Original research article

To Evaluate the Differences in Clinical Presentation and Risk Factors Between Gender in Patients with Congestive Cardiac Failure- A Cross Sectional Study

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Abstract

Background: Heart failure is one of the major cause of morbidity and mortality in India and worldwide other countries. Its prevalence in the population has increased dramaticallyover time. Heart failure is a growing health problem . It is been found that the prevalence and incidence of HF are increasing, particularly in individuals aged more than 60 years. Objective: To determine gender difference in heart failure with respect to symptoms atpresentation (NYHA), clinical findings, underlying heart disease, risk factors, precipitating factors and prolonged hospital stay. Material methods: This was a cross-sectional study done in In-patients in the department of Cardiology Patna medical college and Hospital Patna Bihar. Patients who presented with symptoms and signs of heart failure secondary to cardiaccause where included in the study who fulfilled the modified Framingham's criteria for diagnosis of HF. Study duration One and half year.

Conclusion: In this study we proved that gender difference was found with regard to More of presentation of symptoms, even though males and females presented with same set of symptoms and signs, females were found to have worse symptoms at the time of admission. Females were more prone to hae Heart Failure with preserved ejection fraction, mainly at elderly age with LV diastolic dysfunction.

Keywords: HF, CAD

Introduction

Heart failure is one of the major cause of morbidity and mortality in India and worldwide other countries. Its prevalence in the population has increased dramaticallyover time The incidence of heart failure is increasing as well, due to both better medical treatment and improved survival rates following preceding cardiovascular disease such as myocardial infarction or hypertension.

Heart failure is a growing health problem. Above the age of 40, the prevalence of heart failure is greater in men as compared to women, but this ratio is reversed after the 80 years. The aetiology of heart failure is mainly arterial hypertension in women, although ischemic heart disease can be important as well. The genetic basis for the gender differences in aetiology is the chromosomal XY configuration in men, because various genes present on the Y

chromosome are associated with many cardiovascular risk factors. HF is a complex clinical syndrome that develops from any structural or functional damage of ventricular filling or ejection of blood out of the ventricles. The cardinal manifestations of HF are dyspnea on exertion and fatigue, which may limit the exercise tolerance in the patient and fluid retention, which may lead to pulmonary and/or splanchnic congestion and/or peripheral edema. Some patients have exercise intolerance but minimal evidence of fluid retention, whereas others complain primarily of oedema, dyspnea on exertion or fatigue. Because some of the patients present without signs or symptoms of fluid overload, the term "heart failure" is preferred over "congestive heart failure '' which was used previously. There is no one single diagnostic test for detecting HF because it is mainly a clinical diagnosis which is based on a careful history and physical examination. HF can be related to a wide spectrum of LV functional defects, which may range from patients with normal LV size and preserved EF to those with severe dilatation and/ or markedly reduced EF. In most patients, abnormalities of systolic and diastolic dysfunction coexist, irrespective of EF. Heart failure with preserved ejection fraction (HFpEF) or diastolic heart failure is currently an increasingly recognized entity of HF, which plays significant impact in the morbidity particularly in woman and elderly population, Which was previously under diagnosed in India . current studies conducted on heart failure are focusing more on HFpEF since the impact caused on morbidity and mortality is equivalent to as caused by HFrEF. The lifetime risk of developing HF goes on increasing with the age. With the increasing age of population in India, the burden of this problem is bound to rise. It is been estimated that the number of people over the age of 60 yrs. in India are projected to increase from 105 million in 2011 (8.4% of total population) to 376 million in 2051 (21.6%) HF in India are due to underlying heart diseases like coronary heart disease (CHD), hypertensive heart disease and rheumatic heart disease (RHD) and other risk factors like obesity, T2 Diabetes, hypothyroidism etc. The clinical implications for gender differences in HF are significant. It signifies the risk factor screening and targeting gender-specific intervention. Thus Clinical guidelines should reflect on these gender-based data and provide needed evidence and recommendations regarding appropriate approach and management.

Objectives
To determine gender difference in heart failure with respect to symptoms at presentation (NYHA),clinical findings, underlying heart disease ,risk factors, precipitating factors and prolonged hospital stay.

