e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 13(12); 266-269

Original Research Article

A Hospital-based Study to Evaluate the Mortality in ST-Segment Elevation Acute Myocardial Infarction in Diabetic Patients

Pramod[1], Aishwerya[2], Girish Narayan Mishra[3]

[1]Assistant Professor, Department of Cardiology, Narayan Medical College and Hospital, Sasaram, Rohtas, Bihar, India

[2]Consulatant, Radiologist, Bihar Diagnostics and Imaging, Patna, Bihar, India

[3]Associate professor and HOD, Department of Cardiology, Narayan Medical College and Hospital, Sasaram, Rohtas, Bihar, India

Received: 03-10-2023 / Revised 20-11-2023 / Accepted 13-12-2023

Corresponding author: Dr. Pramod

Conflict of interest: Nil

Abstract:

Aim: The aim of the present study was to evaluate the mortality in ST-segment elevation acute myocardial infarction in diabetic patients.

Methods: The present study consisted of 100 patients of acute ST-segment elevation myocardial infarction (STEMI) of both genders at Department of cardiology. All were enrolled with their written consent.

Results: The age group <40 years had 4 patients in group I and 5 in group II, 40-50 years had 9 in group I and 8 in group II, 50-60 years had 14 in group I and 15 in group II and >60 years had 23 in group I and 22 in group II. The difference was significant (P< 0.05). The site was anterior in 12 in group I and 10 in group II, inferior in 28 in group I and 23 in group II, inferior+ right ventricular in 7 in group I and 10 in group II and lateral in 3 in group I and 7 in group II. The difference was significant (P< 0.05). 7 patients in group I and 2 in group II had mortality in which streptokinase was given and 15 in group I and 6 in group II had mortality in which streptokinase was not given. The difference was significant (P< 0.05). The type of treatment given was streptokinase was 92, aspirin in 100, beta- blockers in 75, ACE inhibitors in 85, statins in 94 and diuretics in 60 patients. The difference was significant (P< 0.05).

Conclusion: Diabetic patients who were not on streptokinase had higher mortality as compared to non- diabetics.

Keywords: Acute coronary syndrome, Diabetes, STEMI.

Introduction

The most frequent cause of mortality and morbidity is cardiovascular disease (CVD),[1] and the greatest burden of diseases worldwide belongs to ischemic heart disease.[2] Coronary artery disease (CAD) is a common condition that affects several million adults. Despite a reduction in the CVD rate in developed countries, ischemic heart disease is still high in developing countries. Acute myocardial infarction (MI) encompasses ST-segment elevation myocardial infarction (STEMI) and non-ST-segment elevation myocardial infarction (NSTEMI). Although in-hospital mortality is higher in SETMI than NSTEMI, the chance of 30 days and 1-year mortality is higher in NSTEMI compared to STEMI.[3] The global prevalence of diabetes mellitus (DM) in 2019 is estimated to be 9.3%, rising to 10.2% by 2030 and 10.9% (700 million) by 2045.[4] DM is an established risk factor for CAD.[5] Moreover, diabetic patients with MI have adverse cardiovascular effects and higher in-hospital morbidity and mortality rates.[6]

Previous studies have focused on mortality in patients with NSTEMI and indicated that DM is one of the major risk factors.[7] Nonetheless, the additive effects of risk factors in diabetic patients with MI have yet to be fully elucidated, and so do the factors influencing the mortality of MI in diabetic patients. In patients with AMI, heart failure is characterized by diastolic dysfunction alone or systolic and diastolic dysfunctions together. About 3% of the adult patients develop systolic dysfunction which recognized by echocardiography and is asymptomatic in about of them.[8]

Re-infarction is diagnosed by persistent and typical severe chest pain along with re-elevation of ST-segment and increased concentrations of cardiac markers in the blood. AMI remains one of the leading cause of mortality, especially in elderly patients where mortality can be 9 times higher than patients of less than 65 years of age.[9]

The symptoms of AMI are late in diabetics, thus causes delay in fibrinolytic therapy and PTCA.[10]

It has been reported that diabetic patients with AMI should be administered thrombolytic agents very early. Such a practice can reduce mortality in them.[11,12] Early therapy with Statin has been found to reduce the recurrent ischemia.[13]

The aim of the present study was to evaluate the mortality in ST-segment elevation acute myocardial infarction in diabetic patients.

Materials and Methods

The present study consisted of 100 patients of acute ST-segment elevation myocardial infarction (STEMI) of both genders at Department of Cardiology, Narayan Medical College and Hospital, Sasaram, Rohtas, Bihar, India for 12 Months. All were enrolled with their written consent.

