

RISK FACTORS OF HEART FAILURE AFTER MYOCARDIAL INFARCTION

Muhammad Zafar Majeed Babar¹, Mirza Ahmad Raza Baig², Hammad Azam³, Sheikh Muhammad Azam⁴

¹ Department of Medicine, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan - Pakistan.

² Department of Cardiac Surgery, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan - Pakistan.

³ Department of Cardiac Surgery, Ch. Pervaiz Elahi Institute of Cardiology, Multan - Pakistan.

⁴ Department of Zoology, University of Education Lahore, Dera Ghazi Khan Campus-Pakistan.

Address for correspondence:
Dr. Muhammad Zafar Majeed Babar

Sheikh Zayed Medical College/Hospital, Rahim Yar Khan - Pakistan.

Email: mzmababar@yahoo.co.uk

Date Received:

June 15, 2016

Date Revised:

January 20, 2017

Date Accepted:

January 24, 2017

ABSTRACT

Objective: To find out risk factors of heart failure after ST Elevation Myocardial Infarction (STEMI) and to see the most commonly involved vessels in myocardial infarction responsible for heart failure.

Methodology: This cross-sectional study was conducted from June 2013 to November 2013. 225 patients of heart failure (HF) following STEMI who came in the emergency department of the hospital were included. The selected patients were followed till the angiography reporting. Statistical analysis was done in SPSS version 16.

Results: Mean age of patients was 51.42 ± 11.78 years. 49.0% patients were hypertensive, 37.3% patients were diabetic, 44.0% were smokers and 18.2% had positive family history. In this study, anterior wall MI was predominant and found in 30.7% patients. 46.7% patients had triple vessel disease (TVD). There was 33.7% involvement of Left main stem (LMS).

Conclusion: Hypertension and smoking are most common risk factors of heart failure. The patients who present with heart failure are most who have involvement of triple vessel coronary artery disease. Left main stem (LMS) is most commonly involved vessel in these patients.

Key Words: Coronary artery disease, Heart failure, Myocardial infarction

This article may be cited as: Babar MZM, Baig MAR, Azam H, Azam SM. Risk factors of heart failure after myocardial infarction. *J Postgrad Med Inst* 2017; 31(1): 29-32.

INTRODUCTION

Heart failure (HF) is responsible for worsening of the outcome of patients after myocardial infarction¹⁻⁴. Left ventricular systolic dysfunction occurs in about 40% cases of acute MI, out of which 25% patients develop heart failure (HF)⁵.

It has been estimated that about one fifth patients with acute MI and 10% with unstable angina patients develop HF during hospitalization⁵. Heart failure has considerably increased the hospitalization rate, mortality and treatment cost over the last years⁶. Most of these patients are with low ejection fraction (EF) e.g. 40% or less. Also there is a reduction in left ventricular EF in HF patients⁷⁻¹⁰.

Patients who developed MI have two times higher hospitalization rate and four times greater death rate compared to those without MI⁴. Patients in

whom HF occurs during hospitalization are at advanced threat of mortality than patients with HF at admission¹¹⁻¹³. Felker et al¹⁴ demonstrated that information about angiographic data of heart failure patients relating the extent of coronary artery disease (CAD) can offer supplementary prognostic information in patient of heart failure. We conducted this study to evaluate the risk factors in patients who developed heart failure after MI, in addition to it we also observed the extent of coronary artery disease and which vessel was most commonly involved. This study will help us to identify the common causative factors of heart failure in our population.

METHODOLOGY

A non-randomized prospective study was conducted in department of cardiology, Sheikh Zayed Medical College/Hospital Rahim Yaar Khan. Approval from institu-

tional review board was taken before starting the study. The study was completed in 5 months. Sample size for this study was calculated by taking 25% prevalence of heart failure in myocardial infarction patients⁵, by taking precision level 5%, sample size for this study was 225 patients. 225 patients of HF following STEMI who came in the emergency department of the hospital from June 2013 to November 2013 were included in this study, irrespective of their age and gender. Patients of STEMI without heart failure were excluded. Written informed consent was taken from participants by ensuring him/her the confidentiality of data. Presence of ST segment elevation in chest leads along with raised cardiac troponin-t levels (trop-t >0.3 ng/dl) was classified as STEMI. Patients with presence of frank pulmonary edema and systolic blood pressure <90 mmHg were classified as heart failure patients. The selected patients were followed till the angiography reporting.

