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Research Article

A STUDY ON PREVALENCE AND ETIOLOGY OF HEART FAILURE IN QATARI RESIDENTS: DATA ANALYSIS FROM A TERTIARY HOSPITAL

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ABSTRACT

Objective: Heart failure is a multi-faceted syndrome with diverse etiologies. Knowledge of the cause can be crucial to therapy and management including long term strategy planning. The aim of this study is to analyze the prevalence and etiology of heart failure present in Qatari residents, which is a mix of multiple ethnicities. Qatar is today one of the leading growing economies of the world and witnessing a population boom. It is currently undergoing major lifestyle changes, which comes with aplenty due to recently discovered vast natural resources. Enhanced knowledge of disease incidence/prevalence in the Qatari environment can have a prospect of developing and evaluating novel and more effective approaches for disease prevention, diagnosis and treatment in the future. **Methods:** Our study was conducted in a total of 50 patients over a period of 21 months in a tertiary care institute. Detailed clinical history, followed by examination and laboratory tests were performed to identify the etiology and data analyzed to study the prevalence. **Results:** Our study revealed that in all cases of HF admitted in our hospital, 52% were males and 48% were females. The occurrence of Congestive Heart Failure (CHF) was highest between 50 and 80 years in both males and females. The relation of CHF to various etiologies has been discussed. The data has also been compared with select international studies and the variations discussed. **Conclusion:** Major etiology of CHF was a combination of lifestyle disease, Hypertension, Diabetes Mellitus and Ischemic heart disease. Minor causes included Valvular heart disease, chronic arrhythmias, and myocarditis and conduction system disease.

Keywords: Heart failure, prevalence, Qatar.

INTRODUCTION

Heart failure can be defined as an abnormality of cardiac structure or function leading to failure of the heart to deliver oxygen at a rate commensurate with the requirements of the metabolizing tissues, despite normal filling pressures (or only at the expense of increased filling pressures). Heart Failure is defined, clinically, as a syndrome in which patients have typical symptoms (e.g. breathlessness, ankle swelling, and fatigue) and signs (e.g. elevated jugular venous pressure, pulmonary crackles, and dis- placed apex beat) resulting from an abnormality of cardiac structure or function.[1] Heart failure is a common and major health problem worldwide that continues to increase in both prevalence and incidence. It is a frequent cause for hospitalization. It is a multi-faceted syndrome with diverse etiologies.[2] Knowledge of the cause can be crucial to therapy. Improving the reliability of diagnosis has been essential since determining the etiology and the stage of heart failure leads to different management choices to improve symptoms, quality of life and disease prognosis.

The overall incidence of heart failure is likely to increase in the future, because of both an aging population and therapeutic advances in the management of acute myocardial infarction leading to improved survival in patients with impaired cardiac function. The epidemiology of heart failure has been extensively investigated, but the etiology of heart failure in a contemporary population remains incompletely described.[3, 4]

Aims and objectives

To systematically analyze the predisposing, determining and precipitating causes exacerbating Congestive Heart Failure (CHF).

1. To identify the most common etiology of CHF on the basis of clinical assessment, non-invasive investigations and coronary angiography.

MATERIALS AND METHODS

All cases of CHF satisfying the European Society of Cardiology's (ESC) diagnostic criteria for heart failure admitted in the Intensive Coronary Care Unit (ICCU) unit of a tertiary hospital & research center in Qatar were included in the study.

The present study was undertaken from October 2011 to June 2013. A total of 50 patients >16 years of age were selected for this study. Detailed clinical history of patients was recorded. This was followed by a detailed clinical examination and laboratory tests.

A master chart was prepared with the requisite variables to analyze the etiology of CHF.

Laboratory testing (Done in all patients): Complete Blood Picture (CBP), Erythrocyte Sedimentation Rate (ESR),

Blood Sugar, Serum Urea, Serum Creatinine, Electrolytes, Protein, Liver Function Tests (LFT), Lipid and Thyroid Profile, Cardiac Biomarkers, B natriuretic peptide BNP/Pro BNP, Chest X-ray (PA view), ECG (12-lead multi-channel), 2D Echocardiograph,

The following definitions were used in the study:
Heart failure can be defined as an abnormality of cardiac structure or function leading to failure of the heart to deliver oxygen at a rate commensurate with the requirements of the metabolizing tissues, despite normal filling pressures (or only at the expense of increased filling pressures). HF is defined, clinically, as a syndrome in which patients have typical symptoms (e.g. breathlessness, ankle swelling, and fatigue) and signs (e.g. elevated jugular venous pressure, pulmonary crackles, and dis- placed apex beat) resulting from an abnormality of cardiac structure or function.[1]

Coronary artery disease (CAD): Clinical history of myocardial infarction (anterior/lateral/inferior/right ventricular), ECG Abnormalities, Echo evidence of Regional Wall Motion Abnormality (RWMA) or angiographic confirmation of CAD.

