RISK FACTORS OF CONGESTIVE HEART FAILURE IN PATIENTS ADMITTED FOR CORONARY ARTERY BYPASS GRAFTING

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ABSTRACT

Background: Congestive heart failure, has high morbidity and mortality outcomes. **Objective:** To evaluate the association between the risk factors and congestive heart failure in patients admitted for CABG surgery. **Subjects and Methods:** This comparative cross sectional study includes 102 consecutive patients aged >50 years, admitted for CABG surgery and were classified as with and without congestive heart failure. They were selected from cardiac surgery department of Punjab Institute of Cardiology, Lahore over a period of 6 months from 1st January 2014 to 31st June 2014. Pre-operative risk factors were recorded while, the data was analyzed by using SPSS Version 20. P-value < 0.05 was taken as significant. **Results:** Out of 102 patients, 48 were males and 54 were females. Females were older than males. Risk factors i.e. AF, raised creatinine (>1.4 mg/dl), impaired LV function, renal disease, valvular heart disease (VHD), COPD, smoking and hypertension were found to be comparatively higher in heart failure group than non- HF group. (P<0.05) **Conclusion:** CHF in patients admitted for CABG surgery leading to increased morbidity. Male gender, age, hypertension, smoking, renal disease, VHD, raised creatinine (mg/dl), impaired LV function, chronic obstructive pulmonary disease (COPD) and artial fibrillation were independently associated with CHF.

Key words: Congestive heart failure, Chronic obstructive pulmonary disease, Atrial Fibrillation, Left ventricular ejection fraction, Coronary artery bypass grafting.

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INTRODUCTION

Heart failure (HF), often called congestive heart failure (CHF) or congestive cardiac failure (CCF), is an inability of the heart to provide sufficient pump action to distribute blood flow to meet the needs of the body. Heart failure is a common, costly, disabling, and potentially deadly condition.[1] In Pakistan prevalence is 14.75%-22.87%,[2] and in developed countries around 2% of adults suffer from heart failure while 23 million worldwide.[3] The incidence of morbidity and mortality from congestive heart failure (CHF) have been increasing and have become important public health and clinical problem,[2] about 400,000[4]- 660 000, new cases occur annually with an incidence of 10 per 1000 population,[5,6] and 287,000 individuals in America die of CHF in each year.[4,5,6] The number of deaths from CHF were increased by approximately 120%-137%.[7]

Multiple risk factors are associated with the increased risk of congestive heart failure.[6] Chronic obstructive pulmonary disease (COPD) is commonly associated with heart failure. Individuals with COPD have a 4.5-fold greater risk of developing heart failure than those without. The prevalence of COPD among individuals with HF ranges between 20% and 32% of all cases.[8]

In patient with congestive heart failure, reduced LVEF raised the mortality risk four-fold times higher compared with control subjects who were free of CHF.[9] Hypertension is the most important risk factor accounting to congestive heart failure, while the other common risk factors are smoking, diabetes, hyperlipidemia, prior history of valvular and coronary heart disease. Systolic and diastolic dysfunction applies mainly to CHF related to coronary artery disease and hypertension; valvular disease and arrhythmia-associated CHF can occur with or without systolic or diastolic dysfunction. About 30% to 40% of CHF is associated with diastolic dysfunction.[10] Congestive heart failure (CHF) in patients admitted for CABG surgery is a leading source of morbidity and mortality, so we conducted this study to investigate the risk factors for CHF and by recognizing the presence of congestive heart failure with associated risk factors, we can predict the surgical outcome of patients.

SUBJECTS AND METHODS

A total number of 102 consecutive patients who were waiting for CABG surgery presenting with and without congestive heart failure, aged >50 years

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were selected from cardiac surgery department of Punjab Institute of Cardiology, Lahore from 1st January, 2014 to 31st June, 2014.

Patients fulfilling the criteria of diagnosis of congestive heart failure defined according to the guidelines of the European Society of Cardiology from medical records and who were experiencing signs and symptoms like breathlessness, ankle swelling, fatigue, raised jugular venous pressure, and a third heart sound were included while all cases of isolated right heart failure, isolated left heart failure and other medical causes with similar symptoms and signs were excluded from the study.

