

Original Article

Variability and Pattern of Diseases Following Chronic Heart Failure With LV Systolic Dysfunction Who Had Elevated Serum Cardiac Troponin-1 Level.

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Abstract

Objective: The aim of the study was to observe age, sex, age/sex-wise distribution of diseases, occupational status, socio economic status and disease pattern involving chronic heart failure with LV dysfunction. **Materials and Methods:** This study was prospective, cross sectional and observational, carried out among chronic heart failure with LV systolic dysfunction patients in the department of Cardiology NICVD, Dhaka during the period of April 2004 to December 2004. In this study, total 740 patients of chronic heart failure were evaluated randomly. Among 740 patients, initially 100 patients were selected as chronic heart failure on the basis of inclusion and exclusion criteria, history, physical examination biochemical, X-ray, ECG and other relevant investigations. Finally, 60 (Sixty) patients were selected by Echocardiography who had ejection fraction 40%. Serum Cardiac Troponin-I was measured in each and every studied patients. In-hospital outcome, age distribution, sex distribution and disease pattern involving chronic heart failure with elevated serum cardiac Troponin-I level were observed in this study. **Results:** The mean age of the studied patients was 50-20 yrs. Highest percentage (58.33%) was in the age group 41-60 years and lowest (13.33%) in the age range 20-40 yrs. Male patients were higher in number (63.33%) than female patients (33.66%). Among the studied patients, majority were ischaemic Cardiomyopathy (43.33%) followed by idiopathic dilated Cardiomyopathy (30%), valvular heart disease (20%) and lowest (6.67%) hypertensive Cardiomyopathy. Ischaemic Cardiomyopathy were more common (23.33%) in the age group above 60 yrs. Idiopathic dilated cardiomyopathy was highest (21.67%) in age group 41-60 yrs, valvular heart diseases (15%) in the age group 41-60 yrs and equal percentage (3.33%) of hypertensive heart disease were in the age range of 41-60 yrs & above 60 yrs. Among the male patients, Ischaemic Cardiomyopathy was highest (33.33%) in number whereas idiopathic dilated cardiomyopathy was highest (13.33%) in number in female patient. In female Hypertensive heart disease was lowest in both sex. Highest number (53.33%) of patients were in poor socioeconomic status. Lowest (10%) number were rich society. In this study the most common form was left heart failure (55%) and biventricular failure was 45%. 65% patients came from rural area & 35% patients from Urban area. Sedentary worker & housewives suffer most than others. **Conclusion:** In this study, majority patients were male. Most of the patients were in the age group 41-60 yrs. Majority of the patients were ICM. ICM was more common above 60 yrs. Lowest number of patients had hypertensive heart disease. ICM was more in male patients. IDCM was more in female patients. Chronic heart failure was more in sedentary workers than others. Rural people was more affected than Urban people. Left heart failure was more than biventricular failure. Right heart failure or EF 40% were exclude from the study.

Key words: Chronic Heart Failure, systolic dysfunction, Elevated CTnI Level.

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Introduction

Heart failure is common in clinical practice and its incidence is increasing day by day. Heart failure is not a disease per se but a consequence of various cardiovascular disorders. It may be defined as "The pathophysiological state in which an abnormality of cardiac function is responsible with the requirements of the metabolizing tissues and/or can do so only from abnormally elevated ventricular diastolic volume"¹. In practice, heart failure is diagnosed whenever a patient with significant heart disease develops sign and symptoms of low cardiac output, pulmonary congestion or systemic venous congestion. Chronic heart failure is a public health problem in the UK and also in our country. Heart failure is a significant cause of morbidity and mortality. Approximately 50% of patients with severe heart failure due to Left ventricular dysfunction will die within 2 years².