Hypertension (HTN) - ESC and ESH Guidelines (23)

Diabetes Mellitus (DM), ESC and EASD Guidelines (24)

Smoking: The subject was considered to be a smoker if he/she gave a history of tobacco smoking within the past 20 years. Subjects who had quit smoking completely before 20 years were not considered as smokers.

Alcohol Consumption: Only patients who were heavy drinkers were considered. > 15 drinks/week in men or > 8 drinks/week in women

Dyslipidemia: Criteria may include documentation of the following – Total cholesterol > 5.2 mmol/l, LDL >3.3mmol/l, HDL <1.03mmol/l, Triglycerides >1.5 mmol/l or use of lipid-lowering therapy.

Family History: Included those who exhibited the following – family history of sudden cardiac death, myocardial infarction/angina/HF, premature CAD (<55 years for male relatives and <65years for female relatives), cardiomyopathy (Dilated Cardiomyopathy – DCM) / (Hypertrophic Obstructive Cardiomyopathy – HOCM) or pacemaker insertion/conduction system disease.

Valvular heart disease: History of Rheumatic Heart Disease (RHD) with echocardiographic evidence of valvular abnormalities or history of congenital and degenerative valvular disease.

Arrhythmias: Patients who had clinical and ECG evidence of arrhythmias such as atrial fibrillation, paroxysmal supraventricular tachycardia, ventricular tachycardia or ventricular fibrillation.

Anemia: Defined as blood hemoglobin level <12 g% for men or 11 g% for women.

Drug related: On treatment with -blockers, calcium channel blockers, NSAIDS, steroids, anti-arrhythmic, tricyclic antidepressants, chemotherapeutic agents.

Obesity: Body Mass Index (BMI) of 30 or greater was considered clinically obese.

RESULTS

Age–sex distribution of CHF

Of the total study population of 50; 26 [52%] were males and 24 [48%] were females. The study population was divided into 7 age intervals ranging from 21 to 90 years. The occurrence of CHF was highest between 50 and 70 years in both males and females. 64% patients were between 50 and 80 years and nearly 22% were between 20 and 50 years. 14% were above 80 years.

Acute/chronic distribution of heart failure with age distribution

33 (66%) i.e. nearly 2/3 presented with acute heart failure and 17 (34%); i.e. rest of the 1/3rd had chronic heart failure. Of the 33 patients with acute heart failure, acute coronary syndrome was seen in 4 (12%) patients, CAD causing acute LVF was in 7 (21%) and acute on chronic HF was seen in 8 (24%) patients. Out of the 17 patients with chronic heart failure, 9 [53%] were females and 8 (47%) were males. Majority of the males, nearly 78% with acute heart failure were between 50 and 80 years. Majority of the females, nearly 75% with acute heart failure were also between 50 and 80 years. In the 71–90 age interval, the distribution of acute and chronic heart failure were nearly equal in both males and females.

Major etiologies of CHF

Among this study population of 50, major etiology of CHF was a combination of IHD, HTN and DM accounting for nearly 90% of cases. There was presence of significant overlap between HTN, CAD and DM. The etiologies have been sub grouped into three groups according to prevalence. Group 1 being the most prevalent and Group 3 the least. [Figure1] The etiology wise distribution has been given below in Table 1.
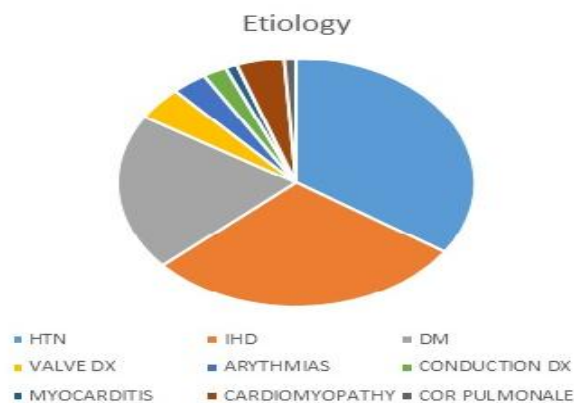

Fig 1 : Etiology wise distribution of congestive heart failure patients (Overlap exists).

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Table 1: Etiology wise distribution of congestive heart failure patients.

