Clinical Profile of Acute Heart Failure Patients hospitalized at a tertiary centre in south India.

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Abstract-
Background and Aim: Acute Heart Failure (AHF) is a leading cause of hospitalizations globally in patients aged >65 years and is associated with high mortality and rehospitalization rates. In-hospital mortality ranges from 4% to 10% in western countries. Epidemiology of Heart Failure (HF) in India hasn't been studied fully, however a preliminary estimate on the community-level prevalence of HF in the adult population in India is about 1%.The prognosis of AHF in Indian patients is poor with higher in-hospital mortality rates which vary between 8.4% - 30.8%.As the outcomes of AHF remains poor and prospective Indian data on In-hospital outcomes of AHF and adherence of guideline-directed medical therapies (GDMTs) at discharge is far from complete, we sought to study the clinical profile and short-term prognosis of patients with AHF admitted in a tertiary care center.

METHODS

This was a single centre Prospective observational study conducted in Department of Medicine, JIPMER. Hospitalized AHF patients were consecutively enrolled from February 2020 to November 2021. The Institute Ethics Committee (Human Studies) approved the protocol on 20th February,2020. Patients aged >18 years, admitted primarily for new onset or worsening signs and symptoms of heart failure and Echocardiographic evidence of anyone 1. Ejection Fraction <50%, 2. Structural Heart Disease, 3. Diastolic Dysfunction were included in this study.Patients with Heart Failure due to non-cardiac causes (Haematological, Endocrinological) were excluded from the study.

RESULTS

324 patients with Acute Heart Failure were screened during the study period (February 2020 to November 2021) and 210 patients were enrolled in the study after applying inclusion and exclusion criteria. Mean age of the study population was 55.57 ± 15 years with 85 patients (40%) above the age of 60 years with male preponderance(61%). Heart Failure with reduced Ejection Fraction (HFrEF) was the most common type seen in 53% followed by Heart Failure with preserved Ejection Fraction (HFpEF)in 30% and Heart Failure with mildly reduced Ejection Fraction (HFmrEF) 17% respectively. Most common co-morbidities were Diabetes Mellitus (59%) followed by hypertension (44%), dyslipidaemia (14%) and Atrial fibrillation (9%). Both Diabetes and hypertension was present in 32%. Previous admission for heart failure was documented in 43% patients. 55% patients had Acute coronary syndrome at admission. The most common aetiology for HF was *ischemic heart disease* (73%) followed by Rheumatic heart disease (17%). Cardiogenic shock requiring inotropes and Hypertensive Emergency was present in 25.7% and 11.4% respectively. Median hospital stay with IQR was 5 (5–10). 43% of the patients had a hospital stay of less than 5 days and 94% of the patients had hospital stay under 15 days. In-hospital complications occurred in 56% patients and the most common one was Acute Kidney Injury (39%). In-hospital mortality occurred in 18% of the AHF patients. At discharge, Angiotensin converting enzyme inhibitors (ACE-I) or Angiotensin Receptor Blockers (ARB) were prescribed in 72% and Beta-Blockers in 69%. Statins were the most prescribed drug which was given to 89%. Age (p=0.027) and cardiogenic shock (p=0.005) at admission were associated with an increased risk of in-hospital mortality. No other parameters were predictor of inpatient mortality with statistical significance.

Conclusion

Patients with Acute Heart Failure were younger with male predominance. 18% patients had in-hospital mortality and 16% were readmitted within 90 days of discharge. Most common aetiology of heart failure was ischemic heart disease followed by Rheumatic Heart Disease. Advanced age and cardiogenic shock at presentation were associated with increased risk of in hospital mortality. A larger prospective study comprising multiple study centres with a longer follow up period could unravel the real epidemiological

burden and the cause for mortality among Acute Heart Failure patients.

Key words: Acute Heart Failure (AHF), Guideline-Directed Medical Therapies (GDMTs), Heart Failure with reduced Ejection Fraction (HFrEF), Heart Failure with preserved Ejection Fraction (HFpEF), Heart Failure with mildly reduced Ejection Fraction (HFmrEF).

