PREVALENCE OF ISCHEMIC HEART DISEASE IN HEART FAILURE WITH PRESERVED EJECTION FRACTION

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ABSTRACT

Background

The pathogenesis and prevalence of ischemic heart disease (IHD) in heart failure (HF) with reduced ejection fraction (HFrEF; EF <50%) is well established, but its prevalence and pathogenesis significance in HF with preserved ejection fraction (HFpEF; EF ≥50%) has been much less explored.

Objectives

To identify prevalence of IHD in HFpEF and to correlate the effect of clinical data and diagnostic tools in HFpEF

Methods

This cross sectional study was carried out in Sulaimani Cardiac Center and Shar Teaching Hospital from April 2017 to January 2018. 104 patients of heart failure whom showed ejection fraction above 50% when evaluated by echocardiography were further evaluated for ischemic heart disease by CT coronary angiography and/or percutaneous coronary angiography

Results

Among the patients, 34 (32.7%) were males and 70 (63.7%) were females, and their mean age was 65.49±4.9 with the IHD was equal in both genders with P value of 0.5. However, it was more common in overweight and obese patients with P value of 0.07 when comparing with underweight and normal, in our study 81.6% of patients were HTN and 62.6% of patients were diabetic, a strong relationship between past medical disease and CAD with p value of <0.001. Overall, 43.3% had ischemic heart disease.

Conclusion

Our data suggest that coronary artery disease is more prevalent in heart failure with preserved ejection fraction and it depends on other risk factors and risks of ischemic heart disease.

Keywords: *HFpEF, IHD, Sulaimani*

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INTRODUCTION

Ischemic heart disease is a major underlying pathogenic factor in heart failure, increasing the risk of HF eight 8 folds and with a population-attributable risk of 65% in men and 48% in women [1]. However, with aging populations and increasingly effective treatment of acute coronary syndrome resulting in less extensive myocardial damage and chronic remodeling, increasingly favors heart failure with preserved ejection fraction HFpEF (previously called diastolic heart failure) compared with heart failure with reduced ejection fraction HFrEF [2]. However, crucial gaps in evidence include scarce and highly variable data on IHD prevalence in HFpEF [3-5]. A poor understanding of how different HF types affect ischemic outcomes [6, 7] and uncertainty about the role of established IHD in determining the risk of new ischemic events and other outcomes and longitudinal changes in EF in HFpEF versus HFrEF [8,9]. Heart failure with preserved ejection fraction accounts for upward of 50% of all patients with HF [10]. While traditionally associated with the concept of 'pump failure' or reduced left ventricular (LV) ejection fraction (EF), it has become widely recognized that HF can occur even when EF is preserved (i.e. the EF ≥50%). This condition has become a major public health problem because its prevalence increases at an alarming rate of 1% per year [11].

These recent studies provided a more refined estimate of the prevalence of HFpEF among patients with HF, which averaged 54%, with a range from 40 to 71% [12]. This temporal trend for increasing HFpEF occurred in association with increases in the prevalence of hypertension, diabetes, and atrial fibrillation, but without a corresponding increase in the relative prevalence of HF with reduced ejection fraction HFrEF. In the same time frame, survival was noted to improve in patients with HFrEF, but not in those with HFpEF. These secular trends underscore the importance of HFpEF as a major and growing public health problem. Patients with HFpEF were found to be female, more predominantly hypertensive, and have a higher prevalence of atrial fibrillation. Notably, non-cardiovascular co-morbidities also appear to be highly prevalent in HFpEF, consistent with an elderly population, and include renal impairment, chronic lung diseases, anemia, cancer, liver disease, peptic ulcer disease, and hypothyroidism. Survival of patients with HFpEF is poor and similar to HFrEF, with observational studies reporting a dismal 5-year survival of only 35-40% post-hospitalization for HF [13,14].

These finding emphasize the critical need to screen carefully for the presence and severity of CAD in patients with heart failure, even in the absence of reduced LVEF. However, because CAD and HFpEF are associated with common risk factors, such as aging and hypertension, it is also possible that CAD and HFpEF simply coexist in many patients without any mechanistic relationship. As such, it remains unclear whether HFpEF patients with CAD should be diagnostically grouped separately from those without CAD, how and when to evaluate for CAD in patients presenting with HFpEF, and how to manage CAD once it is identified, at least in the absence of an acute coronary syndrome. Finally, few data exist on the prevalence of CAD in the specific group of patients with HFpEF, which was recently defined in the guidelines [15].