Review of Literature
Heart failure is defined as a complex clinical syndrome that can occur from any structural or functional cardiac disorder that impairs the ability of the ventricle to fill with or eject blood. Based on ejection fraction heart failure is defined as HFpEFie Heart failure with preserved Ejection Fraction or diastolic heart failure EF >40-50%, HFrEFie Heart failure with reduced Ejection Fraction EF < 40%. The basic genetics for the gender difference is the presence of chromosome XY configuration for males and XX for females. Many genes on the Y chromosome are associated with many cardiovascular risk factors, namely increased blood pressure, increased low-density lipoprotein cholesterol, and in European males the propensity to develop myocardial infarction. It is been found that in all ethnic groups, young men tend to have a higher mean systolic and diastolic blood pressure than young women. However, it is been found that with advancing age the prevalence of hypertension is greater in women, that is the male: female ratio is reversed. Chronic hypertension activates neurohormonal axis. Peripheral vascular resistance is directly proportional to sympathetic drive in young men, but not in young women. In post-menopausal women, however, peripheral vascular resistances increase with sympathetic drive, probably because oestrogen levels have declined. It is been

found that , baroreflex sensitivity is modulated by oestrogen hormones. There are no clinical data from trials on the effects of physiological doses of estrogenhormone on cardiovascular disease or risk for developing cardiovascular disease in men or women. The oral route of administration, with its "first-pass" liver effect, appears to be responsible for one of the most favourable lipoprotein changes attributed to exogenous estrogen, the increase in HDL cholesterol seen with oral but not transdermal estradiol. Thus, the relation of physiological levels of estrogen and CHD is based on few observational studies. Nearly all these observational studies related to postmenopausal women and middle-aged men show no positive correlation between endogenous estrone hormone levels or estradiol levels and CHD risk factors, most notably HDL cholesterol. Even though it is shown in one prospective study which followed women through the menopause showed the expected remarkable decrease in estradiol hormone levels and decrease in HDL cholesterol levels, the hormone- lipoprotein correlation was neither linear nor independent of covariates. Heart Failure with Reduced Ejection Fraction HFrEF (EF<40%):, Coronary artery disease, Myocardial infarction, Myocardial ischemia ,Conditions that cause pressure overload on the myocardium, Hypertension, Stenotic Valvular heart disease, Conditions that cause volume overload on the myocardium, Regurgitant valvular heart disease, Intracardia(left to right) shunting, Extracardiac shunting, Dilated cardiomyopathy (Non-ischemic), Familial/genetic disorders, Infiltrative disorders(amyloidosis) Disorders of rate and rhythm, Chronic bradyarrhythmias, Chronic tachyarrhythmias, Chronic obstructive lung disease, Toxic/drug-induced damage , disorders, Chagas disease,

Material and Methods
This was a cross-sectional study done in In-patients in department of Cardiology, Patna medical college and Hospital, Patna, Bihar. Patients who presented with symptoms and signs of heart failure secondary to cardiac cause where included in the study who fulfilled the modified Framingham's criteria for diagnosis of HF. Study duration One and half year. The sample size was 150 patients .

Descriptive statistics: The continuous data are presented as mean ±SD or median (IQR) for parametric and nonparametric data respectively and categorical data as number (%). Inferential statistics: The 2 groups were compared using Independent-T tests or Mann-Whitney U tests as appropriate. Pearson chi-squared and Fisher's exact tests calculated to compare proportions across groups. Statistical significance assumed where $p<0.05$. HFpEFie Heart failure with preserved Ejection Fraction or diastolic heart failure is defined as Clinical evidence of heart failure with ECHO findings of Left ventricular diastolic dysfunction and EF >40-50% , with no valvular abnormality noted . HFrEFie Heart failure with reduced Ejection Fraction or systolic heart failure is defined as : clinical evidence of heart failure with ECHO findings of Left ventricular systolic dysfunction and EF < 40%. Physician-based interpretation of ECG to define IHD. ECHOCARDIOGRAM showing regional wall motion abnormality. Coronary Angiogram suggestive of IHD.based on treatment records (PCI : Percutaneous coronary intervention , CABG: coronary artery bypass graft ,ECG presence of Q waves suggestive of old MI)

Inclusion Criteria
Patients, with an underlying heart disease presenting with HF.
Age > 18yrs

Exclusion Criteria

Patients with Non-Cardiac circulatory failure caused by high outputstates
Comorbidities like COPD ,CLD, CKD, Malignancies .