INTRODUCTION

Acute Heart Failure (AHF) is defined as the rapid development or change of symptoms and signs of heart failure requiring unplanned hospital admission or an emergency department visit.[1] AHF is a leading cause of hospitalizations globally in patients aged >65 years and is associated with high mortality and rehospitalization rates. In-hospital mortality ranges from 4% to 10% in western countries. [2–4] Epidemiology of Heart Failure (HF) in India hasn't been studied fully, however a preliminary estimate on the community-level prevalence of HF in the adult population in India is about 1%.[5] The prognosis of AHF in Indian patients is poor with higher in-hospital mortality rates which vary between 8.4% - 30.8%. The INTER-CHF study also reported a mortality rate of 37% in Indian patients. The cumulative 1-month, 3-month, and 6-month mortality rates of discharged patients were 15.8%, 26.3%, and 26.3%, respectively suggesting that the maximum events were occurring either within the hospital or within 3-month following discharge. [6–11] As the outcomes of AHF remains poor and prospective Indian data on In-hospital outcomes of AHF and adherence of guideline-directed medical therapies (GDMTs) at discharge is far from complete, we sought to study the clinical profile and short-term prognosis of patients with AHF admitted in a tertiary care center.

METHODS

This was a single centre Prospective observational study conducted in Department of Medicine, JIPMER. Hospitalized AHF patients were consecutively enrolled from February 2020 to November 2021. Patients aged >18 years, admitted primarily for new onset or worsening signs and symptoms of heart failure and Echocardiographic evidence of anyone 1. Ejection Fraction <50%, 2. Structural Heart Disease, 3. Diastolic Dysfunction were included in this study. Patients with Heart Failure due to non-cardiac causes (Haematological, Endocrinological) were excluded from the study.

DATA COLLECTION

Detailed history was taken, and clinical examination was done at admission and laboratory parameters were collected from the case records. The participants were clinically reassessed daily for symptomatic improvement/worsening, vitals and treatment and
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investigational details were recorded till the day of discharge/mortality. After Discharge the patients were followed up once at one month and once again three-month period on the day of their OPD follow up and clinical data was collected

STATISTICAL ANALYSIS

Normality of the data will be assessed by Kolmogorov-Smirnov tests. Variables with normal tendencies will be presented as mean and SD. Variables with non-normal tendencies will be presented as median Interquartile range. Categorical data will be expressed as proportion and percentage. Student t-test or Mann Whitney U Test continuous variables and Chi-Square or Fisher's Exact Test for Categorical variables were applied based on the normality on data distribution.

RESULTS

Characteristics	Overall N=210 (%)	In Hospital Mortality n=38(%)	Survivors n=172 (%)	Statistical Analysis (p)
Age in years (Mean ± SD)	55.57 ± 15	56.3 ± 15.8	55.3 ± 14.8	0.71
Gender Males No.(%) Females No.(%)	128 (61) 82 (39)	27 (71) 11 (29)	101 (59) 71 (41)	0.02
Diabetes Mellitus	124 (59)	27 (71)	97 (56)	0.09

Ischemic Heart Disease	**82 (39)**	**24 (63)**	**58 (34)**	**0.62**
Hypertension	**92**	**17 (45)**	**75 (44)**	**0.07**
Rheumatic Heart Disease	**36 (17)**	**5 (13)**	**31 (18)**	**0.63**
Chronic Kidney Disease	**44 (21)**	**11 (29)**	**33 (19)**	**<0.001**
Atrial Fibrillation	**19 (9)**	**3 (8)**	**16 (9)**	**<0.001**
Pulse (Mean ± SD)	**97.5 ± 23.1**	**94.4 ± 25.7**	**98.2 ± 22.4**	**0.17**
Systolic Blood Pressure (Median ± IQR)	**120 (90-140)**	**85 (70 – 130)**	**120 (98 – 140)**	**0.03**
Diastolic Blood Pressure (Median ± IQR)	**74 (60-90)**	**60 (50 – 82)**	**79 (60 – 90)**	**0.08**
Pedal Edema	**89 (42)**	**16 (42)**	**73 (58)**	**0.02**
Room Air Saturation (Mean ± SD)	**88.4 ± 9**	**83.4 ± 10.1**	**89.6 ± 9.3**	**0.35**
ICU Admission (Median ± IQR)	**94 (45)**	**18 (48)**	**76 (44)**	**0.12**
Acute Severe Hypertension	**24 (11.4)**	**5 (13)**	**19 (11)**	**<0.001**
Cardiogenic Shock	**54 (25.7)**	**20 (53)**	**34 (20)**	**<0.001**
Acute Kidney Injury	**83 (40)**	**19 (50)**	**64 (37)**	**<0.001**
Forrester Classification **Warm and Dry** **Warm and Wet** **Cold and Dry** **Cold and Wet**	**32** **123** **16** **39**	**2** **17** **3** **16**	**30** **106** **13** **23**	**<0.001**