A questionnaire was made for data collection. All risk factors of IHD, presence and type of MI, ECG changes, clinical history and angiographic data were included in the questionnaire to evaluate the patients. In addition to collecting basic demographic details, detailed clinical

history regarding risk factors of IHD e.g. chronic hypertension and diabetes mellitus, smoking and family history of IHD in first degree relatives was taken. Smoking was demarcated as smoking minimum 100 cigarettes during lifespan¹⁵.

Statistical analysis was done in SPSS version 16. Mean with standard deviation and percentages were used for presentation of continuous and qualitative variables respectively.

RESULTS

All characteristics of patients are described in table 1. The total patients under study were 225, of them 171 (76.0%) patients were male. Mean age was 51.42±11.78 years. 110 (49.0%) patients were hypertensive, 84 (37.3%) patients were diabetic, 99 (44.0%) were smoker and 41 (18.2%) patients were with positive family history.

Out of 225, 69 (30.7%) patients had anterior wall MI. In this study, 105 (46.7%) patients had TVD and LMS stenosis was found in 33.7% patients.

Table 1: Characteristics of all patients following heart failure

Name of Variable		Value
Number of Patients (n)		225
Age (years), Mean±SD		51.42±11.78
Gender (%)	Male	171 (76.0)
	Female	54 (24.0)
Hypertension (%)		110 (49.0)
Smoking (%)		99 (44.0)
Diabetes (%)		84 (37.3)
Family History (%)		41 (18.2)
Category of MI (%)	Lateral wall	9 (4.0)
	Anterior Wall	69 (30.7)
	Posterior Wall	6 (2.7)
	Inferior Wall	54 (24.0)
	Antero-lateral wall	38 (16.8)
	Antero-septal wall	45 (20.0)
	Infero-posterior wall	4 (1.7)
Percentage involvement of Individual Vessel (%)	Right main coronary Artery (RCA)	50 (22.2)
	Left circum flex Artery (LCx)	55 (24.4)
	Left main stem (LMS)	76 (33.7)
	Left Anterior Descending Artery (LAD)	44 (19.5)
Association of HF with severity of Coronary Artery Disease (%)	Single vessel disease (SVD)	81 (36.0)
	Double vessel disease (DVD)	39 (17.3)
	Triple vessel disease (TVD)	105 (46.7)

DISCUSSION

Heart failure has now become a leading cause of hospitalization. It is responsible for 1-2% of total hospital admissions¹⁶⁻¹⁸. In this study, we evaluated the risk factors and angiographic findings in HF patients.

Gheorghiade et al¹⁹ demonstrated that the most frequent causal disease in HF patients is CAD. In another study coronary artery disease was responsible for approximately two third cases of heart failure. The remainders were with non-ischemic sources of systolic dysfunction (e.g., hypertension, valvular disease, myocardial toxins or myocarditis)²⁰. Coronary disease and other risk factors e.g. diabetes and hypertension singly or together predispose to heart failure and are responsible for 87% cases of cardiac failure in the general population²¹.

Coronary artery disease have put a heavy socio-economic and mortality load in general population²². Faisal et al²² demonstrated a close association between age and ACS risk. According to Adams et al²³ the risk of ischemic heart disease is more in men as compared to women, and ejection fraction was higher in non-ischemic women than non-ischemic men. Kannel et al²¹ reported that diabetes predisposes all patients to cardiac failure irrespective of sex and age and hypertension is responsible for up to 75% cases of cardiac failure. In our study, 49.0% patients were hypertensive, 37.3% patients were diabetic and 44.0% were smokers. A recent trial has concluded that there is an increased risk of cancer in patients of HF after MI²⁴.

