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Frequency of Various Clinical Triggers Precipitating Acute Heart Failure in Patients with Known Heart Failure with Reduced Ejection Fraction

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Abstract:

INTRODUCTION: *Acute heart failure (AHF) is one of the leading causes of unscheduled hospitalization and is associated with frequent readmissions, morbidity and mortality. Precipitating factors of AHF influence short-term mortality. These patients often suffer from co-morbidities including diabetes, hypertension and ischemic heart disease resulting in frequent hospital admissions and greater burden on the health service. The present study assessed the precipitating factors at admission in acute heart failure patients.*

OBJECTIVE: *To determine frequency of various clinical triggers precipitating acute heart failure in patients with known heart failure with reduced ejection fraction*

DURATION & STUDY DESIGN*: Six months after approval of synopsis this Descriptive cross sectional study conducted was conducted at Department of Cardiology.*

METHODOLOGY: *Data was prospectively collected from patients after taking a verbal consent. 149 patients who met the diagnostic criteria were included. Quantitative data was presented as simple descriptive statistics giving mean and standard deviation and qualitative variables was presented as frequency and percentages. Effect modifiers were controlled through stratification to see the effect of these on the outcome variable. Post stratification chi square test was applied taking p-value of ≤0.05 as significant.*

RESULTS: *A total of 298 acute heart failure patients were included in this study. Mean age in our study was 53.14±8.49 years. 182 (61.1%) were male and 116 (38.9%) were female. Out of 298 acute heart failure patients the frequency of triggering factors were 12.1%, 16.1%, 16.8%, 20.8%, 10.1%, 62.4% and 56.4% due to pulmonary infection, myocardial ischemia, arrythmia, uncontrolled hypertension, worsening renal function, noncompliance to medication and non-compliance to diet respectively.*

CONCLUSION: *Awareness of potential precipitating factors may help to optimize treatment and provide guidance for patients with heart failure. The presence of potential precipitating factors should be routinely evaluated in patients presenting acute heart failure.*

Keywords: Acute heart failure, pulmonary infections, myocardial ischemia, arrhythmias, uncontrolled hypertension, non-adherence to medications

INTRODUCTION

Acute heart failure is defined as a clinical syndrome characterized by new onset or worsening of pre-existing symptoms of chronic heart failure requiring urgent or emergent therapy and hospitalization. Acute heart failure patients may present as first ever episode of heart disease or more commonly as worsening of pre-existing chronic heart failure [1], sometimes called as acute decompensation of chronic heart failure. Acute heart failure commonly presents with features of congestion either peripheral or pulmonary congestion. Peripheral congestive features include peripheral edema, weight gain, jugular venous distension, hepatic enlargement, hepato-jugular reflux and ascites. Pulmonary congestion presents as shortness of breath and fine crackles over lung fields [1]. Dyspnea is most common presenting symptom of acute heart failure [2]. The clinical examination (i.e., a history and physical examination) remains central in the management of patients with heart failure [4]. Examination in acute heart failure may reveal an elevated jugular venous pressure, fine crackles over lung fields, S3 gallop rhythm and decreased oxygen saturation on pulse oximetry. Chest radiology during acute heart failure may demonstrates increased lung vascular markings, kerley A lines, kerley B lines or bilateral airspace shadowing of frank pulmonary edema[7] The overall in-hospital mortality rate ranges from 4%-7% [5] in most registries including ADHERE, OPTIMIZE HF, and ALARM- HF registries, with a reported 0 – 90 days rehospitalzation rate ranged between 25 – 30% [5] . Acute decompensation of chronic heart failure can occur in various clinical settings. Various clinical triggers precipitate acute heart failure in a patient with pre-existing heart failure with reduced ejection fraction. In OPTIMZE HF registry, it was found that 61% patients with acute heart failure had clinically identifiable triggers most common being Pulmonary infections (15.3%), myocardial ischemia (14.7%), arrhythmias (13.5%), uncontrolled hypertension (13%), non adherence to medications (9%), worsening renal function (7%), non adherence to diet (5%) and other less common triggers like myocarditis, urinary tract infection, infective endocarditis, anemia, pulmonary embolism, and beta blocker therapy[7]. Every effort should be made to identify and address these clinical triggers in order to improve management and risk stratification strategies in high-risk patients and institution of appropriate preventive measures, which can prevent re-hospitalization of patients for acute heart failure and morbidity and mortality associated with acute heart failure.

