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The Prevalence of Risk Factors Associated with Heart Failure

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ABSTRACT

Introduction: Cardiovascular disease is a leading cause of death in India (CVD). Understanding the changes in CVD risk factors and identifying modifiable variables will aid in the development of preventative interventions and policies. Heart Failure (HF) affects 1.5% to 2% of the population, according to epidemiological research, and is the leading cause of hospitalisation among the elderly. Despite having a large youthful population and low levels of obesity, our Asian (INDIAN) area is characterised by high CVD prevalence rates. Cardiac Failure (CF) with an ejection fraction that is normal (HFnEF) is a very frequent complication of long-term hypertension. Obesity, hyperlipidemia, type 2 diabetes, COPD, and chronic renal disease may all cause it to develop over time. Because these risk factors for HFnEF are more common in India the prevalence of HFnEF is anticipated to be greater in India.

Methods and research: The research was placed from March through August of this year on a total of 46 participants including males, females, hailing from rural as well urban areas, under various age groups. According to the criteria of inclusion and exclusion, all participants recently diagnosed with CF having preserved EF were recruited for this research. Patient's demographic information was gathered from their medical records using a pre-defined case record. Pulse rate, blood pressure, BMI, waist circumference, cardiac and respiratory tests were all performed on each participant of study.

Result: HFnEF is more common and severe in elderly ladies (56.52%) than in males (43.4%). Hypertension being the topmost etiology. Left ventricular hypertrophy (65.21%) was the most prevalent ECG result. Dyspnea is most common presenting complaint.

Conclusion: The study's findings highlight the urgent need to create routine screening techniques to detect those who are at risk of or suffering from heart failure in early stages, so that effective management and care may be provided before the condition worsens and slips to beyond manageable.

Background: Heart failure affects a high percentage of the population and is the leading cause of hospitalisation in the elderly. HF, on the other hand, is a primary cause of mortality. According to recent research, a large proportion (nearly half) of individuals having HF have a left ventricular ejection rate that is 50% or greater than 50% (EF). Cardiac failure with preserved ejection fraction (HFnEF) is a complication of long-term hypertension. Obesity, hyperlipidemia, diabetes mellitus COPD, and chronic renal disease can all cause it to develop over time. Despite having a large youthful population and low levels of obesity, our Asian (INDIAN) area is characterised by high CVD prevalence rates.

Key words: Ventricular, Ejection, Hypertension, Demographic, Epidemiological, Hospitalisation

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INTRODUCTION

Heart Failure (HF) affects 1.5% to 2% of the population, according to epidemiological research, and is the leading cause of hospitalisation among the elderly [1]. Patients, who are beyond 65 years of age, have the estimated prevalence of HF to 6 percent to 10% [2,3]. HF, on the other hand, is one of the primary causes of mortality, accounting for nearly 30,000 fatalities each year [4]. Despite having a large youthful population and low levels of obesity, our Asian (INDIAN) area is characterised by high CVD prevalence rates. The presence of a "Asian Indian" phenotype has been proposed as a possible explanation for this phenomena when compared to white Caucasians of comparable BMI, this physique is characterised by a higher total and visceral obesity and higher circumference of waist, hyper lipidemia, higher glucose intolerance and resistance to hormone insulin and a high chances of diabetes, hypertension, atherosclerosis and thus a higher risk of cardiovascular disease such as myocardial infarction and ultimately heart failure at an early age. On echocardiography, heart failure is identified by a set of clinical signs and symptoms, such as dyspnea, tiredness, and pedal oedema, as well as functional and organic abnormalities of the pumping organ heart that

limits its capacity to pump [5]. Reduced contraction and working of the heart's left sided ventricle, as assessed by a decreased ejection fraction, failure to maintain stroke volume is the most common cause of pump failure (40%). Sometimes reduced ejection fraction can be associated with poor left ventricular filling, however in certain individuals, reduced filling which is low end diastolic volume predominates over decreased Ejection Fraction' is the term for this condition (HFnEF). Recent studies denotes more than half patients diagnosed with HF have normal or near normal Ejection Fraction (EF) [6,7].

Cardiac Failure (CF) with an ejection fraction that is normal (HFnEF) is a very frequent complication of long-term hypertension [8]. Obesity, hyperlipidemia, type 2 diabetes, COPD, and chronic renal disease may all cause it to develop over time. These diseases are linked to low-grade systemic inflammation, which can lead to coronary microvascular endothelial dysfunction, which can lead to myocardial hypertrophy and stiffness, as well as interstitial fibrosis.

Because these risk factors for HFnEF are more common in India [7,9] the prevalence of HFnEF is anticipated to be greater in India. We propose to investigate the prevalence and risk factors related with HFnEF because the actual frequency and incidence of HFnEF are unknown. We also look at the treatment that was given and the short-term results among the people in the research.

