

Original Research Article

Etiological profile in patients with heart failure

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ABSTRACT

Background: The incidence and prevalence rates of heart failure (HF) are increasing worldwide. The prevalence of HF rises exponentially with increasing age and affects 4% to 8% of people older than 65. The leading causes of HF in India include coronary artery disease (CAD), diabetes, hypertension, rheumatic valvular heart diseases and primary cardiac muscle diseases. Rheumatic heart disease (RHD) is still a common cause of HF in India. Epidemiological studies have estimated that 1.5% to 2% population experience HF and it is the main reason for hospital admission of elderly patients. The objective of this study was to establish the etiological factors of heart failure

Methods: A cross sectional study of 150 patients above the age of 18 years presented with heart failure diagnosed clinically on the basis of Framingham heart failure criteria and echocardiography, done over a period of one year in department of medicine in BRD medical college Gorakhpur Uttar Pradesh.

Results: A total of 150 patients were include in this analysis the majority of patients were male (57.3%). Age of patients ranged from 18 - 70 years and 84% patients were above the age of 40 years.

Conclusions: Heart failure was more prevalent in elderly male above 40 years of age. Myocardial infarction, DCMP, rheumatic heart disease and hypertensive heart failure are the common etiology leading to heart failure.

Keywords: Brain natriuretic peptide, Coronary artery disease, Dilated cardiomyopathy ejection fraction, Heart failure, Killip class, Myocardial infarction, New York heart association functional class, Troponine I

INTRODUCTION

Heart failure is a complex clinical syndrome resulting from structural and functional impairment of ventricular filling or ejection of blood. Most patients have impairment of myocardial performance with finding ranging from normal ventricular size and function to marked dilation and reduced function. The traditional categorization of HF has been according to underlying left ventricular (LV) systolic function based on LV ejection fraction (LVEF).^{2,3} Although a substantial proportion of HF cases have preserved LV systolic function, few population-based studies have provided a clinical picture of patients before, during, and after the onset of symptomatic HF with preserved (HFPEF) versus reduced ejection fraction (HFREF).⁴ Previous work from the Framingham heart study demonstrated that HF can be

feasibly categorized etiologically as due to: a) coronary heart disease, b) valvular heart disease, c) hypertensive heart disease, and d) other/unknown etiologies using a hierarchical approach.⁵ Although survival after heart failure (HF) has improved due to advancement in diagnosis and treatment, it is still one of the leading causes of death causing approximately 30,000 deaths per year.⁶ Epidemiological studies have estimated that 1.5% to 2% population experience HF and it is the main reason for hospital admission of elderly patients.⁷ The leading causes of HF in India include coronary artery disease (CAD), diabetes, hypertension, rheumatic valvular heart diseases and primary cardiac muscle diseases. Rheumatic heart disease (RHD) is still a common cause of HF in India, where the prevalence ranges from 6.0 to 11.0/1000.^{8,9} though there has been a significant decline in the prevalence of RHD in developed countries mainly

due to improved socioeconomic conditions rather than any modern treatment methods. It is still very much prevalent in all parts of India and other developing and underdeveloped nations of the world. It has been observed that amongst cardiovascular diseases, RHD accounts for 12-65% of all admissions in developing countries.¹⁰ Epidemiological data have also shown that approximately one-half of patients who develop HF have a normal or preserved ejection fraction (EF) (>40-50%) i.e., diastolic HF.¹¹ More than 400,000 new cases of HF are diagnosed each year in the United States; about 3 to 5 million people have stage- B (asymptomatic ventricular dysfunction) and 2-3 million persons have stage-C (symptomatic) HF.^{12,13}

METHODS

A cross sectional study of 150 patients above the age of 18 years presented with heart failure diagnosed clinically on the basis of Framingham heart failure criteria and echocardiography done over a period of one year in department of medicine in BRD medical college Gorakhpur Uttar Pradesh. All the patients underwent detailed clinical history, thorough clinical examination and relevant biochemical and radiological investigations after informed consent. Investigations e.g. EKG, CXR, Troponin I, BNP, CBC, LFT, KFT, thyroid function test, fasting lipid profile, random blood sugar, 2D ECHO and USG abdomen was done in all patients. Patients having comorbidities like trauma, cancer, and high risk of mortality during follow-up were excluded in this study. A database was constructed on Microsoft excel 2007 and

Statistical analysis

Continuous variables were provided as means \pm SD and categorical variables were shown as percentages. Categorical variables were compared using the χ^2 test, and the continuous variables were compared among the three groups using ANOVA test. statistical analyses were performed using SPSS software version 22.0 (IBM, NY, USA).