Iqbal and colleagues²⁵ concluded that 51% patients of heart failure after STEMI had triple vessel disease. In their study LAD stenosis was most common found in 33% patients.

In our study, 46.7% with triple vessel involvement and only 19.5% patients were of having left anterior descending artery stenosis. In our study, left main stem stenosis was most commonly diagnosed in 33.7% patients.

LIMITATIONS OF STUDY

In this study, the diagnosis of hypertension, diabetes and smoking was made on self-reporting by patients. Although it is not the best system but still it is trustworthy. We presumed that using self-reporting for evaluating these variables would not produce outcomes much different from those attained using more sophisticated approaches.

CONCLUSION

Hypertension and smoking are most common risk-factors of heart failure. The patients who present with heart failure are most who have involvement of

triple vessel coronary artery disease. Left main stem is most commonly involved vessel in these patients.

REFERENCES

1. Tonkin A, Aylward P, Colquhoun D, Glasziou P, Harris P, MacMahon S et al. Prevention of cardiovascular events and death with pravastatin in patients with coronary heart disease and a broad range of initial cholesterol levels. *N Engl J Med* 1998; 339:1349-57.
2. Ambrosy AP, Fonarow GC, Butler J, Chioncel O, Greene SJ, Vaduganathan M et al. The global health and economic burden of hospitalizations for heart failure: lessons learned from hospitalized heart failure registries. *J Am Coll Cardiol* 2014; 63:1123-33.
3. Torabi A, Cleland JG, Rigby AS, Sherwi N. Development and course of heart failure after a myocardial infarction in younger and older people. *Journal of geriatric cardiology: J Geriatr Cardiol* 2014; 11:1-12.
4. Smith SC, Blair SN, Bonow RO, Brass LM, Cerqueira MD, Dracup K et al. AHA/ACC Guidelines for Preventing Heart Attack and Death in Patients With Atherosclerotic Cardiovascular Disease: 2001 Update A Statement for Healthcare Professionals From the American Heart Association and the American College of Cardiology. *J Am Coll Cardiol* 2001; 38:1581-3.
5. Steg PG, Goldberg RJ, Gore JM, Fox KA, Eagle KA, Flather MD et al. Baseline characteristics, management practices, and in-hospital outcomes of patients hospitalized with acute coronary syndromes in the Global Registry of Acute Coronary Events (GRACE). *Am J Cardiol* 2002; 90:358-63.
6. Hunt SA, Baker DW, Chin MH, Cinquegrani MP, Feldman AM, Francis GS, et al. ACC/AHA guidelines for the evaluation and management of chronic heart failure in the adult: executive summary A report of the American college of cardiology/American heart association task force on practice guidelines (committee to revise the 1995 guidelines for the evaluation and management of heart failure) developed in collaboration with the international society for heart and lung transplantation endorsed by the heart failure society of America. *J Am Coll Cardiol* 2001; 38:2101-13.
7. Cooper LT, Baughman KL, Feldman AM, Frustaci A, Jessup M, Kuhl U et al. The Role of Endomyocardial Biopsy in the Management of Cardiovascular Disease A Scientific Statement From the American Heart Association, the American College of Cardiology, and the European Society of Cardiology Endorsed by the Heart Failure Society of America and the Heart Failure Association of the European Society of Cardiology. *J Am Coll Cardiol* 2007; 50:1914-31.
8. White HD, Norris RM, Brown MA, Brandt PW, Whitlock R, Wild CJ. Left ventricular end-systolic volume as the major determinant of survival after recovery from myocardial infarction. *Circulation* 1987; 76:44-51.