Cardiac Troponin I (cTnI) is an important investigation tool for identification of patients, selection of therapy and assessment of prognosis. Cardiac Troponin I (cTnI) inhibits the actin-myosin interaction³. Troponin I is not expressed in skeletal muscle. So Troponin I is more sensitive for detection of myocardial necrosis⁴. Low-level elevation of serum cTnI has been documented in a number of cardiovascular diseases, including heart failure. The pathology behind serum cTnI elevation in heart failure probably is distinct from that seen during myocardial infarction which is due to necrotic myocardium.

The mechanism of release of serum cTnI believed to be responsible for ongoing irreversible myocyte injury and/or apoptotic cell death in heart failure include activation of adrenergic, renin-angiotensin-aldosterone, or endothelin signaling pathways, calcium-handing abnormalities, inflammatory cytokines, nitric oxide, oxidative stress and mechanical stress⁵. Another possible mechanism of low level elevation cTnI is leakage of the cytosolic pool of cTnI during reversible injury as a result of loss of cell membrane integrity⁶. Patients with advanced heart failure, detection of serum cTnI level is associated with impaired haemodynamics, elevated BNP levels and progressive ventricular dysfunction. Cardiac troponin I level is significant predictor of increased mortality and morbidity rates in patients with ischaemic and non-ischaemic heart failure. So, it is important to see the in-hospital morbidity and mortality in patients with chronic heart failure. In relation to cardiac troponin I, as much type of study had not been carried out previously in our country. Moreover, this study will

create awareness of the physician. So that, they can take aggressive management strategies for these patients. Ultimately, knowledge from the study will give benefit to the individual patient as well as whole nation will be benefited.

Materials and Methods

This study was prospective, cross sectional and observational study. The study was conducted in the Department of Cardiology, National Institute of Cardiovascular Diseases, Sher-E-Bangla Nagar, Dhaka. The period was from April 2004 to December 2004. Among 740 patients, initially 100 patients were selected as chronic heart failure with the help of inclusion & exclusion criteria by taking meticulous history, physical examination and relevant investigations. Echocardiography was done for 100 patients. Among them, 60 patients were finally selected who had ejection fraction =40%. Ejection fraction was done by modified Simpsons method with the help of following formula: $EF = \frac{(LVIDd)^3 - (LVIDs)^3}{(LVIDd)^3} \times 100$. Epidemiological aspect (age, sex, occupation, housing status, socioeconomic status, pattern of heart failure and clinical characteristics of heart failure) were studied. serum Cardiac troponin I (cTnI) was done for the sixty (60) selected patients. On the basis of serum cardiac Troponin I level, patients were divided into two groups, group-A (cTnI level 0.04ng/ml) and group-B (cTnI level) 0.04ng/ml). The patients suffering from Chronic heart failure with ejection fraction (EF) =40% due to Ischaemic cardiomyopathy, Idiopathic dilated cardiomyopathy, Valvular heart diseases involving the left ventricle and Hypertensive heart failure were included in this study. On the other hand, the patients suffering from Acute coronary syndromes, Myocarditis, Corpulmonale, Restrictive (Infiltrative) cardiomyopathy, Congenital heart disease, Heart failure associated with high metabolic demand and Pericardial diseases were excluded. Severe systemic disorders like chronic renal failure, hepatic failure and patients suffering from malignant disorder were also excluded from this study. Protocol was fully explained to the study group of patients and informed consent was taken. Clearance from ethical committee of the institution was obtained. All the information's were recorded in a standard case recording form. Data was processed and expressed in frequency, percentage, mean standard deviation as applicable. Comparison between two groups were done by unpaired student's test and chi-square test. Statistical analysis of result was performed by using SPSS (Statistical package for social science).

P' value of less than 0.05 was considered as significant.

Results

The mean age of the studied patients was 50.20 yrs. Highest percentage (58.33%) was in the age group 41-60 years (Table-I).

