Clinical Study of Chronic Heart Failure Patients admitted in Tertiary Health Care Center in the Industrial Town of Western India

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***Abstract**: Chronic heart failure (CHF) is a major and growing public health problem in India. Chronic heart failure (CHF) is primarily a disease of the elderly. Approximately 6% to 10% of people older than 65 years have heart failure (HF), and approximately 80% of patients hospitalized with CHF are more than 65 years old. The aim of the study was to analyse the various clinical manifestations of Chronic Heart Failure and identify prognostic indices by echocaediographic, chest x-ray and electrocardiograph. 50 cases of chronic heart failure presenting from August 2008 to July 2010 was studied. Diagnosis based on symptoms and clinical data was supported by Radiological, Electrocardiography and Echocardiography data. Any acute heart failure patients were excluded. In this study it was observed that 35 patients (70%) had low Left Ventricular Ejection Fraction (LVEF) out of which 30 patients had cardiomyopathies which is statistically significant (P value<0. 05). Also, among the four deaths in the study, three patients had low LVEF. The present study suggests that low LVEF to be an adverse prognostic index in CHF, particularly cardiomyopathies. Cardiomyopathies more commonly lead to chronic heart failure than valvular heart diseases and pericardial diseases. Also advancing age is associated with poor prognosis especially in the cardiomyopathies group. New York Heart Association (NYHA) III/ IV at the time of diagnosis is an adverse prognostic factor for chronic heart failure. Despite advances in our treatment options, heart failure remains a highly lethal condition. The present study suggests that low LVEF may be an adverse prognostic index in CHF, particularly cardiomyopathies. Early detection and in time treatment for the primary and secondary prevention of CHF may alter its incidence and prognosis.*

INTRODUCTION

Chronic heart failure is a major and growing public health problem in India. Approximately 6% to 10% of people older than 65 years have heart failure and approximately 80% of patients hospitalized with heart failure are more than 65 years old.[1] The National Heart, Lung and Blood Institute (NHLBI) estimate that *75%* of heart failure cases have antecedent hypertension.[2,3] In industrialized countries the treatment of advanced symptomatic heart failure is becoming economic burden.[2,3,4,6] The major etiologic risk factors are coronary artery disease, hypertension and diabetes mellitus.

It was planned to study the various clinical manifestations of Chronic Heart Failure, which was diagnosed by ECG, Chest X-Ray features and 2D ECHO.

SUBJECTS AND METHODS

Fifty (50) cases of CHF presenting from August 2008 to July 2010 were studied. Institutional Ethics Committee permission was obtained prior to initiate the study. Diagnosis of CHF was based on subjective symptoms, objective clinical data, supported by electrocardiographic, radiological and echocardiographic data. Each patient was evaluated in dependently at initial visit and every subsequent visit. The major thrust of this study was more on clinical bed-side medicine. Severity of CHF was assessed as per the N.Y.H.A. classification of heart, failure; assisted by the questionnaire of the Minnenesota living with heart failure.[6]

Exclusion Criteria

(1) Those with Acute Heart Failure (HF which occurs in an acute setting such as due to Acute Myocardial Infarction) may be due to any cause will be excluded.
(2) Patients in CHF due to congenital heart disease.

Diagnosis of CHF was made by:

(1) Careful and detailed history, and clinical examination of the subjects under study was performed. These were combined 'with tests to confirm the presence of heart failure and make a complete diagnosis.
(2) Chest X-ray was taken after admission to hospital to support diagnosis of heart disease and its severity was assessed. The cardiothoracic ratio (C-T ratio) was calculated using the technique of Nickol & Wade.[7]
(3) Twelve lead ECG was recorded at time of admission in hospital for identifying axis of heart, ventricular hypertrophy, bundle branch blocks or any arrhythmias if present. Criteria of Horan and Flowers were followed for identifying left ventricular hypertrophy (LVH) on the ECG.[8]
(4) 2D ECHO was performed to exclude important valve disease, assess the systolic (and diastolic) function of the (left) ventricle, and detect intracardiac shunts.[21]

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Each variable was measured in three consecutive cardiac cycles and the mean values there of were calculated. Volumes were calculated using the following formulas [10].