Demographic data such as name, age, gender etc. was recorded. Based on their glycated hemoglobin level, they were classified into diabetic (group I) and non-diabetic (group II). A 12-lead ECG of each patient was recorded. The patients were divided into four groups on the basis of ST-segment elevation in different leads. ST-segment elevation in leads V1-V6 (anterior AMI), in II, III, aVF (Inferior AMI), in II, III, aVF+ V4R (Inferior + Right ventricular AMI) and in I, aVL, V5, V6 (Lateral AMI). 5 ml blood sample were collected and analysed for serum CK and CK-MB and Trop-T level. Treatment was given to all patients. Results were assessed statistically using Mann Whitney U test. P value less than 0.05 was considered significant

Result

Table 1: Distribution of patients

Age group (Years)	Group I	Group II	P value
<40	4	5	0.01
40-50	9	8	
50-60	14	15	
>60	23	22	

The age group <40 years had 4 patients in group I and 5 in group II, 40-50 years had 9 in group I and 8 in group II, 50-60 years had 14 in group I and 15 in group II and >60 years had 23 in group I and 22 in group II. The difference was significant (P< 0.05).

Table 2: Distribution of patients according to site

Parameters	Variables	Group I	Group II	P value
Site	Anterior	12	10	0.05
	Inferior	28	23	
	Inferior+ right ventricular	7	10	
	Lateral	3	7	

The site was anterior in 12 in group I and 10 in group II, inferior in 28 in group I and 23 in group II, inferior+ right ventricular in 7 in group I and 10 in group II and lateral in 3 in group I and 7 in group II. The difference was significant (P< 0.05).

Table 3: Mortality based on Streptokinase

Mortality	Group I	Group II	P value
Streptokinase given	7	2	0.05
Streptokinase not given	15	6	

7 patients in group I and 2 in group II had mortality in which streptokinase was given and 15 in group I and 6 in group II had mortality in which streptokinase was not given. The difference was significant (P< 0.05).

Table 4: Type of treatment given

Treatment given	Number	P value
Streptokinase	92	0.07
Aspirin	100	
Beta- blockers	75	
ACE inhibitors	85	
Statins	94	
Diuretics	60	

The type of treatment given was streptokinase was 92, aspirin in 100, beta- blockers in 75, ACE inhibitors in 85, statins in 94 and diuretics in 60 patients. The difference was significant (P< 0.05).

Discussion

Acute coronary syndrome (ACS) remains a leading cause of morbidity and mortality. The Global Registry of Acute Coronary Events (GRACE) study showed that the mortality rate of ACS patients after 1 year is approximately 15%, and the cumulative mortality rate after 5 years is as high as 20%. Consequently, early risk stratification is important to prevent and manage ACS.[14] Insulin resistance (IR), the decreased insulin sensitivity of peripheral tissues characterized by defects in the uptake and oxidation of glucose, plays a critical role in the pathogenesis of diabetes as well as cardiovascular disease (CVD). The molecular mechanisms include the roles of IR in vascular function, macrophage accumulation, atherosclerosis development and hypertension.[15] Diabetes mellitus is a major risk factor for cardiovascular disease in general and for coronary heart disease in particular. Furthermore, the recent National Cholesterol Education Program III guidelines have elevated diabetes to a coronary disease risk equivalent.[16]

Diabetes is a universal problem and is becoming a major concern at old age especially in obese people and in people with sedentary life style. The risk of AMI is 2-4 times higher in diabetics. The coronary artery disease is much more serious in diabetics with about 4 times higher morbidity/mortality in men, while 8 times in women.[17-19] The age group <40 years had 4 patients in group I and 5 in group II, 40-50 years had 9 in group I and 8 in group II, 50-60 years had 14 in group I and 15 in group II and >60 years had 23 in group I and 22 in group II. The difference was significant (P< 0.05). Franklin et al[20] examined patients with ST- segment elevation acute myocardial infarction, non–ST-segment elevation acute myocardial infarction, and unstable angina. The study sample consisted of 5403 patients with ST- segment elevation acute myocardial infarction, 4725 with non–ST segment elevation acute myocardial infarction, and 5988 with unstable angina. Approximately 1 in 4 patients presented to participating hospitals with a history of diabetes. Patients with diabetes were older, more often women, with a greater prevalence of comorbidities, and they were less likely to be treated with effective cardiac therapies than nondiabetic patients.