Table-I: Age distribution of the study patients

Age group (years)	Number of patients (n=60)	Percentage
20 - 40	8	13.33
41 - 60	35	58.33
> 60	17	28.33

Among the studied patients, male patients were higher in number (63.33%). Majority of patients were Ischaemic Cardiomyopathy (43.33%) (Table-II). Hypertensive Cardiomyopathy was lowest (6.67%) Ischaemic Cardiomyopathy were more common (23.33%) in the age group above 60 yrs (Table-II). IDCM was highest (21.67%) in the age group 41-60 yrs. Valvular heart diseases (15%) was in the age group 41-60 yrs and equal percentage (3.33%) of hypertensive heart disease were in the age 41-60 yrs and above 60 yrs (Table-II).

Table-II: Age-wise distribution of diseases of the study patients

Age group in years	Number of patients n=60	Ischaemic cardiomyopathy n=26 (43.33%)	Idiopathic dilated cardiomyopathy n=18 (30%)	Valvular disease n=12 (20%)	Hypertensive heart disease n=4 (6.67%)
20-40	08(13.33%)	01(1.67%)	04(6.67%)	3(5%)	-
41-60	35(58.35%)	11(18.33%)	13(21.67%)	9(15%)	2(3.33%)
>60	17(28.33%)	14(23.33%)	01(1.67%)	-	2(3.33%)

n denotes number of patients

It was found that among the male patients, Ischaemic Cardiomyopathy was the highest in number (33.33%) followed by IDCM (16.67%), valvular heart disease (8.33%) and hypertensive heart disease (5%) (Fig.-I).

Among the female patients, IDCM was the highest in number (13.33%) and hypertensive heart disease was the lowest in number (1.67%) (Fig.-I).

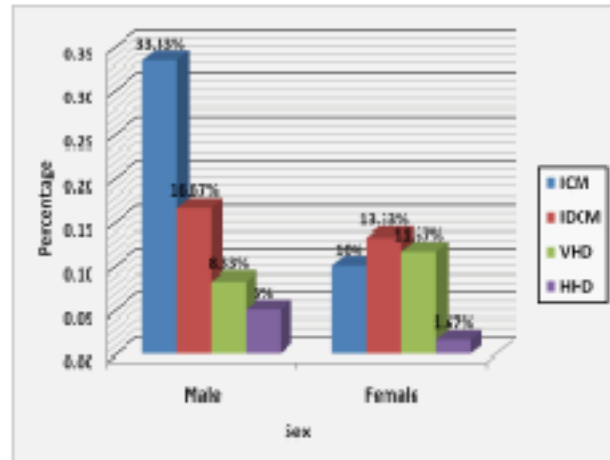


Figure-I: Sex-wise distribution of diseases of the study patients

Overall, ICM was more in male patients and IDCM was more common in female patients. Study reveals that housewives suffer most (35%) followed by equal number of sedentary worker and retired person (16.67%), businessman (10%), cultivator (10%), service holder (6.67%) and day labourer (5%) (Table-III).

Table-III: Occupational pattern of chronic heart failure in the study patients

Occupation	Number of patients	Percentage
Housewife	21	35.00
Sedentary worker	10	16.67
Retirement	10	16.67
Businessman	6	10.00
Cultivator	6	10.00
Service holder	4	6.67
Day laborer	3	5.00

Highest number of patients were in poor socio-economic status (53.33%) followed by middle class (36.66%) and rich socio-economic class (10%). It was observed that 65% of chronic heart failure came from rural area and 35% patients came from urban area (Table-IV).

Table-IV: Housing pattern of the study patients

Living Place	Number of patients	Percentage
Rural	39	65
Urban	21	35

Left heart failure was 55% and biventricular failure was 45%. Isolated right failure or EF 40% was not included in this study. The commonest cause of chronic heart failure was ICM (43.33%) followed by IDCM (30%) & left sided valvular heart disease (20%) (Table-II). Chronic heart failure was less common in hypertensive heart disease (6.67%).