PATIENTS AND METHODS

It's a cross sectional study carried out at Sulaimani cardiac center and Shar Teaching hospital between April 2017 and Jan 2018, one hundred and four consecutive patients visiting hospitals with new or worsening heart failure and those who developed significant symptoms of heart failure in the hospital, exclusion criterias are: Patients with significant valvular heart disease (more than moderate primary mitral regurgitation, mitral stenosis, aortic regurgitation or aortic stenosis),prosthetic valve, cardiomyopathy (restrictive,hypertrophic), congenital heart disease,constrictive pericarditis, pulmonary embolism, cardiac tamponade,severe pulmonary disease causes pulmonary artery hypertension,high output heart failure and Patients were excluded from analysis if they had EF <50% (HFrEF). In the present study, HFpEF was defined by (patients with signs and symptoms of heart failure like dyspnea,orthopnea,body swelling, fatigue and by echocardiography EF ≥50%). then we took full history and physical examinations with electrocardiography and echocardiography for all patients, by echocardiography we measured left atrial dimensions by LA anterior-posterior diameter in parasternal long axis view and by minor and major axis in apical 4 chamber view and normal values use in our study are for LA diameter (27-38) mm in woman and (30-40) mm in man and volumes (22-52) ml and (18-58) ml respectively, also we measured left ventricular diastolic function as a measure for HFpEF and left ventricular hypertrophy (LVH) by both electrocardiography measures and echo by two dimensional measurements using the biplane method of discs(modified Simpson's rule) both the posterior wall and interventricular septal thickness (normal 6-10 mm) we measured as LVH,

also pulmonary artery pressures and dyskinesia and akinesia of walls all are measured. History of CAD was defined as previous acute coronary syndrome, coronary artery revascularization or the presence of at least one significant stenosis at a previous coronary angiography session.

Data analysis was done by computerized statistical software; Statistical Package for Social Sciences (SPSS) version 24. In all statistical analysis level of significance (p value) set at ≤ 0.05 and the result presented as tables and/or graphs.

RESULTS

Among one hundred and four patients, patients aged between 48 and 81 years were in the study, mean age was 65.49±4.95, females 70 (63.7%) were more than males 34 (32.7%). According to BMI patients were classified in to underweight (BMI less than 18.5) were 6.7%, normal (BMI between 18.5-25) were 20.8% and overweight and obese (BMI more than 25) were 64.4%. About smoking state 71.2% were no smoker and 28.8% were smoker. The mean age of patients with IHD was 66.33±4.95 years old, when comparing with ages of patients without IHD it was 64.84±4.89 with P value of 0.1, and it was common in both genders with P value of 0.5, regarding smoking the ischemic heart disease was common in smokers with P value of 0.07 and it was more common in overweight and obese patients with P value of 0.07 when comparing with underweight and normal BMI. In our study patients who had hypertension were 85 patients (81.6%) and diabetes mellitus were 65 patients (62.6%), those had dyslipidemia 66 patients (63.5%) and who had chronic kidney disease 23 patients (22.1%) were all are shown in Table1.

Majority of our patients had sinus ECG (70.2%) while (29.8%) had atrial fibrillation, regarding echocardiography results among patients had LVH were 88 patients (84.7%), those had left atrial dilate were 52 patients (50%), pulmonary hypertension were 34 (32.6%), wall motion abnormality like dyskinesia and akinesia were 37 (35.6%) and mitral valve regurgitation 44 patients (42.3%) as shown in Table2.

Those who had ischemic heart disease were (43.3%). Coronary artery disease was diagnosed by CT coronary angiography in 15 patients (14.5%) and by coronary angiography (pci) in 30 patients (28.8%) as shown in Table 3.

Regarding the presence of coexisting medical illness of which may increase the prevalence of ischemia among patients with heart failure, we found that the ischemia was more prevalent among patients with hypertension, diabetes mellitus, dyslipidemia and chronic kidney disease with P value of <0.001 as shown in Table 4.