METHODOLOGY:

All the patients presenting with complaints of shortness of breath, orthopnea, pedal edema and having fine crackles over lung fields and meeting inclusion criteria were included in study by researcher. Patient's vital status including heart rate, blood pressure, total leukocyte count, troponin I, electrocardiograph (ECG) and chest radiograph would be obtained as described in operational definition. This study was conducted at Department of cardiology Civil Hospital Karachi. The time limit of study would be 6 months after approval of synopsis. Informed consent was obtained from all patients attendants for assigning them to study and using their data in research. Study of the patients was done after a written consent is signed.

Using software, SPSS version 20 data was analyzed. Frequency and percentages was computed for gender, comorbid conditions like hypertension and

diabetes mellitus, family history of heart failure and each clinical trigger (Pulmonary infection, Myocardial ischemia, arrhythmia, uncontrolled hypertension, worsening renal function, non-compliance to diet and medication). The proportion for each clinical trigger was estimated. Mean and SD was computed for age. Data was presented in form of Bar chart. Effect modifiers like age, gender, duration of symptoms, family history of heart failure and comorbids conditions were controlled through stratification.

RESULT

A total of 149 acute heart failure patients admitted at Department of Cardiology, Civil Hospital, Quetta who met the inclusion and exclusion criteria were included in this study. Out of 149 acute heart failure patients minimum age of the patient was 34 while maximum age of the patients was 75 years. Mean age in our study was 53.14±8.49 years. As shown in Table 1.

Out of 149 acute heart failure patients, 18 (12.1%) and 131 (87.9%) had and did not have pulmonary infection. As shown in Figure 1.

Out of 149 acute heart failure patients, 24 (16.1%) and 125 (83.9%) had and did not have myocardial ischemia. As shown in Figure 2.

Out of 149 acute heart failure patients, 25 (16.8%) and 124 (83.2%) had and did not have arrythmia. As shown in Figure 3. 62 Out of 149 acute heart failure patients, 31 (20.8%) and 118 (79.2%) had and did not have uncontrolled hypertension. As shown in Figure 4.

Out of 149 acute heart failure patients, 15 (10.1%) and 134 (89.9%) had and did not have worsening renal function. As shown in Figure 5.

Out of 149 acute heart failure patients, 93 (62.4%) and 56 (37.6%) had and did not have non-compliance to medication. As shown in Figure 6.

Out of 149 acute heart failure patients, 84 (56.4%) and 65 (43.6%) had and did not have non-compliance to diet. As shown in Figure 7.

Out of 149 acute heart failure patients, 91 (61.1%) were male and 58 (38.9%) were female. As shown in Figure 8.

Frequency distribution of age showed that out of 149 acute heart failure patients, 16 (10.7%), 63 (42.3%) and 70 (47%) patients were in age group 20-40 years, 41-60 years and 61-80 years respectively. As presented in Figure 9.

63 Frequency distribution of symptoms showed that out of 149 acute heart failure patients, 19 (12.8%) and 130 (87.2%) had symptoms < 24 hour and > 24 hours respectively. As presented in Figure 10.

Frequency distribution of diabetes mellitus type II showed that out of 149 acute heart failure patients, 73 (49%) and 76 (51%) had and did not have diabetes mellitus type II respectively. As presented in Figure 11.

Frequency distribution of hypertension showed that out of 149 acute heart failure patients, 106 (71.1%) and 43 (28.9%) had and did not have hypertension respectively. As presented in Figure 12.

Stratification for age with respect to pulmonary infection showed that 00 (00%), 00 (00%) and 18 (100%) patients who 64 were in age group 20-40 years, 41-60 years and 61-80 years had pulmonary infection respectively. Whereas 16 (12.2%), 63 (48.1%) and 52 (39.7%) patients who were in age group 20-40 years, 41-60 years and 61-80 years did not have pulmonary infection respectively. P-value was 0.00. As presented in Table 2.