LITERATURE REVIEW

Aim: To determine the prevalence, etiological factors with management associated with Cardiac Failure with preserved left ventricular Ejection Fraction (CFpEF) in a tertiary setup.

Objectives: To find out how common it is to have Heart Failure with a normal Ejection Fraction (HFnEF). To investigate the etiologies and risk factors for HFnEF.

Methodology

This study was done at a rural tertiary care hospital in central India and is a cross sectional observational study done at a point of time. Our hospital has a well-equipped cardiac section and serves a primarily rural population. The research was placed from March through August of this year on a total of 46 participants including males, females, hailing from rural as well urban areas, under various age groups. The study's protocol was approved by the hospital's Institutional Ethics Committee prior to the study's start. All of the patients who were enrolled in the trial gave their informed consent. According to the criteria of inclusion and exclusion, all participants recently diagnosed with CF having preserved EF were recruited for this research.

Inclusion criteria: The research will involve individuals hospitalised to the hospital's medicine or cardiology departments with all clinical evidence of HF according to Framingham's criteria [9] and a preserved EF (EF>50%).

Exclusion criteria: Individuals with

- Anaemia (haemoglobin<8.00 g/dl).
- Haemodynamically severe or symptomatic valvular heart disease.
- Prosthetic/metallic valve replacement/repair.
- Implanted ventricular pacemaker.

Patient's demographic information was gathered from their medical records using a pre-defined case record form. Pulse rate, blood pressure, BMI, waist circumference, cardiac and respiratory tests were all performed on each participant of study [10,11].

The studies mentioned above were carried out at both the baseline and follow-up visits. A standardised, pretested, and validated interviewer-administered questionnaire was prepared to gather info about demographics, socioeconomic status of participant, medical background and family history of the person, physical activity status, and habit of cigarette and alcohol use.

Physical activity was divided into two categories: active (moderate cardio or vigorous aerobic exercise for at least 600 met. equivalent minutes per week and workout days per week) and inactive (no physical activity at all) (those not meeting the above criteria) [12]. If one or both parents had diabetes or cardiovascular disease, the family history of diabetes and cardiovascular disease was deemed positive. Those who were actively smoking were classified as smokers, while those who were currently consuming alcohol were classified as alcoholics. Using established methodologies, anthropometric information (such as individual, bodyweight, measurement of circumference of waist and hip) and measurement of blood pressure using sphygmomanometer were assessed [6]. The waist-hip proportion was defined as the proportion of circumference of waist to circumference of hip, and abdominal (central) obesity was calculated as a measurement of circumference of waist 80 cm for men and 90 cm for women [13].

Biochemical evaluation: In the follow-up appointment, all participants who did not report a history of diabetes development gave a venous blood sample in the fasting state and 2 hours after oral administration of 75 g of glucose. Fasting and post meal (2 hour) glucose and insulin levels, blood lipid profile, and HbA1c were all tested biochemically [14,15]. Biochemical analyses were performed on a 912 Autoanalyzer (Hitachi, Germany) using Roche diagnostics kits for measurement of blood glucose levels, plasma cholesterol in blood sample, plasma triglycerides in blood sample, and HDL in our central clinical lab certified by the National Board for Testing (NBT) and Calibration Laboratories (CB). The variant machine was used to calculate HbA1c using High Pressure Liquid Chromatography (HPLC) (Bio-Rad, Hercules and CA). High triglyceride levels were plasma triglyceride levels of higher than 150 mg/dL and low HDL was HDL of 40 mg/dL for males and 50 mg/dL for females [16].

Assessment of imaging: Electrocardiography, echocardiography, (x-ray) chest radiography and

and specialised lab tests such as Complete Blood Count (CBC) and Kidney Function Test (KFT) were all performed on the patient. 2DECHO was performed using a Philips echocardiography machine (HD 11 XE) using a conventional 2-4 megahertz multifrequency probe in our investigation.

Definitions

Heart failure: Patients who meet Framingham's criteria and have a (LVEF) ejection fraction of greater than 50% have cardiac failure with a more than 50% ejection fraction. Patients with cardiac failure with a decreased left ventricular ejection fraction meet Framingham's criteria and have an ejection fraction of less than 40% [10].

Hypertension: If your blood pressure is higher than 140/90 mm Hg, or you're taking antihypertensive medication, according to JNC VII standards [11].

Diabetes: Diabetes is defined as fasting blood glucose of more than 126 gm/dl and/or a post-meal/2 hr blood glucose of more than 200 gm/dl, or a patient using oral hypoglycemic medications, according to WHO guidelines.

Obesity: Overweight (BMI of 23 kg/m^2 but less than 25 kg/m^2), Generalised Obesity (GO, BMI of 25 kg/m^2), Abdominal Obesity (AO, waist circumference 90 cm for males and 80 cm for females) and central obesity (accounting waist circumference and BMI both) were all defined using WHO Asia Pacific criteria (GO plus AO) [12].