RESULTS

In total 150 study subject, in gender distribution 86 (57.3%) patients were males and 64 (42.7%) females which show male have slightly higher prevalence than female (Table 1 and 6).

Table 1: Distribution of age.

Age in years	No. of patients (n=150)	%
<40	24	16.0%
40-50	31	20.7%
51-60	36	24.0%
61-70	44	29.3%
>70	15	10.0%

A total 84% patients were above age of 40 years. In this study in total 150 patients of heart failure, 69 patients (46%) was on antihypertensive medication, in which 53 (76.8%) patients were male and 16 (23.2%) patients were female (Table 1 and 4).

Table 2: Distribution of gender in heart failure patients.

Gender	No. of patients (n=150)	%
Male	86	57.3%
Female	64	42.7%

Table 3: Prevalence of diabetes mellitus in heart failure patients.

Diabetes mellitus	No. of patients (n=150)	%
Controlled-HbA1C<7	11	73.33%
Uncontrolled-HbA1C>7	4	26.66%
Total	15	100%

In total 69 hypertensive patients, blood pressure of 45 patients (65.21%) was controlled on medication, while of 24 patients (34.79%) uncontrolled even on medication. In total 150 heart failure patients 15 patients are diabetics, in which blood sugar of 11 patients (73.33%) was controlled (HbA1C <7) on medication while blood sugar of 4 patients (26.66%) was uncontrolled (HbA1C>7) on medication (Table 3). Dyslipidemia (either elevated non-HDL-cholesterol \geq 190 mg/dl or low HDL-cholesterol <40 mg/dl in men and <50 mg/dl in women) present in 50 (33.3%) patients, in which 37 (74%) were male patients and 13 (26%) were female patients. Chronic smoking and chronic alcoholic habit present in 44 out of 150 (29.3%) patients. Out of 150 patients 69 patients (46%) were on antihypertensive medications with controlled blood pressure (Table 4). Heart failure more common among elderly people, 84% patients were above age of 40 years. Out of 150 patients 86 patients (57.3%) were males and 64 patients (42.7%) were females (Table 1). In this study ischemic heart disease constituted 28%; dilated cardiomyopathy 21.3%; rheumatic heart diseases 20.7%; cor-pulmonale 18%, hypertensive heart failure 9.3%; 2.7% other causes among the etiologies (Table 6). Patients were managed conservatively according to ACC/AHA 2017 guideline.

KILLIP class II was among more than half of patients (56%) followed by class III (32.7%), class IV (10%) and class I (1.3%).

In total 150 patients of heart failure 42 patients (28%) had CAD as etiology, which was most common etiology in this study and significantly associated with male patient (Table 1 and 6). 32 patients (21.3%) have DCMP as etiology which was second most common etiology in this study have nearly equal distribution in both sexes (Table 6). 31 patients (20.7%) had RHD as etiology. It also has

nearly equal distribution in both sexes (Table 6). 27 patients (18%) had cor-pulmonale as etiology and significantly associated with female patients (Table 6). 14 patients (9.3%) had hypertensive heart failure as etiology and significantly associated with male heart failure

patient (Table 6). In other causes 3 patients had severe anemia and 1 had severe hypothyroidism as etiology (Table 6). In this study authors found that CAD (28%) was the most common cause of heart failure, DCMP was the second most common etiology (Table 6).

Table 4: Prevalence of hypertension in heart failure patients.