Stratification for gender with respect to pulmonary infection showed that 12 (66.7%) and 79 (60.3%) who were in male group had and did not have pulmonary infection respectively. Whereas 06 (33.3%) and 52 (39.7%) who were in female group had and did not have pulmonary infection respectively. P-value was 0.40. As presented in Table 3.

Table-1: Descriptive Statistics

VARIABLE	MEAN ±SD	MIN-MAX
AGE (YEARS)	53.14±8.49	34-75

Figure-1: Pulmonary Infection Distribution

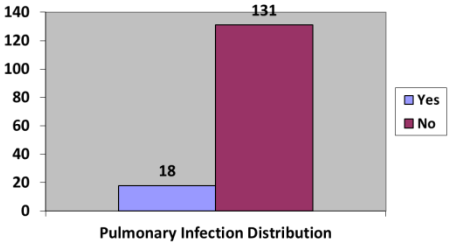

Figure-2: Myocardial Ischemia Distribution

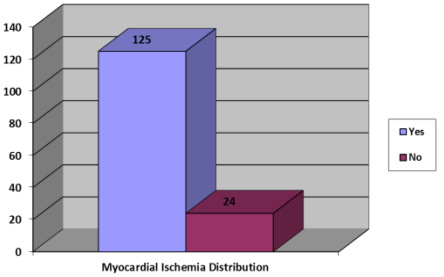

Figure-3: Arrythmia Distribution

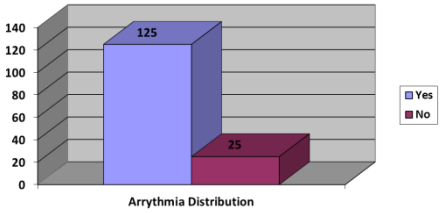

Figure-4

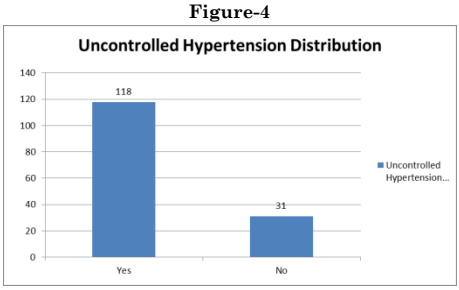

Figure 5

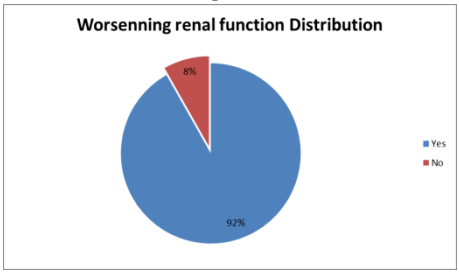

Figure 6

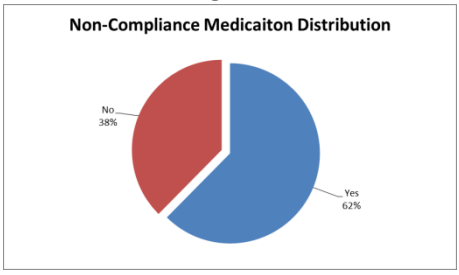

Figure-7: Non-Compliance to Diet Distribution

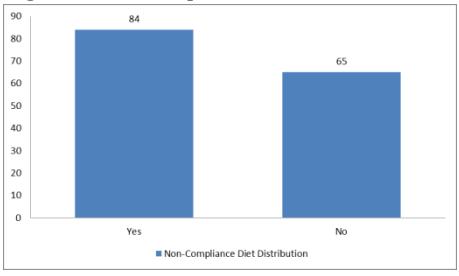

Figure 8

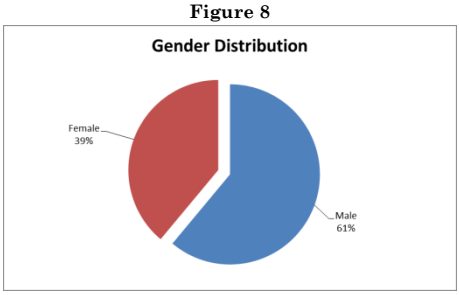

Figure 9

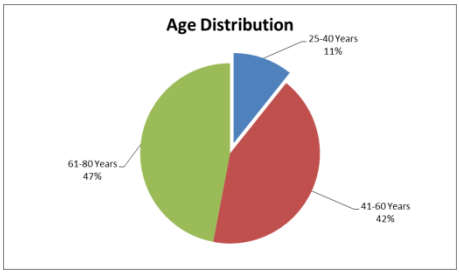

Figure 10: Duration of Symptoms Distribution

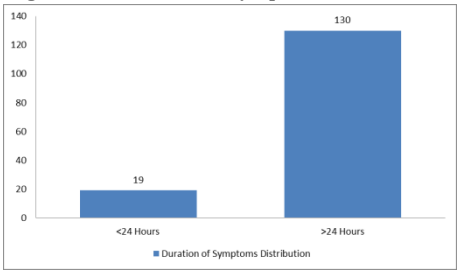

Figure-11: Type 2 Diabetes Mellitus Distribution

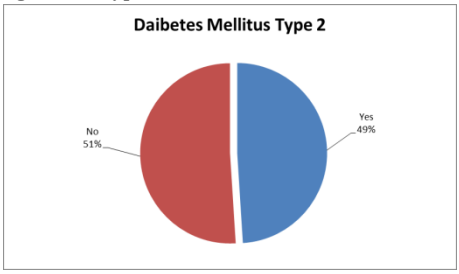

Figure-12: Hypertension Distribution

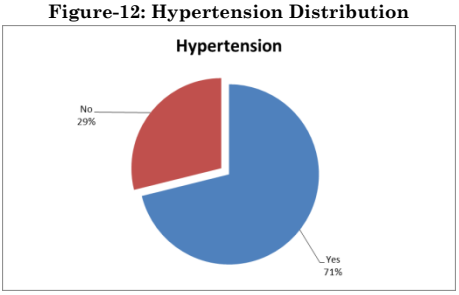

Table-2: Pulmonary Infection according to Age

Age	Pulmonary Infection	
	Yes	No
24-40 Years	08	16
41-60 Years	00	63
61-80 Years	18	70
Total	26	149

Table-3: Pulmonary Infection according to Gender

Age	Pulmonary Infection	
	Yes	No
Male	12	79
Female	06	58
Total	18	131

DISCUSSION

Heart failure (HF) is an increasingly prevalent disease in developed and developing countries. This population is expected to increase 3 as the survival rates of both ischemic heart disease (IHD) and HF are improving. During the past decade, there has been a stepwise improvement