324 patients admitted with Acute Heart Failure were screened during the study period and 210 patients were enrolled in the study after applying inclusion and exclusion criteria. Mean age of the study population was 55.57 ± 15 years with 85 patients (40%) above the age of 60 years. Majority of the patients were men (61%). HFrEF was the most common type seen in 53% followed by HFpEF in 30% and HFmrEF 17% respectively.

Most common co-morbidities were Diabetes Mellitus (59%) followed by hypertension (44%), dyslipidaemia (14%) and Atrial fibrillation (9%). Both Diabetes and hypertension was present in 32%. Previous admission for heart failure was documented in 43% patients. 55% patients had Acute coronary syndrome at admission. The leading etiology for HF was ischemic heart disease (73%) followed by Rheumatic heart disease (17%) and remaining 10% comprised of Myocarditis, Dilated Cardiomyopathy, and congenital heart diseases.

Presenting symptom were shortness of breath (82%) followed by chest pain (58%), pedal Edema (39%), cough (24%) and palpitations (22%). Mean pulse rate was 97.5 ± 23.1 beats per minute. Electrocardiogram showed Normal sinus rhythm in 89% patients. Median with Inter-Quartile Range (IQR) for systolic Blood Pressure and Diastolic blood pressure were 120 (90-140) and 74 (60-90) respectively. Cardiogenic shock requiring inotropes and Hypertensive Emergency was present in 25.7% and 11.4% respectively. Mean room air saturation was 88.4 ± 9 with 50% patients requiring supplemental oxygen. Non-invasive ventilation (NIV) and invasive mechanical ventilation (IMV) were required in 14% and 11% respectively.

Median hospital stay with IQR was 5 (5–10). 43% of the patients had a hospital stay of less than 5 days and 94% of the patients had hospital stay under 15 days. In-hospital complications occurred in 56% patients of which the most common one was Acute Kidney Injury (39%). In-hospital mortality occurred in 18% of the AHF patients. At discharge, Angiotensin converting enzyme inhibitors (ACE-I) or Angiotensin Receptor Blockers (ARB) were prescribed in 72% and Beta-Blockers in 69%. Statins were the most prescribed drug which was given to 89%.

At 30 day follow up, 12 patients were lost to follow up, 13 patients were readmitted, and one patient died. At 90 day follow up, 26 patients were lost to follow up, 28 patients were readmitted, and 3 patients expired. At the end of 90 days, 143 patients completed follow up without readmission or mortality.

Predictors of Mortality

Age (p=0.027) and cardiogenic shock (p=0.005) at admission were associated with an increased risk of in-hospital mortality. No other parameters were predictor of inpatient mortality.

Table 18. Bivariate Analysis of Predictors of In-hospital mortality

Parameter	Odds Ratio	p Value
Gender	0.89	0.81
Age	1.05	0.75
Diabetes Mellitus	0.39	0.07
Hypertension	1.51	0.44
Atrial Fibrillation	1.43	0.13
Chronic Kidney Disease	0.43	0.13
HFrEF	0.01	0.99
HFmrEF	3.32	0.19
HFpEF	0.29	0.94
Pulse	1.09	0.44
Serum Sodium	1.02	0.45
eGFR	1.08	0.24
Hospital Stay	0.94	0.22
Cardiogenic Shock	1.35	0.005