End diastolic volume (EDV) = (LVID ed)
End Systolic volume (ESV) = (LVID es)
Stroke volume (SV) = EDV - ESV
LV Ejection fraction % (LVEF) = $\frac{SV \times 100}{EVD}$

Reduction of LVEF below 0.45 suggests impaired myocardial function, independent of loading conditions.[2]

Statistical Analysis

Paired t test was applied for comparison of variables like age, sex, duration of symptoms, ECG findings, X-ray findings and ECHO report. The p value less than 0.05 is considered statistically significant. Chi square test was used for comparing proportions.

After discharge from the hospital, follow up was made through monthly visits to the outpatient department of the hospital. During these visits, the functional status on the NYHA class was assessed.[4,1] Deaths were classified according to the categories of Hinckle and Thaler[11]. Mean follow up period was 7.5 months (3-18 months).

RESULTS & DISCUSSION

It was observed that out of 50 patients, 35 patients(70%) had low Left Ventricular Ejection Fraction (LVEF),out of which 30 patients had cardiomyopathies which is statistically significant (P value<0. 05). Mortality was observed in 4 patients in the study. Out of which three patients had low LVEF. The present study suggested that low LVEF is to be considered as an adverse prognostic index in CHF, particularly cardiomyopathies. Analysis of the results are shown Tables 1 to 4.

In this study are shown in table 1, out of the total sample size, 16 patients were more than 60 years of age while 25 were between 49-60 years of age at the time of presentation and 9 were less than 40 years age. The statistical analysis translates to 32% of patients being over 60 while the rest 50% being between 40-60 years of age and 18% below 40 years. (*P* value<0.05)

The incidence of CHF found in EPICAL study and SOLVD registry record[12]

Table 1: *Age Distribution of patients in different types of CHF*

Age (yrs)	Diagnosis			Total
	Cardiomyopathies	Pericardial diseases	Valvular Heart Diseases	
≤ 40	4(8)	0(0)	5(10)	9(18)
41 – 60	16(32)	1(2)	8(16)	25(50)
61 – 80	16(32)	0(0)	0(0)	16(32)
Total	36(72)	1(2)	13(26)	50(100)

is consistent with all previously published data as well the present study, and the result show that the incidence of advanced CHF increase dramatically with increasing age.

The symptomatology as shown in table 2 shows breathlessness was universal (100%) in CHF. Easy fatigability was the next common symptom (92%) followed by orthopnoea (78%), anorexia (66%) and Paroxysmal nocturnal dyspnoea (62%). Other major symptoms noted in the study included cough, chest pain and palpitations in decreasing order of frequency. Senni, et al[9] also had similar findings in 137 patients which included dyspnoea (93%), orthopnoea (31%), Paroxysmal nocturnal dyspnoea (32%), pulmonary crepts (81%), raised jugular venous pressure (55%) and Repatomegaly (14%) as dominant clinical features. The study also supported our findings that moderate to severe NYHA functional class were negative predictors of long-term survival. Bourassa, et al[12] observed that on physical examination of patients in the SOLVD Registry, 32% had pulmonary crepitations, 26% had edema and 20% an elevated JVP. Approximately 80% patients were in NYHA class I or II. However, the present study has majority patients in severe NYHA classes.

Table 2: *Major symptoms wise distribution of patients in the study group*

Symptoms	Symptoms	Percentage(n = 50)
Dyspnoea	50	100
Fatigue	46	92
Cough	30	60
Orthopnoea	39	78
PND	31	62
Angina	24	48
Palpitation	23	46
Syncope	1	2
Anorexia	33	66

Considering, a cardiothoracic ratio of more than 50% in posterior-anterior view to be indicative of cardiomegaly[13]. In present study, 39 patients (78%) had this feature out of which 27 patients belonged to cardiomyopathies group. Increase in cardiothoracic ratio was found to be an important adverse prognostic index by the Mayo Clinic[14].