in terms of understanding the pathophysiology and treatment of chronic HF patients. Despite better medical care, HF patients are frequently re-hospitalized and consume medical services. In fact, HF is considered to be the number 1 reason for readmission in both medical and surgical groups. Therefore, it is important to identify factors associated with long-term morbidity and mortality among patients hospitalized for acute HF. Precipitating factors leading to heart failure decompensation can be identified in many instances when a careful history is obtained, and may be associated with subsequent outcomes. Precipitants represent important targets for preventive interventions that are highly cost effective.

Our study included a total of 149 acute heart failure patients. Mean age in our study was 53.14±8.49 years. 91 (61.1%) were male and 58 (38.9%) were female. Out of 149 acute heart failure patients the frequency of triggering factors were 12.1%, 16.1%, 16.8%, 20.8%, 10.1%, 62.4% and 56.4% due to pulmonary infection, myocardial ischemia, arrythmia, uncontrolled hypertension, worsening renal function, noncompliance to medication and non-compliance to diet respectively.

Another study showed that the mean patient age was 73.1 years, 52% of patients was female, and mean ejection fraction was 39.0%. Of 48 612 patients, 29 814 (61.3%) had 1 or more precipitating factors identified, with pneumonia/respiratory process (15.3%), ischemia (14.7%), and arrhythmia (13.5%) being most frequent.

Pneumonia (odds ratio, 1.60), ischemia (1.20), and worsening renal function (1.48) were independently associated with higher in-hospital mortality, whereas uncontrolled hypertension (0.74) was associated with lower inhospital mortality. Ischemia (1.52) and worsening renal function.

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