Discussion

In this study 13.33% patients were in between 20-40 yrs, 58.33% patients were in between 41-60 yrs and 28.33% patients were more than 60 yrs of age group. Increasing age was associated with increased incidence of chronic heart failure (Haslet² et al, 2002). In this study, middle age patients suffered from chronic heart failure which is not similar to that study. This dissimilarities was probably short survival of people in our country. In this study, male patients were significantly higher than the female patients. 63.33% patients were male and 36.67% patients were female. Male-female ratio was 1.73. In the study of Horwich⁷ et, al 2003 male-female ratio was 2.41. One study of our country showed that 72% patients of chronic heart failure were male and 22% patients were female. Cowie⁸ et, al, 1999 found that 66% patients were male and 34% patients were female. My study was similar to that study. In all the studies, male preponderance was shown in chronic heart failure patients.

Among the male patients, 33.33% patients had increased serum cardiac troponin-I level and 30% had increased insignificant cTnT level. Among the female patients, 15% patients had increased cTnT level and 21.67% patients had insignificant serum cardiac troponin-I level. In female patients, ratio of significant and insignificant increased cTnT level was 1.44. In one study it has been shown that significant and insignificant rise of cTnT level in female patients was 1.15 which was near similar to this study. In this study, 43.33% patients had ICM, 30% patients had IDCM, 20% patients had valvular cardiomyopathy and only 6.67% patients had hypertensive cardiomyopathy. Ratio of ischaemic and non ischaemic cardiomyopathy was 0.76. In the study of Horwich⁷ et al, 2003, ratio of ischaemic and non

ischaemic cardiomyopathy was 0.92 which was near similar to this study. ICM was dominant cause of chronic heart failure in our country as well. In this study, ICM (33.33%), IDCM (16.67%) and hypertensive cardiomyopathy (5%) were predominant causes of chronic heart failure in male patients whereas IDCM (13.33%) was the predominant cause of chronic heart failure in female patients. One study in our country showed that heart failure due to ICM was more common in male and valvular heart disease was more common in female in Bangladesh, which was similar to this study.

Heart Failure was found in all occupation. Housewives appear to suffer most (35%) followed by sedentary worker and retirement (16.67%) of each. Businessman and cultivators are next category (10%). Service holders were 6.67% and day labourers were only 5%. Majority of the patients (53.33%) belonged to poor socioeconomic status and least were in rich group (10%). No association has been documented in any study between different causes of heart failure, occupation and socioeconomic status. In this study, chronic heart failure patients were more common in rural population (65%) than in urban population (35%).

This may be due to lack of health care facilitation in the rural area. In this study, left heart failure was more common (55%) and biventricular failure was less common (45%). Isolated heart failure or EF 40% was not included in this study. No available data of clinical presentation of heart failure was found in our country or abroad. In this study, ICM was the most common cause of heart failure (43.33%) followed by IDCM 30%, valvular heart diseases involving left heart 20% and hypertensive heart failure was 6.67%. Study in abroad showed that hypertensive heart failure was 41%, ICM 33%, valvular heart diseases 17%, IDCM 5% and mixed 9%. Horwich⁷ et al, 2003, found that ICM patients were 50% and IDCM were 33%. In my study, some forms of heart failure were similar and some were dissimilar to those studies. Hypertensive heart failure was only 6.67% in comparison to a study done abroad (41%).

Hypertension cause both systolic and diastolic dysfunction but in my study, hypertensive patients of only systolic dysfunction and whose ejection was 40% were included. But the study done in abroad included all form of congestive heart failure, irrespective of ejection fraction. This is why some form of heart failure was quiet dissimilar to my study.

Conclusion

In this study, majority patients were male. Most of the

patients were in the age group 41-60 yrs. Majority of the patients were ICM. ICM was more common above 60 yrs. Lowest number of patients had hypertensive heart disease. ICM was more in male patients. IDCM was more in female patients. Chronic heart failure was more in sedentary workers than others. Rural people was more affected than Urban people. Left heart failure was more than biventricular failure. Right heart failure or EF 40% were excluded from the study.

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