 (68%)
Digoxin	22 (26%)
Nitrates	26 (31%)
Diuretic	79 (94%)
Amiodarone	16 (19%)

Discussion

Comparison of our studied patients with those from large European and American AHF (11-15) registries shows the following: Our patients were younger (mean age of 66 years compared with 71-75 years) and had a higher ratio of males (69% compared with 50%), however, they were older than patients from the Gulf-area registry (Gulf care) (16) and from other low-income African countries (17) (59 and 42 years mean ages respectively). The male ratio in the Gulf registry was similarly high 63%. Only 11 (10.7%) of our patients were known to have previous heart failure in contrast to 65 - 87% of western registries suggesting either delayed or missed diagnosis of HF. Unlike acute coronary syndromes, where a biomarker such as a cardiac troponin establishes the diagnosis, AHF lacks a readily available and universally accepted criterion standard for the acute care setting (18). Initial diagnosis of AHF should be based on a thorough history and physical examination and further confirmed by appropriate additional investigations such as ECG, chest X-ray, laboratory assessment and echocardiography (2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure) (19). Initial diagnosis may be difficult at the primary care level because of the variable clinical presentations of HF. BNP or NT-proBNP measurement supports clinical judgment for the diagnosis of acutely decompensated HF, especially in the setting of uncertainty for the diagnosis (ACCF/AHA2013) (20). They should be measured in all patients with acute dyspnoea and suspected AHF upon presentation to the ED or CCU/ICU (ESC2016) (19). In our patients, BNP level was not measured as the test was not available.

Regarding the concurrent diseases, 60% of our patients had diabetes, which was higher than both the western and Gulf registries (40 and 50%, respectively) and 47.6% gave a history of treated hypertension which was lower than 53 - 72% in the western registries. Renal impairment (29.1%) and COPD (22.3%) were comparable with that in the western registries (17-30% and 28-31% respectively). The mean SBP in our study (120 ± 25 mmHg) was lower compared with a mean SB of 133 - 145 mmHg in the western registries and 47.5% of our patients had a $SBP \leq 110$ compared with 20% patients with $SBP \leq 110$ in an Italian registry on AHF (21). According to the WHO criteria^[22] ($Hb < 13$ g/L in men and < 12 g/L in women), 55.3% of our patients were anemic, a remarkable finding compared with 14.7% in the EHFS II (13) and 36.9% of our patients had presenting hyponatremia (serum $Na \leq 135$ mEq/L) compared with 20 - 25% in the western registries. DCM is defined as $LVEF < 40\%$ in the presence of increased left ventricular dimensions and there are a number of possible causes that includes ischemic, idiopathic, familial-genetic, immune, alcoholic, toxic, and valvular heart disease (23). There was a markedly high percentage of DCM in our study (74.8% compared with 19.3% of the Euro American registries), and it could be due to late presentation of the patients.

In-hospital management included inotropic therapy (dopamine or dobutamin) in 24.2% of our patients compared with 9-10 % in the western registries and invasive mechanical ventilation in 9.7% compared with 5.1% in EHFS II (8). The 18.4% in-hospital mortality in our study was high (18.4%) compared with 4-7% mortality in western registries, or 6.3% in Gulf registry. Statistical analysis showed association between mortality and female gender ($P = 040$), renal impairment ($P = 016$), past history of HF ($P = 000$) and lower systolic BP on presentation ($P = 007$). Initiation or up-titration of evidence-based chronic HF therapies during hospitalization may improve post-discharge event rates (19, 24) and evidence based medications ACEIs/ARBs, beta-blockers and MRAs were prescribed in 71.4%, 44% and 59.5% of the discharged patients compared with 82, 59% and 54% in the Euro HFS II (2006).

Digoxin is considered of less certain benefits in HF with reduced EF (19), its use in our patients (26%) was comparable with Euro HFS II. Statins reduce mortality and morbidity in patients with atherosclerotic disease, but are not effective in improving the prognosis in patients with AHF, and evidence does not support their initiation (19). Statins' prescription was higher in our patients (68% compared with 28.4% in Euro HFS II). Similarly, there was higher prescription of anti-platelet drugs Aspirin and clopidogrel (57% and 38% compared with 42.9 and 7.9% in EHFS II), although there is no evidence on their benefits in patients with HF without accompanying IHD and there is a substantial risk of gastrointestinal bleeding, particularly in elderly subjects (19). Amiodarone was prescribed in 19% compared with 12.9% in EHFS II. Recent studies suggest that amiodarone does not reduce mortality in patients with HF while implantable cardioverter-defibrillators (ICDs) are effective in preventing and correcting potentially lethal ventricular arrhythmias in HF (19, 25). Our study has several limitations; the diagnoses was made according to the clinical judgment of the admitting doctors, important data was not documented especially the hemodynamic profile of the patients, the reasons for choosing the medications, and the likely precipitating factors of AHF. In conclusion, compared with European and American AHF patients, our study patients were of younger age and higher ratio of males and of De Novo presentation. In-hospital mortality was higher too and could be due to the high prevalence of known mortality risk factors (diabetes, low systolic BP, anemia, hyponatremia). Up on discharge, there was less prescription of RAAS and beta-blockers, and higher prescription of statins, anti-platelet drugs and amiodarone. We recommend increased awareness of heart failure and its risk factors at the primary care level and development of local guidelines for the proper management of both acute and chronic heart failure.

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