The site was anterior in 12 in group I and 10 in group II, inferior in 28 in group I and 23 in group II, inferior+ right ventricular in 7 in group I and 10 in group II and lateral in 3 in group I and 7 in group II. The difference was significant (P< 0.05). Luo et al[21] included 1092 STEMI patients who underwent PCI. The patients were divided into 4 quartiles according to TyG index levels. Clinical characteristics, fasting plasma glucose (FPG), triglycerides (TGs), other biochemical parameters, and the incidence of major adverse cardiovascular and cerebral events (MACCEs) during the follow-up period were recorded.

Wang et al[22] conducted an exhaustive metaanalysis evaluating the possible role of gender in the mortality rate in the short and long term after NSTEMI. They observed no significant differences between men and women in the prognosis of NSTEMI. Further research is recommended on the impact of sex on mortality in diabetic patients with NSTEMI.7 patients in group I and 2 in group II had mortality in which streptokinase was given and 15 in group I and 6 in group II had mortality in which streptokinase was not given. The difference was significant (P< 0.05). The type of treatment given was streptokinase was 92, aspirin in 100, beta-blockers in 75, ACE inhibitors in 85, statins in 94 and diuretics in 60 patients. The difference was significant (P< 0.05). Lee et al[23] showed that a higher TyG index is associated with an increased risk of coronary artery stenosis in asymptomatic subjects with type 2 diabetes, particularly when they have risk factors for cardiovascular disease. The findings of Jin et al[24] showed that the TyG index was positively associated with future cardiovascular events, suggesting that the TyG index may be a useful marker for predicting clinical outcomes in patients with CAD and that the TyG index might have better prognostic value than haemoglobin glycation indexes (HGIs) in diabetes patients with new-onset, stable CAD.

Conclusion

Diabetic patients who were not on streptokinase had higher mortality as compared to non- diabetics.

References

1. Johnson NB, Hayes LD, Brown K, Hoo EC, Ethier KA. CDC National Health Report: leading causes of morbidity and mortality and associated behavioral risk and protective factors—United States, 2005–2013. 2014.
2. Moran AE, Tzong KY, Forouzanfar MH, Roth GA, Mensah GA, Ezzati M, Murray CJ, Naghavi M. Variations in ischemic heart disease burden by age, country, and income: the Global Burden of Diseases, Injuries, and Risk Factors 2010 study. Global heart. 2014 Mar 1;9(1):91-9.
3. Awad HH, Tisminetzky M, Metry D, McManus D, Yarzebski J, Gore JM, Goldberg RJ. Magnitude, treatment, and impact of diabetes mellitus in patients hospitalized with non-ST segment elevation myocardial infarction: a community-based study. Diabetes and Vascular Disease Research. 2016 Jan;13(1):13-20.
4. Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, Colagiuri S, Guariguata L, Motala AA, Ogurtsova K, Shaw JE. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes

Atlas. Diabetes research and clinical practice. 2019 Nov 1; 157:107843
5. Kannel WB, McGee DL. Diabetes and cardiovascular disease: the Framingham study. Jama. 1979 May 11;241(19):2035-8.
6. Zhou M, Liu J, Hao Y, Liu J, Huo Y, Smith SC, Ge J, Ma C, Han Y, Fonarow GC, Taubert KA. Prevalence and in-hospital outcomes of diabetes among patients with acute coronary syndrome in China: findings from the Improving Care for Cardiovascular Disease in China-Acute Coronary Syndrome Project. Cardiovascular diabetology. 2018 Dec; 17:1-4.
7. Bataille V, Ferrières J, Danchin N, Puymirat E, Zeller M, Simon T, Carrié D. Increased mortality risk in diabetic patients discharged from hospital with insulin therapy after an acute myocardial infarction: Data from the FAST-MI 2005 registry. European Heart Journal: Acute Cardiovascular Care. 2019 Apr 1;8(3):218-30.
8. Nielsen OW, Hansen JF, Hilden J, Larsen CT, Svanegaard J. Risk assessment of left ventricular systolic dysfunction in primary care: cross sectional study evaluating a range of diagnostic tests. Bmj. 2000 Jan 22;320(7229):220-4.
9. Maggioni AP, Zuanetti G, Franzosi MG, Rovelli F, Santoro E, Staszewsky L, Tavazzi L, Tognoni G. Prevalence and prognostic significance of ventricular arrhythmias after acute myocardial infarction in the fibrinolytic era. GISSI-2 results. Circulation. 1993 Feb; 87(2): 312-22.
10. Mak KH, Moliterno DJ, Granger CB, Miller DP, White HD, Wilcox RG, Califf RM, Topol EJ, GUSTO-I Investigators. Influence of diabetes mellitus on clinical outcome in the thrombolytic era of acute myocardial infarction. Journal of the American College of Cardiology. 1997 Jul;30(1):171-9.
11. Brandle MM, Amann FW, Soloman F: Diabetes mellitus and coronary heart disease. Abteilung for Endorcrinologic / Diabetologic, universitatsspital. Zurich, 1999;129: 700-706.
12. Tjandrawidjaja MC, Fu Y, Goodman SG, Van de Werf F, Granger CB, Armstrong PW. The impact of gender on the treatment and outcomes of patients with early reinfarction after fibrinolysis: insights from ASSENT-2☆. European heart journal. 2003 Jun 1;24(11):1024-34.
13. Serruys PW, de Feyter P, Macaya C, Kokott N, Puel J, Vrolix M, Branzi A, Bertolami MC, Jackson G, Strauss B, Meier B. Fluvastatin for prevention of cardiac events following successful first percutaneous coronary intervention: a randomized controlled trial. Jama. 2002 Jun 26;287(24):3215-22.
14. Tansey MJ, Opie LH, Kennelly BM. High mortality in obese women diabetics with acute myocardial infarction. Br Med J. 1977 Jun 25;1(6077):1624-6.
15. Kouvaras G, Cokkinos D, Spyropoulou M. Increased mortality of diabetics after acute myocardial infarction attributed to diffusely impaired left ventricular performance as assessed by echocardiography. Japanese heart journal. 1988;29(1):1-9.
16. Lomuscio A, Castagnone M, Vergani D, Verzoni A, Beltrami A, Ravaglia R, Pozzoni L. Clinical correlation between diabetic and non-diabetic patients with myocardial infarction. Acta cardiologica. 1991 Jan 1;46(5):543-54.
17. Dirkali A, van der Ploeg TJ, Nangrahary M, Cornel JH, Umans VA. The impact of admission plasma glucose on long-term mortality after STEMI and NSTEMI myocardial infarction. International journal of cardiology. 2007 Oct 1;121(2):215-7.
18. Pitsavos C, Kourlaba G, Panagiotakos DB, Stefanadis C. Characteristics and in-hospital mortality of diabetics and nondiabetics with an Acute Coronary Syndrome; the GREECS study. Clinical Cardiology: An International Indexed and Peer-Reviewed Journal for Advances in the Treatment of Cardiovascular Disease. 2007 May;30(5):239-44.
19. Laing SP, Swerdlow AJ, Slater SD, Botha JL, Burden AC, Waugh NR, Smith AW, Hill RD, Bingley PJ, Patterson CC, Qiao Z. The British Diabetic Association Cohort Study, II: cause-specific mortality in patients with insulin-treated diabetes mellitus. Diabetic medicine. 1999 Jun;16(6):466-71.
20. Franklin K, Goldberg RJ, Spencer F, Klein W, Budaj A, Brieger D, Marre M, Steg PG, Gowda N, Gore JM, GRACE investigators. Implications of diabetes in patients with acute coronary syndromes: the Global Registry of Acute Coronary Events. Archives of Internal Medicine. 2004 Jul 12;164(13):1457-63.
21. Luo E, Wang D, Yan G, Qiao Y, Liu B, Hou J, Tang C. High triglyceride–glucose index is associated with poor prognosis in patients with acute ST-elevation myocardial infarction after percutaneous coronary intervention. Cardiovascular diabetology. 2019 Dec; 18:1-2.
22. Wang Y, Zhu S, Du R, Zhou J, Chen Y, Zhang Q. Impact of gender on short-term and long-term all-cause mortality in patients with non-ST-segment elevation acute coronary syndromes: a meta-analysis. Internal and Emergency Medicine. 2018 Mar; 13:273-85.
23. Lee EY, Yang HK, Lee J, Kang B, Yang Y, Lee SH, Ko SH, Ahn YB, Cha BY, Yoon KH, Cho JH. Triglyceride glucose index, a marker of insulin resistance, is associated with coronary artery stenosis in asymptomatic subjects with type 2 diabetes. Lipids in health and disease. 2016 Dec;15(1):1-7.
24. Jin JL, Cao YX, Wu LG, You XD, Guo YL, Wu NQ, Zhu CG, Gao Y, Dong QT, Zhang HW, Sun D. Triglyceride glucose index for predicting cardiovascular outcomes in patients with coronary artery disease. Journal of thoracic disease. 2018 Nov;10(11):6137.