Group	No.	Etiology	No. of patients	%
Group 1	a	HTN	32	64
	b	CAD	27	54
	c	DM	19	38
Group 2	a	ValvularHeart Disease	4	8
	b	Conductive disorder[LBBB/IVCD]	2	4
	c	Dilated Cardiomyopathy	4	8
Group 3	a	Corpulmonale	1	2
	b	Others, Myocarditis	1	2

Multi factorial etiology of CHF

There was significant overlap of patients having CAD, HTN and DM. Patients having multifactorial etiologies were commoner than single etiology patients Table 2 and Fig 2

Table 2: Prevalence of multifactorial etiology in CHF patients

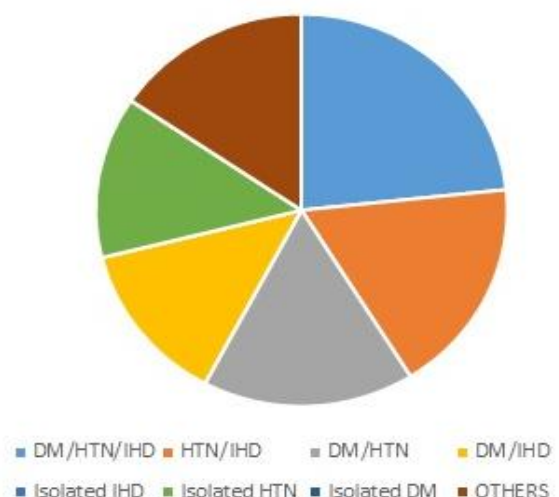| Etiology	No. of patients	Percent [n=50]
DM + HTN + CAD	21	42
HTN + CAD	16	32
DM + HTN	15	30
DM + CAD	12	24
Isolated CAD	0	0
Isolated HTN	12	24
Isolated DM	0	0

Fig 2: Multifactorial etiology of heart failure.

Other causes of CHF form a large number in our study. Among them were

a) Valvular Heart disease 4 patients
b) Arrhythmias [AF] 3 patients

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c) Conduction disorder , LBBB/IVCD 2 patients
d) Myocarditis 1 patient
e) Cardiomyopathy 4 patients

Co morbid factors for CHF: Our study revealed a few Co morbid factors which were not direct causes of CHF but were additional risk factors (table 3)

Table 3: Co morbid risk factors for CHF.

Risk factor	Value	Percent [$n = 50$]
Obesity (BMI > 30)	33	66
Family History	12	24
Smoking	14	28
Dyslipidemia	17	34

Acute precipitants of CHF

In this study population, the major acute precipitant of CHF was acute Myocardial Infraction (MI). The remaining causes are as detailed in table 4. In many patients, more than one precipitating cause was implicated

Table 4: Distribution of acute precipitants of heart failure in study population.

Precipitants	Value in population ($n = 50$)	
	Value	Percentage%
ACS	4	8
Uncontrolled HTN	12	24
Infection	9	18
Arrhythmias	3	6

DISCUSSION

Heart failure is a multi-faceted syndrome with multiple etiologies.[2] In some cases, the etiology remains hypothetical or undefined. The diseases that can lead to HF are very different and their detection is of great importance as this can modify the diagnostic, therapeutic and preventive approach as well as determine prognosis.

Data from the Framingham study indicate that the incidence of congestive heart failure increases with age and is higher in men than in women as also seen above in this study.[6] Galasko et al in his study found that the final primary etiology for definite Left Ventricular Systolic Dysfunction (LVSD) was CAD in 68% which is close to 54% seen in the present study.[7,8]

The most interesting feature of this study was that multifactorial cause was the commonest etiology for CHF with HTN being the single commonest etiology, contributing to 64% of cases of heart failure.

In the Framingham study, CAD and HTN (either alone or in combination) were implicated as the cause in over 90% of cases of HF.[6] In the Hillingdon heart failure study, in which etiology has been allocated on the basis of non-invasive investigations, coronary artery disease was identified as the primary etiology in 36% cases of HF.[9] In a study based upon 31 reports on heart failure, Teerlink et al reported 50.3% of the cases to be due to CAD.[10] Eriksson et al found 54% to have sustained MI or have angina pectoris.[11] In a prospective study of 730 consecutive patients in a Chinese population of Hong Kong by Sanderson et al, the main identifiable risk factors were HTN (37%), IHD (31%), Valvular Heart Disease (15%), Corpulmonale (27%), Idiopathic DCM (4%) and miscellaneous (10%).[12] In a study by Mair et al, the principal etiology was CAD in 45.1%; HTN in 18.0%; Valvular heart disease in 9%; Corpulmonale in 6.6%; cardiomyopathy in 2.3%; metabolic in 1.9% and unknown etiology in 16.9% of patients.[13]