SOLVD investigators[12] among 137 patients also found cardiomegaly (70%) pulmonary edema (48%) as predominant radiological features. The Framingham study[15] observed that patients with valvular heart disease (VHD) individuals were more likely to have radiographic generalized cardiac enlargement than subjects with heart failure caused by cardiomyopathies (P value <O.OOl). This is contrary to our findings where VHD formed only 28% of total cardiomegaly patients.

Though the present study showed abnormal ECG patterns in total study population, no statistically significant correlation could be established. However, left ventricular hypertrophy (LVH) and ischemic changes (suggesting coronary artery disease) could be considered as adverse prognostic indices of CHF.

In the present study, 50 patients were subjected to 2D-echo within 7 days of presentation. in over to evaluate the severity and predict the prognosis for further management of CHF. Reduction of LVEF below 45% indicated impaired myocardial function, independent of loading conditions.[2] An LVEF of less than 30% was arbitrarily chosen as a cut-off point for severe left ventricular dysfunction[16,17]. In this study (table 3) it was observed that 35 patients (70%) had low Left Ventricular Ejection Fraction (LVEF) out of which 30 patients had cardiomyopathies, which is statistically significant (P value<0. 05). Also, among mortality observed in four patients, three patients had low LVEF. The present study thus suggests that low LVEF is an adverse prognostic index in CHF, particularly in cardiomyopathies. Vasan et al[18] in their study found that nearly half the CHF cases had normal LVEF. These results confirm and extend to the prior findings from hospital-based series which highlighted the frequent presence of normal left ventricular systolic function among CHF patients. These findings also concur with estimates from the Helsinki Ageing Study[19]. Vasan et al[18] also concluded that although CHF cases with normal LVEF have a lower mortality risk than cases with reduced LVEF, they have a fourfold mortality risk compared with control subjects who are free of CHF.

CONCLUSIONS

Table 3: *Association between 2D Echo and diagnosis in study group*

2D Echo	No. of cases	Percentage (n=50)
Low Ejection fraction	35	70
Chamber dilatation	29	58
Global Hypokinesias	19	38
Local Wall Hypokinesias	10	20
Pulmonary Arterial Hypertension(PAH)	14	28
Ventricular Wall thickening	5	10
Mitral Regurgitation	18	36
Mitral Stenosis	7	14
Aortic, Regurgitation	7	14
Aortic Stenosis	1	2

Table 4: *Association between etiology and death in this study group.*

Diagnosis	Death		Total (%)
	Yes(%)	No(%)	
Cardiomyopathies	4(8)	32(64)	36(72)
Pericardial disease	0(0)	1(2)	1(2)
Valvular heart disease	0(0)	13(260	13(26)
Total	4(8)	46(92)	50(100)

$X^2 = 1.69, p>0.05$

During follow up period ranging upto 22 months there were 4 deaths, 33 patients showed improvement in NYHA functional class, whereas 13 did not.

1.) Cardiomyopathies more commonly lead to CHF than valvular heart diseases and pericardial diseases. The major aetiology of CHF is ischaemic cardiornyopathy
2.) Middle age and elderly age group were more commonly affected. Also, advancing age is associated with poor prognosis especially in the cardiomyopathies group.
3.) There was a male preponderance noted in the study. Additionally, male sex is associated with higher mortality rate.
4.) Ischaemic changes and left ventricular hypertrophy were the most common electrocardiographic findings in the study
5.) Severely depressed LVEF (below 30%) i.e. systolic dysfunction assessed by Doppler echcocardiography is a poor prognostic factor.

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