Results
Out of the 230 patients screened , 150 were included in the study according to the inclusion criteria. **Demographic profile**

Age distribution of patients :
The mean age of patients who developed heart failure was 61.48 in males and 60.7 in females with a standard deviation of 13.45 and 13.5 respectively . The mean age of patients with HFrEF was 62.28 with a standard deviation of 13.8 andmean age of patients with HFpEF was 60.3 with a standard deviation of 13.46 . out of the 150 patients included in the study 86 were males and 64 were females. The youngest patient in the study was 25 years old and the oldest patient was 96 years of age.

AGE DISTRIBUTION :

Crosstab					
			GENDER		Total
			MALE	FEMALE	
AGE	<=60	Count	40	36	76
		% within GENDER	46.5%	56.2%	50.7%
	>60	Count	46	28	74
		% within GENDER	53.5%	43.8%	49.3%
Total		Count	86	64	150
		% within GENDER	100.0%	100.0%	100.0%

Among 150 patients 74 were elderly (>60 years), out of which 28 werefemales(43.8%) and 46 were males(53.5%).Among 150 patients 76 were aged less than 60 years, out of which 40 (46.5%) weremales and 36 (56.2%)were females. Pearson Chi-square value 1.392P value :0.238

GENDER DIFFERENCE :

Crosstab					
			GENDER		Total
			MALE	FEMALE	
FATIGUE	PRESENT	Count	86	64	150
		% within GENDER	100.0%	100.0%	100.0%
Total		Count	86	64	150
		% within GENDER	100.0%	100.0%	100.0%

Out of 150 patients , all patients had fatigue as presenting symptom. Out of 86 males ,all males 86 (100%) and out of 64 females , all females 64(100%)had fatigue at the time of presentation. No gender difference was found.
HEPATOMEGALY*GENDER DIFFERENCE

Crosstab		
	GENDER	Total

			MALE	FEMALE	
HEPATOMEGALY	ABSENT	Count	38	32	70
		% within GENDER	44.2%	50.0%	46.7%
	PRESENT	Count	48	32	80
		% within GENDER	55.8%	50.0%	53.3%
Total		Count	86	64	150
		% within GENDER	100.0%	100.0%	100.0%

Out of all 150 patients, 80 (53.3%) patients had hepatomegaly at the time ofadmission. Out of all males 48(55.8%) males and out of all females 32(50.0%)females hadhepatomegaly. Chi-square value :0.498P value : 0.4 No gender difference was found. Out of 150 patients , 61 patients had HFpEF (40.7%). HFpEF was found in 35(54.7% females and 26(30.2%) males .HFpEF was found more commonly in females (out of 64 females 35 females had HFpEF) more in elderly age above 60yrs(out of 35 females with HFpEF 21 were above 60 years) .Chi-square test : 9.5 P value : 0.002 HFpEF was found more common in females above the age of 60 years and was statistically significant. Grade 2 diastolic dysfunction was considered as significant for Diastolic heart failure . Out of 34(22.7%) patients with diastolic heart failure ,24(37.5%) were females and 10(11.6%)were males. Chi-square test value : 16.191P value : 0.00 Diasstolic dysfunction was more common in females with HFpEF comparedto males and is statistically significant. Most common cause for prolonged hospital stay was cardiorenal syndrome [total 61 (40.7%) , out of all males 32(37.2%) males had CRS and out of all females 29(45.3%) females had CRS] and duration of stay was 6.17 days in males and 7.23 days in females . New onset MI : NSTEMI [total 87(58%), out of all males51(59.3%) males had NSTEMI ,out of all females 36(56.2%) females had NSTEMI] STEMI [total 20(13.3%), out of all males 15(17.4%) males and out of all females 5(7.8%)females had STEMI] Hypertensive emergency [total 40(26.7%) patients ,out of all males 17(19.8%) males , out of all females 23(35.9%) females had Hypertensive emergency] , Infections (11.3%) , out of all males8(9.3%) of males and outof all females 9(14.1%)females had infections]. The cause for prolonged hospital stay in males was new-onset MI and in females was hypertensive emergency. Cardiorenal syndrome was seen in both the genders with relatively more common in females. Most common cause for prolonged hospital stay was cardiorenal syndrome [total 61(40.7%).