Following data was calculated for each patient by interview and direct observation: patient characteristics like age, sex, obesity (BMI > 25), hypertension (systolic BP > 140 mm Hg or diastolic BP > 90 mm Hg), diabetes (fasting glucose > 126 mg/dl), stroke or transient ischemic attack (TIA) hyperlipidemia (total cholesterol > 200 mg/dl or LDL > 130 mg/dl or HDL < 40 mg/dl on treatment[11]), smoking,[12] raised CRP level (> 2 mg/liter[13]), raised creatinine (> 1.4 mg/dl), valvular heart disease, coronary heart disease, atrial fibrillation and chronic obstructive pulmonary disease (determine by spirometry as FEV1/FVC with a cutoff point <0.70), Impaired LV function (ejection fraction >30%).[14]

Data was analyzed by using SPSS (Statistical Package for Social Sciences) Version 20.0 for Window. Mean ± S.D was done for quantitative variables. Frequencies, percentages were used for qualitative variables. Chi square test was applied to observe the association of the qualitative variables with heart failure, while for quantitative variable independent sample t test was applied. Binary logistic regression was used to determine the influence of predictors on congestive heart failure. Level of significance was considered <5%.

RESULTS

There were total 102 patients of which 48 (47%) were male while 54 (53%) were female. There was a trend towards slightly higher HF cases amongst men. The mean age of the patients was 36.94 ± 5.65. HF was detected in 60 (58.8%) cases. Risk factors were more commonly observed in heart failure as compared to non- HF. (Table I)

Test of significance result indicate that those whose were male, older hypertensive, smoker, having renal disease, prior history of VHD and raised creatinine having AF and COPD were independently associated with heart failure. (P <0.05). (Table I).

Table l: Risk factors association with CHF

Risk factors		Heart Failure		P-value
		Yes(60)	No(42)	
Sex	Male	38(63.3%)	10(23.8%)	0.001
	Female	22(36.7%)	32(76.2%)	
Age (>50 years)		45.0 ± 675	41.0 ± 7.75	0.048
Hypertension		16(26.7%)	4(9.5%)	0.032
Smoking		19(31.7%)	6(14.3%)	0.045
Obesity		11(18.3%)	5(11.9%)	0.380
Diabetes		16(26.7%)	3(7.1%)	0.729
Hyperlipidemia		4(6.7%)	1(2.4%)	0.324
Valvular heart disease		17(28.3%)	8(19%)	0.028
Coronary artery disease		44 (73.3%)	30(71.4%)	0.823
Renal disease		19(31.7%)	5(11.9%)	0.021
Stoke/TIA		5(8.3%)	3(7.1%)	0.826
Impaired LV function		11(18.3%)	2(4.8%)	0.043
Raised Creatinine (>1.4 mg/dl)		1.27ÿ0.5	0.85ÿ0.4	0.033
Raised CRP level		4.70ÿ7.5	3.38ÿ6.05	0.188
CRP	>2 (mg/liter)	10(16.8%)	5(9.7%)	0.188
	<2 (mg/liter)	50(83.2%)	37(90.3%)	
AF		15(25.0%)	5(9.5%)	0.048
COPD		22(35.39%)	24(57.1%)	0.041

DISCUSSION

The present study provides evidence that the predictors play a promising role in the development of CHF in patients admitted for CABG. Males as compared to females were significantly associated with CHF. Hypertension, age, VHD, CHD, smoking, renal disease, impaired LV function, raised creatinine, chronic obstructive pulmonary disease (COPD) and artial fibrillation were all associated with CHF, while obesity, diabetes, hyperlipedemia, stroke, and raised CRP level were noted to be insignificantly associated with CHF.

Our results are comparable with literature as a study by John SG et al[15] demonstrated that congestive heart failure increased progressively across younger age groups and Neuspiel DR reported the age > 30 years was independently associated with congestive heart failure, we demonstrated the similar results.

Owan TE et al[16] provides evidence that CHF was more commonly found in older age group (>50 years). Levy D et al,[17] Framingham study[18] and Rotterdam study[19] provide results that older age is a risk factor for the development of congestive heart failure. In contrast to our study it showed different results probably due to the different nutritional and environmental factors of the population.