Hypertension	No. of patients	On single antihypertensive drug		On Double anti-hypertensive drug		On triple anti-hypertensive drug		p-value ¹
		No.	%	No.	%	No.	%	
Controlled	45	25	55.6%	15	33.3%	5	11.1%	0.02*
Uncontrolled	24	6	25.0%	10	41.7%	8	33.3%	

¹Chi-square test, *Significant

Table 5: Killip class among heart failure patients.

Killip class	No. of patients		Male		Female		p-value ¹
	No.	%	No.	%	No.	%	
Class I	2	1.3%	0	0.0%	2	100.0%	0.08*
Class II	84	56.0%	54	64.3%	30	35.7%	
Class III	49	32.7%	23	46.9%	26	53.1%	
Class IV	15	10.0%	9	60.0%	6	40.0%	

¹Chi-square test, *Significant

Table 6: Prevalence of deferent etiology among heart failure patients.

Etiology	No. of patients		Male		Female		p-value ¹
	No.	%	No.	%	No.	%	
MI	42	28.0%	33	78.6%	9	21.4%	0.001*
DCMP	32	21.3%	18	56.2%	14	43.8%	
RHD	31	20.7%	15	48.4%	16	51.6%	
Hypertensive heart failure	14	9.3%	10	71.4%	4	28.6%	
COR-P	27	18.0%	7	25.9%	20	74.1%	
Other causes	4	2.7%	3	75.0%	1	25.0%	

¹Chi-square test, *Significant

DISCUSSION

Urbanization, industrialization and changing lifestyle contribute to the increase in the overall risk of heart failure in India. Heart failure is predominantly a disease of the older people. As overall risk for heart failure increases with age, so the prevalence of heart failure is likely to increase with the older population.¹⁴ Cardiovascular diseases are the leading cause of death in India and its prevalence is in increasing trend. Around 30 million suffered with coronary artery disease in India in 2000 with nearly 3% prevalence.^{15,16} annual incidence of heart failure in patient with coronary artery disease is approximately 0.4% to 2.3% per year.^{17,18} About 28.00% of the heart failure cases in this study population were attributed to CAD.

The prevalence of other risk factors of heart failure is also increasing in India. In addition to the older population as

explained above, the prevalence of hypertension is estimated to increase from 118 million (2000) to 214 million (2025).¹⁹ If the annual incidence of heart failure in patients with a systolic blood pressure (SBP) of 144-154 mmHg is 0.1% to 0.6%, as established in the hypertension optimal treatment (HOT) and United Kingdom prospective diabetes study (UKPDS) trials, respectively, then the number of new heart failure cases due to hypertension may increase from 118 000-708 000 per year in 2000 to 214 000-1.3 million per year in 2025.^{20,21}

This study also found that DCMP was common cause of heart failure (about 21.30%), However valvular heart disease was also common in this study (about 20.70%). Prevalence rates for Rheumatic heart disease remain high in India, approaching 1.0-5.4 cases per 1000 school children in a study.²² As there is inadequate evidence on the role of secondary prevention of rheumatic fever in

preventing the development of valvular disease in RHD, the risk of heart failure remains doubtful in patients with rheumatic heart disease.²³ Other diseases that can manifest as HF such as endomyocardial fibrosis, tubercular pericardial effusion/constrictive pericarditis and infectious endocarditis, appear to be present in greater proportions in India compared with its high-income country counterparts, but data are sparse regarding the prevalence of these diseases in India.

Since patients have uneven and limited access to healthcare in India, the healthcare infrastructure itself may play a role in the rising burden of HF.²⁴ The public healthcare system is often overloaded, which makes access to basic services difficult. India has <2% penetration of health insurance (government employee are an exception), making the out-of-pocket costs for prevention of HF relatively expensive.²⁵ Emergency services are not widely available in India, such that patients who experience acute cardiac events, such as acute coronary syndrome (ACS), typically have longer symptom-to-door and door-to-needle times than in other countries. This combination of inaccessibility, unaffordable treatment and treatment delay possibly increases the incidence of HF in India.

CONCLUSION

Heart failure was more prevalent in elderly male above 40 years of age.

CAD, DCMP, rheumatic heart disease and hypertensive heart failure are the common etiology leading to heart failure.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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