Discussion

The mean age of patients   who developed heart failure was found to be same or both sexes.The mean age of patients with HFrEF   was   found to be the same in both sexes with no gender difference. However HFpEF was seen more commonly in elderly population and females compared to HFrEF. This is similar to most of the studies done on the epidemiology of heart failure, which have shown that the mean age of patients with HFpEF is higher than the mean age of patients with HFrEF. HFpEF is more commonly seen in Females and elderly population. A study done by Heidenreich et al showed the mean age of patients with HFrEF was lesser compared to mean age of patients with HFpEF. The reason for the smaller age difference between the two groups in this study can be explained by the smaller population takenfor the study, the increase in the prevalence of HF with rising age and by the demography of the elderly population in India. There was no gender difference found in the mode of presentation (symptoms and signs). Females were found to present with more severe symptoms as compared to males. In a study done by Gallego J et al, the most common symptom found in patients with

HF was dyspnoea, followed by paroxysmal nocturnal dyspnoea and nocturnal cough. The most common clinical signs were crackles, ankle oedema, presence of S3, hepatomegaly, tachycardia and elevated JVP. The most common radiological abnormality found in these patients was cardiomegaly followed by pleural effusion and acute pulmonary oedema on the chest X-ray. In a study done by Perna ER et al, the most common symptom found in patients with HF was paroxysmal nocturnal dyspnoea. The most common clinical signs were elevated JVP, presence of S3 and hepatomegaly .The most commonradiological abnormality found in these patients was acute pulmonary oedema on the chest X-ray. The common precipitating factors causing hospital admissions in patients with HF were anaemia, new onset M.I ,worsening hypertension ,infections and hypothyroidism .Hypothyroidism and worsening hypertension was more commonly found in females as the precipitating factor for heart failure. New onset M.I and Anemia was more commonly found in males as the precipitating factor for heart failure. Infections were found to be the second major cause precipitating hospital admissions in patients with HF. Out of these, lower respiratory infections were found to be the most common. This is in agreement with the studies mentioned earlier.

population shows that the majority of elderly are 60-69 years of age. Also, the life expectancy of males is 66 years and that of females is 68 years in the Indian population. These factors explain the age distribution of the population in this study.

Out of the patients included in the study,males were more commonly found tohave HFrEF. Among the HF groups, females were less commonly found to have HFpEF.
Thus HFrEF or systolic heart failure is more common in males and HFpEF or diastolic heart failure is more common in females , who are elderly. (as found in othersimilar studies)
The Olmsted study showed that there was a higher percentage of women in the HFpEF group as compared to that of the HFrEF group

Most of the patients who were included in the study had ischemic heartdisease as the underlying aetiology for the structural heart disease leading to HF. Onlyfew of the patients had rheumatic heart disease as the underlying aetiology for the structural heart disease causing HF. Out of these patients half of the patients also had an underlying IHD contributing to the HF. This is similar to studies done in India which show IHD and RHD to be the most common aetiologies of HF in the Indian population. A study done by Sivadasan et al which determined the underlying aetiology causing HF among patients admitted to their hospital over a period of 10 years showed IHD as the most common cause of HF followed by RHD.

Conclusion
This study was done on 150 patients admitted with an episode ofdecompensation of HF to Coronary care unit, after screening 230 patients for the presence of HF using the modified Framingham's criteria.
The mean age of patients in the HFrEF group was 62.8 years and the mean ageof patients in the HFpEF group was 60.3 years. 84 patients were males and 64 were females.
HFrEF was more common in males , elderly population and is associated with LV global hypokinesia / severe LV systolic dysfunction.

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