John SG,[15] Owan TE et al[16] and Alberto M[12] et al, established that CHF was more common in men than women. These results are similar with the present study. Levy D,[17] Marwan N[20] and Steuer J [21] et al found that congestive heart failure was more common in women than in men, (39% vs 59%) showed contradictory results; this disparity may be due to bias in selection of women patients.

Seok J[23] et al found CAD had a prognostic impact on CHF. Our results showed different results from the Neuspiel DR,[22] John SG,[15] Marwan N[20] and Alberto M[12] studies may be due to the small sample size. Cohn[24] and Parameshwars' studies[25] the presence of CAD was not related to worse predictor of CHF, while in the Neuspiel DR,[22] John SG,[15] Marwan N[20] and Alberto M[12] et al reported that prior history of CAD was independently associated with congestive heart failure. In the Framingham study, Wolf PA et al[18] found that the history of stroke/TIA is found to be higher in individuals with HF than in the general population. John SG[15] and Marwan N[20] and Pullicino PM[26] et al found that history of stroke is significantly associated with HF.

The incidence figures from the Framingham[18] and Rotterdam[19] heart studies provide estimates of risk of developing congestive heart failure which found that hypertension was significantly associated with the congestive heart failure as 28% CHF patients had hypertension. Present results were analogous with these results. Levy D[17] et al found hypertension was alone independent predictor of CHF as 91% hypertensive patients developed CHF. It also found that in the presence of hypertension all these predictors like myocardial infarction, diabetes, and valvular heart disease were significantly associated with CHF. In the present study we established these variables as independent predictors of CHF.

John SG,[15] Alberto M,[12] Levy D,[17] and Marwan N[20] et al scrutinized that hypertension, smoking and raised creatinine (>1.4 mg/dl) were significantly associated with CHF. Our study showed same results.

Prior MI, diabetes, hyperlipidemia and low Hb were significantly associated with the occurrence of congestive heart failure by Levy D et al.[17] Alberto M,[12] John SG[15] and Marwan N[20] established that prior history of myocardial infarction, hyperlipidemia, diabetes and obesity were independent risk factors of CHF. In contrast to present study these showed different results due to different co-morbid condition of the study population.

The incidence figures from the Owan TE et al[16] heart study provides estimates of risk of developing congestive heart failure which found that the patients who had impaired LV function (< 30%) had higher chances to develop congestive heart failure.

Jennifer EH, [27] John SG [15] and levy D[17] et al analyzed that impaired LV ejection fraction was significantly associated with the occurrence of congestive heart failure (56%). Carolyn SPL[28] et al found that LV systolic and diastolic dysfunction was associated with increased HF risk. Present study also demonstrated the similar results. On the other hand another study by Ramachandran Sv[9] et al determined that normal LV systolic function is often found in persons with CHF. In contrast to our study it showed different results probably due to the post CABG stunning myocardium.

Some studies Crijns HJ[29] and Mahoney P[30] et al which have small sample size suggested that prior history of AF was not a predictor of CHF, but in some recent large reports by Wang TJ,[31] Alberto M[12] and John SG[15] et al , AF has been shown to be an independent risk factor for CHF. Ajay Ks[32] and Steven A[33] et al found that the patients who develop CHF were more likely to have prior history of AF, because many of these patients have additionally co-morbid condition like impaired LV function.

John Sg[15] found raised CRP level was significantly associated with the CHF. An additional study by Isabella K[34] and Chirinos JA[35]et al estimated in his population-based study that raised CRP was a strong predictor of heart failure. Campbell DJ[36] et al elevated CRP levels have been shown to result in an adverse prognosis in heart failure patients and seem to be predictive of the development of heart failure in high-risk participants, as the raised CRP level was a biomarker associated with many inflammatory diseases, so our results showed different results.

Furthermore COPD, which is a common co-morbidity in HF patients, found to be a worse predictor of HF (12.9%) by Lubna N et al.[2] Felipe VA[8] et al found that COPD patients had four fold increased risk of development of CHF as compared to normal individuals. Noel O'Kelly [37] et al found that COPD is not associated with the CHF, due to the normal RV function in these patients.

CONCLUSION

Our results showed that being male, younger (<50 years) at the time of presentation, with co-morbid conditions like hypertension, smoking, renal disease, AF, raised creatinine, impaired LV function, valvular heart disease and COPD were found to have increase risk of CHF.

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