In a population-based study by Cowie et al, the single most common etiology was coronary artery disease (36%); but this frequently co-existed with hypertension (44%).[7] Valvular heart disease was present in 7% of cases. In 34% of cases, no etiology could be allocated on the basis of clinical and echocardiographic evidences. In a study of etiology of heart failure in Arab population by Agarwal et al, the common causes of heart failure were Ischemic Heart Disease (51.7%), Hypertensive Heart disease (24.9%) and idiopathic dilated cardiomyopathy (8.3%). Valvular heart disease and Corpulmonale were less common.[14]

In the Framingham study, CAD accounted for only 46% of heart failure in men and 27% of chronic heart failure cases in women.[6] In a population-based surveillance study from Eastern Finland by Remes et al, CAD was found in 68% men and 32% of women.[15]

The concept of multiple risk factors well established for CAD is increasingly being applied for CHF. The present study found that following HTN, IHD was the leading factor accounting for 54%, while 38% of the population were diabetic. However, they are not mutually exclusive.

The Framingham study, which defined the major risk factors found that coronary risk factors such as

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smoking, DM, body weight and a high ratio of total cholesterol concentration of high-density lipoproteins are independent risk factors for HF.[6] The INTERHEART study showed potentially modifiable risk factors accounting for over 90% of the risk of an initial acute MI.[16] In a study by Wilhelm Sen et al, it was reported that the strong resemblance between the risk factor pattern in heart failure& CAD seems to be due to the high percentage with coronary heart disease.[17] The findings in our study that high blood pressure, tobacco smoking, DM and a higher BMI were risk factors are well in accordance with previous results in other populations.

In this study, among the 33 patients who were obese (BMI > 30) 16 were males and 17 were females and the majority were was between 51 and 70 years. Various studies have recognized obesity to be a risk factor for heart failure. It is unclear whether overweight individuals are at risk of heart failure. The Framingham study identified a greater predictive value of obesity in women.[6] In a large community-based study by Kenchaiah et al, increased BMI was associated with an increased risk of heart failure.[18] Increased BMI is a risk factor for HTN, DM and dyslipidemia, all of which augment the risk of MI, an important antecedent of heart failure.

In the present study, 64% of the patients had hypertension; among them 61% were males and 39% were females. In the Framingham heart study, hypertension was reported as the cause of heart failure either alone or in association with other factors in over 70% cases.[6] In the SOLVD trials, women were more likely to have concomitant hypertension than men.[19] The MRFIT trial supports the idea that the presence of hypertension indicated by systolic BP > 140 mm Hg increases the risk of CAD by about 2.5 times.[20]

In the present study, 38% were diabetics. Among them, 20% were males and 18% were females. Majority of them were between 51 and 70 years. Sanderson et al reported 21% diabetes in a study population of 730 patients.[12] Data from the Framingham study have shown an increased incidence of congestive heart failure in diabetic subjects irrespective of CAD and hypertension.[6] In the SOLVD study, diabetes was an independent predictor of morbidity and mortality in heart failure.[19] This relationship was confirmed by the RESOLVD trials. In the DIGAMI study, diabetes with heart failure was the most common reason for morbidity and mortality.[21] Recent Italian cross sectional data shows 30% prevalence of diabetes in an elderly heart failure population.[22]

In the present study, valvular heart disease accounted for 8% of which (50%) were females. The SOLVD, Framingham and hospital-based studies report a predominance of women with valvular heart disease.[6,19] However, the incidence of valvular disease has been steadily decreasing over the past 30 years. In the Framingham study, RHD accounted for heart failure in 2% of men and 3% of women.[6] In a study by Mair et al, valve disease was an etiology in 9% of cases.[13] Sanderson et al reported 15% of valvular heart disease in a prospective study of 730 patients.[12] In a study by Fox et al, valvular disease was reported in 9.6 %.[3]

In the present study, all patients were assigned etiology on the basis of clinical data, laboratory data, ECG, Echo and coronary angiography.

CONCLUSION

Multiple risk factors such as Hypertension, Ischemic Heart Disease and Diabetes Mellitus are the leading causes of Heart Failure in this study. The concept of multiple risk factors, well established for coronary artery disease should be increasingly applied to primary and secondary heart failure prevention. HTN causing heart failure was the major etiology amounting to 64%. In patients where etiology is unknown and who have multiple risk factors, the probability of CAD is high; hence coronary angiography needs to be done. Our study also provides enough research databases, for a comprehensive array of laboratory-based research aimed at an improved understanding of disease mechanisms, treatment initiation and implementation.

Competing interests – None

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