9. Polak JF, Holman BL, Wynne J, Colucci WS. Right ventricular ejection fraction: an indicator of increased mortality in patients with congestive heart failure associated with coronary artery disease. *J Am Coll Cardiol* 1983; 2:217-24.
10. Aurigemma GP, Gaasch WH. Diastolic heart failure. *N Engl J Med* 2004; 351:1097-105.
11. Steg PG, Dabbous OH, Feldman LJ, Cohen-Solal A, Aumont MC, López-Sendón J et al. Determinants and prognostic impact of heart failure complicating acute coronary syndromes observations from the Global Registry of Acute Coronary Events (GRACE). *Circulation* 2004; 109:494-9.
12. Spencer FA, Meyer TE, Gore JM, Goldberg RJ. Heterogeneity in the management and outcomes of patients with acute myocardial infarction complicated by heart failure the National Registry of Myocardial Infarction. *Circulation* 2002; 105:2605-10.
13. Hasdai D, Topol EJ, Kilaru R, Battler A, Harrington RA, Vahanian A et al. Frequency, patient characteristics, and outcomes of mild-to-moderate heart failure complicating ST-segment elevation acute myocardial infarction: lessons from 4 international fibrinolytic therapy trials. *Am Heart J* 2003; 145:73-9.
14. Felker GM, Shaw LK, O'Connor CM. A standardized definition of ischemic cardiomyopathy for use in clinical research. *J Am Coll Cardiol* 2002; 39:210-8.
15. Jafar TH, Qadri Z, Chaturvedi N. Coronary artery disease epidemic in Pakistan: more electrocardiographic evidence of ischaemia in women than in men. *Heart* 2008; 94:408-13.
16. Roger VL, Go AS, Lloyd-Jones DM, Benjamin EJ, Berry JD, Borden WB et al. Heart disease and stroke statistics—2012 update a report from the American heart association. *Circulation* 2012; 125:e2-20.
17. Blecker S, Paul M, Taksler G, Ogedegbe G, Katz S. Heart failure-associated hospitalizations in the United States. *J Am Coll Cardiol* 2013; 61:1259-67.
18. Zannad F, Agrinier N, Alla F. Heart failure burden and therapy. *Europace* 2009; 11:v1-9.
19. Gheorghide M, Sopko G, De Luca L, Velazquez EJ, Parker JD, Binkley PF et al. Navigating the crossroads of coronary artery disease and heart failure. *Circulation* 2006; 114:1202-13.
20. Hunt SA, Baker DW, Chin MH, Cinquegrani MP, Feldman AM, Francis GS et al. ACC/AHA guidelines for the evaluation and management of chronic heart failure in the adult: executive summary A report of the American college of cardiology/American heart association task force on practice guidelines (committee to revise the 1995 guidelines for the evaluation and management of heart failure) developed in collaboration with the international society for heart and lung transplantation endorsed by the heart failure society of America. *J Am Coll Cardiol* 2001; 38:2101-13.
21. Kannel WB, Ho K, Thom T. Changing epidemiological features of cardiac failure. *Br Heart J* 1994; 72:S3-9.
22. Faisal AWK, Ayub M, Waseem T, Khan RSAT, Hasnain SS. Risk Factors in Young Patients of Acute Myocardial Infarction. *J Ayub Med Coll Abbottabad* 2011; 23:10-13.
23. Adams KF Jr, Dunlap SH, Sueta CA, Clarke SW, Patterson JH, Blauwet MB et al. Relation between gender, etiology and survival in patients with symptomatic heart failure. *J Am Coll Cardiol* 1996; 28:1781-8.
24. Hasin T, Gerber Y, Weston SA, Jiang R, Killian JM, Manemann SM et al. Heart failure after myocardial infarction is associated with increased risk of cancer. *J Am Coll Cardiol* 2016; 68:265-71.
25. Iqbal UJ, Kaleem M, Hanif MI. Coronary artery disease; severity & its associated risk factors in causing heart failure in patients presented with STEMI at Gulab Devi Chest Hospital. *Professional Med J* 2015; 22:532-5.

CONTRIBUTORS

MZMB conceived the idea, planned the study, and drafted the manuscript. HA designed the methodology of research, and drafted & critically revised the manuscript. MARB helped acquisition of data and did statistical analysis. SMA did statistical analysis and did review. All authors contributed significantly to the submitted manuscript.