DISCUSSION

This study provides descriptive data of clinical profile of AHF. The mean age of patients in our population was 55.57 ± 15 years with 40.4% of the patients were elderly (above 60 years). Ganapathi et al published the findings from Chitra Heart Failure Registry from Trivandrum studied 1502 AHF patients and reported mean age of 51.1 ± 14.3 years and 62.3% patients were males.[12] A retrospective cohort by Munusamy et al of 351 AHF from SRM Institute Tamil Nadu showed mean age of 57.78 ± 12.78 years and males representing 63% of the population.[10] Acute Failure Registry Study (AFAR Study) conducted in AIIMS Delhi which studied 90 AHF patients had mean age of 53.5 ± 17.7 years with 63% being males.[9] ADHERE (Acute Decompensated Heart Failure National Registry) and OPTIMIZE- HF (Organized Program to Initiate Lifesaving Treatment In-Hospitalized Patients with Heart Failure) reported mean age of 72 and 73 years respectively.[14,15]

Median with IQR of Systolic Blood Pressure (SBP) and Diastolic blood pressure (DBP) were 120 (90-140) mmHg and 74 (60-90) mmHg respectively. 25% had cardiogenic shock requiring inotropes and 11% had hypertensive emergency/Acute Severe Hypertension. Similar findings were observed in AFAR study with Mean Pulse Rate – 93.2 ± 23.3 beats per minute, Mean SBP 111 ± 31.3 mmHg and Mean DBP 67.4 ± 18.2 mmHg as well as study done by Munusamy et al which reported mean pulse rate – 94.1 ± 28.8 beats per minute , mean SBP 121.7 ± 27.4mmHg and DBP 78.3 ± 15.6mmHg.[9,10] Shiraishi et al reported the collective data of three nationwide AHF registries in Japan which observed intubation rates between 4.9% - 7.5% and NIV requirement in 22.2 – 24.4 % of the patients.[16] Cardiogenic Shock accounted for 2% of the cases in ADHERE and 8% in OPTIMIZE-HF studies.[17,18]

In-Hospital mortality occurred in 18% of the AHF patients. Proportion of Male gender, renal dysfunction, atrial fibrillation, lower systolic blood pressure, cardiogenic shock, inotrope requirement, HFpEF and HFmrEF were higher in group with in-hospital mortality however on bivariate analysis, only cardiogenic shock and diabetes mellitus were associated with an increased risk of in-hospital mortality. Mortality during index admission varied from 4-7% among western AHF registries like ADHERE, OPTIMIZE-HF and EURO-HF (European Heart Failure Survey).[17–19] Indian Studies conducted by Roby et al, Ganapathi Et al and John et al observed mortality rates of 13%, 16% and 13% respectively but AFAR Study reported in-hospital mortality rate in 31%.[9,12,20,21]

Angiotensin converting enzyme inhibitors (ACE-I) or Angiotensin Receptor Blockers (ARB) were prescribed in 72% and Beta-Blockers in 69%. Statins were the most prescribed drug which was given to 89%. In the AFAR Study, Angiotensin converting enzyme inhibitors (ACE-I) or angiotensin receptor blockers (ARBs) were given at discharge to 71.1% and beta-blockers to 47.6%.

Our study showed significantly low Mortality in follow up compared to other studies, Indian and western. This could be a result 26 patients who were lost to follow up due to the covid-19 pandemic. Vellore Heart Failure Registry reported 30 day and 90 days mortality as 27% and 32% of AHF patients.[21] A higher mortality rate was reported at 90 days in EURO HF (6%) and OPTIMIZE-HF (8%).[18,19]

LIMITATIONS

Our study's sample size is small. Ours is a tertiary care centre, hence mortality/outcome could be worse due to admission of seriously ill cases requiring intensive care . 26 patients were lost to follow up due to the covid pandemic. Readmission rates and mortality rates after discharge could be skewed because of this. Short Follow Up Period: Due to the time bound nature of the study, longer follow up could not be planned.

Conclusion

Patients with Acute Heart Failure were younger with male predominance. 18% patients had in-hospital mortality and 16% were readmitted within 90 days of discharge. Most common aetiology of heart failure was ischemic heart disease followed by Rheumatic Heart Disease. A larger prospective study comprising multiple study centres with a longer follow up period could unravel the real epidemiological burden and mortality among Acute Heart Failure patients

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