Table 1. Distribution of the patients according to the presence of medical illness.

Types of medical illness	Number (%)
Hypertension	85 (81.6)
Diabetes mellitus	65 (62.6)
Dyslipidemia	66 (63.5)
Chronic kidney disease	23 (22.1)

Table 2. Echocardiographic finding in the studied patients.

Echocardiographic finding	Number (%)
Left ventricular hypertrophy	88 (84.7)
Left Atrial dilate	52 (50)
Pulmonary hypertension	34 (32.6)
Wall motion abnormality	37 (35.6)
Mitral valve regurgitation	44 (42.3)

Table 3. Number of patients with ischemia and tools of diagnosis.

Interventional finding	Number (%)
1.Normal coronary	59(56.7)
2. Ischemia	
A. Coronary angiography	30(28.8)
B. CT coronary angiography	15(14.5)
Total	104 (100)

Table 4. Prevalence of IHD according to past medical disease in patients with HFpEF.

Past medical disease	Ischemia		P value
	Yes	No	
Hypertension	39	46	<0.001
Diabetes Mellitus	30	35	
Dyslipidemia	39	27	
Chronic kidney disease	15	8	

DISCUSSION

In this study, we found the prevalent of IHD were common in HFpEF, which was associated with increased risk of new IHD events, HF hospitalization, and cardiovascular events. Two studies have demonstrated worse survival among patients with IHD versus those without IHD [16, 17]. The risk of IHD was more common in all HF categories but greater in HFrEF than in HFpEF as mentioned in the study [18, 19]. prior studies had contradicting data about the relationship of HF and CAD. Some of the prior data have shown that CAD has an inverse relationship with measurements of HFpEF [21] therefore prior studies assessing the association between HFpEF and CAD came to conclusions. In another study, did not find consistent relation between CAD and echocardiographic finding of HFpEF [20] but in our study there is significance ratio of CAD which found nearly 43.3% of study results and this different may be due to their study population which had lower risk factor profile than our patients, those studies Only 6% are diabetic and 36% are hypertensive but in our study HTN patients were 81.6% and DM were 62.6%, However, their protocol and patient population are different from our study.

In this study we found that hypertension, diabetes mellitus and dyslipidemia like major population have significant affect on IHD risk in HFpEF with p value <0.001, regarding age and gender the mean age of previous study were 49 ± 12 years but in our study are 66.33±4.95 years old and gender ratio were female 70 to males 34. which has an effect of the result. However, the result of our study were similar to some previous studies which conducted for the same reason and showed the prevalence of IHD were 52% like in Community-based studies have shown that IHD was common in patients with HFpEF and the results based on a history of myocardial infarction, revascularization, or electrocardiographic changes, it was common in HFpEF, and is present in 40% to 50% of patients [8, 13, 14, 22, 23]. Also we found that the IHD was common in overweight and obese patients with smokers and atrial fibrillation with p value of 0.07 also same the results with a study performed in north America at 2014 showed that the IHD were more common in male and smoker with atrial fibrillation. Despite the common presence of IHD in HFpEF, data regarding its prognostic implications and optimal treatment are sparse and somewhat conflicting but in some previous studies it was shown that the IHD affects outcome and morbidity like in a study from the CASS (Coronary Artery Surgery Study) registry showed that the presence of HF in patients with CAD and EF >50 was associated with increased risk of death [24] because of significant number of IHD in HFpEF like in our study. Further studies are required to identify the optimal diagnostic assessments for IHD in patients presenting primarily with the clinical syndrome of HFpEF.

Recommendation and conclusions

In conclusion coronary artery disease is more prevalent in HFpEF and its depend on past medical disease and risks of IHD. In the future, prospective longitudinal studies are needed to bring more insights about the relationship between coronary artery disease and heart failure with preserved ejection fraction. Because of the presence of comorbid diseases like hypertension, diabetes mellitus, chronic kidney disease and dyslipidemia increases chance of HFpEF and IHD with follow up these patients we can improve their life by good control of these risk factors and doing some kind of intervention like coronary CT angiography and PCI.

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