Coronary Artery Disease (CAD): On 2DECHO, individuals have an abnormal electrocardiogram or regional wall motion abnormalities.

Chronic Kidney Disease (CKD): Patients with a small kidney or lack of corticomedullary differentiation, as well as a serum creatinine level more than 2 mg/dl.

Obstructive Sleep Apnea (OSA): OSA was diagnosed using the Epworth sleepiness scale [13].

Data analysis

- SPSS 22 was used to enter the data.
- For continuous variables like age and serum uric acid levels, mean +/- sd was computed, whereas categorical variables like gender were reported as frequencies and percentages.
- The *Chi square* test is used, with a p value of 0.05 considered significant.

RESULTS

Observations

In comparison to the western population, the mean age of the population analysed was 55.78, with a range of 41 to 69, indicating an early start of heart failure. Females 29 (61.70%) outweighed men 17 (38.3%), indicating that females had a larger incidence of HFnEF than males (P 0.05). The average Body Mass Index (BMI) was 24.19, with a range of 20 to 28. The average ejection fraction was 57.65%, with a range of 53 to 57%. Hypertension was the most frequent risk factor related with HFnEF (63.83%) other risk factors were dyslipidemia (54.17%), diabetes (32.6%), alcohol (30.4%), rheumatic heart disease (28.26%), coronary artery disease (26.08%), smoking (12.77%), and OSA (12.77%). (0.02%) (Table 1).

Table 1: Baseline features of people with cardiac failure with a normal ejection fraction.

Characteristics	Mean (SD)
Age	55.78 ± 14.06
Gender	
Male	20 (43.47%)
Female	26(56.52%)
Ejection fraction	57.65 ± 4.93
BMI	24.19 ± 4.02
Smokers	6 (12.77%)
Hypertension	30 (63.83%)
Diabetes	15(32.6%)
CAD	12(26.08%)
Rheumatic heart disease	13(28.26%)
OSA	1(0.02%)
Dyslipidemia	24(54.17%)
CHD	1(0.02%)
Alcoholics	14(30.4%)

Dyspnea is the most prevalent presenting problem (100%). Pedal edoema (86.95%), Paroxysmal nocturnal dyspnea (54.34%), orthopnoea (54.34%) and weariness, lethargy (6%) are the other common symptoms (Tables 2 and 3).

Table 2: Clinical characteristics of a heart failing patient with a normal ejection fraction.

Clinical features	n (%)
Dyspnoea	46 (100%)
Pedal edema	40 (86.95%)
Orthopnea	25 (54.34%)
PND	25 (54.34%)
Fatigue	3 (6%)
Raised jvp	30 (63.3%)

Table 3: ECG abnormalities in individuals with cardiac failure with a normal left ventricular ejection fraction.

Ecg findings	n (%)
Atrial fibrillation	10 (21.7%)
P pulmonale	9 (19.56%)
Ventricular arrhythmias	1 (0.02%)
Ischaemic changes	12 (26.08%)
LVH	30 (65.21%)

Left ventricular hypertrophy (65.21%) was the most prevalent ECG result, followed by ischemic alterations (26.08%), atrial fibrillation (21.7%), acute pulmonale (19.56%), and ventricular arrhythmias (0.02%) (Tables 4 and 5).

Table 4: Treatment given to patients with normal ejection fraction heart failure.

Sr. no.	Medical Therapy	n (%)
1	NTG	30 (65.21%)
2	Inotropes	8 (17.39%)
3	ACE/ARB's	35 (76.09%)
4	Digoxin	10 (21.7%)
5	Antiplatelet	5 (10.87%)
6	Statins	5 (10.87%)
7	Beta blockers	17 (36.95%)
8	Diuretics	46(100%)

Table 5: Outcomes of patients with normal ejection fraction heart failure.

S. no	Outcome	Mean (SD)	
		Male	Female
1	Duration of Hospital Stay	6.29 ± 3.47 days	9.24 ± 9.18 days
2	Discharge	16 (34.78%)	26 (56.52%)

3	Death	1 (0.02%)	0 (0%)
4	DAMA	3 (0.065%)	0 (0%)

Only one death occurred out of the 46 that were examined. Females had a higher average duration of stay in hospital (9.24 days) than men (6.29) (P 0.05), indicating that the illness affects females more severely than males.

DISCUSSION

Previous studies have shown a rising trend in ischemia cause over time [7], but a comprehensive trend analysis in our study demonstrates that over the last 10 years, the percentage of HF patients with IHD has shifted to constant or declining proportions. Diabetes mellitus, obesity, hypertension, chronic renal disease, and cancer comorbidities are becoming more common at the time of HF development, and these variables may be linked to the rise in HF with intact ejection fraction. Diabetes and obesity are expected to quadruple in the next decade, and an increase in cancer survivors receiving cardio toxic cancer therapies indicates that HF rates, particularly HF with maintained ejection fraction, are likely to grow [8]. Moreover, while antismoking initiatives have resulted in less number of current smokers among new patients of heart failure, our analysis revealed a concerning change in recent years, with increasing proportions, notably among men and ethnic minority groups. IHD has been steadily decreasing in women since 2008, although maintaining steady in males [14].

Along with rising rates of diseases like hypertension, obesity, and anemia, all of which are linked to heart failure with preserved ejection fraction, heart failure with EF>50% is on the rise [6,9]. Because women are older and have a higher prevalence of comorbidity at the time of HF start, this gender gap is expected to widen. This is significant since HF clinical guidelines do not yet identify sex dimorphism [9]. The complicated comorbid profile of females with HFpEF, which includes growing hypertension and morbid obesity, may explain why more women are diagnosed initially in hospital than men. It also points to a coming trend for prim. Prevention, which will necessitate creative treatments to enhance good management and disease prognosis.

Incidence rates are compared: Incidence data for hypertension, T2D, and other risk factors in India are currently confined to three urban studies [9] and our findings, particularly the data from rural areas, are an essential addition to the medical research. In Asian project the cardiovascular risk reduction, a total of 16000 men and women in India were shown to have an age-adjusted hypertension incidence of 4.7 and 3.6 per 100 per year, respectively, during two years (2010–2012). Diabetes was found to be 2.2 per 100 people in the study. Over the course of 6.9 years (1998–2002 to 2006–2009) [14]. These studies imply that the prevalence is higher in major cities than in rural India. which might be due to variations in the distribution of certain disease associated risk factors in different socioeconomic environments. Differential patterns of disease etiology within a nation can have significant consequences for putting in place effective CVD preventive programmes. Global incidence comparisons are limited due to the lack of comparable time-specific incidence data from HICs.

Strengths and limitations of this study: Our study's strengths include its cross sectional design and low bias. Our study was well planned to evaluate rural-urban disparities, and the data of incidence of this study are a welcome complement to currently sparse national and worldwide data and medical literature on rural populations. A problem is the small number of participants, which makes determining and comparing outcomes difficult. As a result, estimates of incidence in that group may have been overstated.

Heart Failure (HF) affects 1.5% to 2% of the population, according to epidemiological research, and is the leading cause of hospitalisation among the elderly [1]. This study was done at a rural tertiary care hospital in central India and is a cross sectional observational study with major objective to find out the prevalence, etiological factors with management associated with Cardiac Failure with preserved left ventricular Ejection Fraction (CFpEF) in a tertiary setup. According to this study, the majority of people in India with significant heart failure (HFnEF) are in the age bracket 41 to 69, with hypertension being the most frequent cause, followed by dyslipidemia. As per our study HFnEF is more common and severe in elderly ladies than man. Similar trends were seen in a study Gupta et al conducted in an urban population of Jaipur in 2002 to evaluate the prevalence of coronary artery disease and risk factors [17]. The overall prevalence of CAD was 6.2% in men and 10.8% in women. The highest prevalence of risk factors included hypertension (36.9%). A study conducted by krishnan underlined the alarmingly low level of awareness, treatment and control of hypertension and diabetes in the sample. Only a third of the individuals were aware of their hypertension and only a quarter were treated; of the treated, one-third had adequate control. Similar trends were noted in diabetes. High blood pressure was observed in nearly 68% of individuals evaluated, comparable to the prevalence in the United States.

The study's findings highlight the urgent need to create routine screening techniques to detect those who are at risk of or suffering from heart failure in early stages, so that effective management and care may be provided before the condition worsens and slips to beyond managable.

CONCLUSION

According to this study, the majority of people in India with significant Heart Failure (HFnEF) are in the age

bracket 41 to 69, with hypertension being the most frequent cause, followed by dyslipidemia. According to the findings, HFnEF is more common and severe in elderly ladies (56.52%) than in males (43.4%). Left ventricular hypertrophy (65.21%) was the most prevalent ECG result. Dyspnea is the most prevalent presenting problem (100%).

Long-term hypertension is a frequent cause of cardiac failure with normal left ventricular Ejection Fraction (HFnEF); additional causes include obesity, hyperlipidemia, type 2 diabetes mellitus, COPD, or CKD (chronic kidney disease). Because these risk factors for HFnEF are more common in India, the prevalence of HFnEF is greater here.

The study's findings highlight the urgent need to create routine screening techniques to detect those who are at risk of or suffering from heart failure in early stages, so that effective management and care may be provided before the condition worsens and slips to beyond managable.

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