International Journal of Advanced Community Medicine

Amrit Pal Kaur Brar
MBBS, Teerthanker Mahaveer Medical College and Research Centre, Uttar Pradesh, India

Deepika Davalath
Vydehi Institute of Medical Sciences and Research Center, Karnataka, India

Deepa Kosuru
MS Ramaiah Medical College, Bangalore, Karnataka, India

Taha Sajjad
MD, Medical Student/Physician Mountain Vista Medical Center USA

Neelima Gaddam
Kamineni Institute of Medical Sciences, Hyderabad, Telangana, India

Sudha Srivalli Konakanchi
Doctor, Osmania Medical College, Hyderabad, Telangana, India

Dr Naghmi Mehmood
Doctor, Medical Student/Physician Indus Hospital, Pakistan

Bhavika Agrawal
MBBS, Surat Municipal Institute of Medical Education and Research, Gujrat, India

Saher Taufiq
Licensed Physician in Pakistan, United Medical and Dental College, Pakistan

Corresponding Author:
Bhavika Agrawal
MBBS, Surat Municipal Institute of Medical Education and Research, Gujrat, India

Assessment of effects of diabetes mellitus on interventional outcome in patients with non-ST-myocardial infarction

Amrit Pal Kaur Brar, Deepika Davalath, Deepa Kosuru, Taha Sajjad, Neelima Gaddam, Sudha Srivalli Konakanchi, Dr Naghmi Mehmood, Bhavika Agrawal and Saher Taufiq

Abstract
Background: Diabetes mellitus (DM) is one of the major risk factors of cardiovascular disease. The present study was conducted to assess effects of diabetes mellitus on interventional outcome in patients with non-ST-myocardial infarction.
Materials and Methods: 78 patients who had DM and MI of both genders were enrolled and parameters such as mortality, cardiovascular readmission, and recurrent MI were recorded. We divided patients into 2 groups. Group I were STEMI and group II were MI patients without presentation of ST-segment elevation as NSTEMI.
Results: Out of 78 patients, males were 40 and females were 38. BMI (Kg/m2) was 27.3 in   group   I and 27.5 in group II. The mean HR (bpm) was 71.4 in group I and 72.8 in group II. SBP (mm Hg) was 138.4 in group I and 140.2 in group II. DBP (mm Hg) was 76.2 in group I and 80.4 in group II. Hyperlipidaemia was seen in 30 in group I and 34 in group II, hypertension was seen in 22 in group I and 28 in group II. MI was seen in 8 in group I and 10 in group II, COPD was seen in 4 in group I and 3 in group II and stroke in 2 in group I and 3 in group II. Hyperlipidaemia, hypertension, MI and COPD were independently related with all-cause mortality.
Conclusion: Multiple risk factors contribute to a higher incidence of composite outcomes in diabetic patients with MI. STEMI poses a greater threat to adverse events.

Keywords: Diabetes, hyperglycemia, STEMI

Introduction

Diabetes mellitus (DM) is one of the major risk factors of cardiovascular disease. The control of blood glucose level doesn't reduce the incidence of cardiovascular events [1]. Multiple center research reported that DM patients with cardiovascular disease had inadequate and less aggressive management. Hyperglycemia in diabetic patients poses significant impairment for the artery system [2].

According to the current European Society of Cardiology (ESC) guidelines on myocardial revascularization, coronary artery bypass grafting (CABG) should be favored over percutaneous coronary intervention (PCI) in patients with DM without contraindications. The current guidelines recommend that decisions about PCI or CABG should be guided by the anatomical synergy between PCI with taxus and cardiac surgery (SYNTAX) score. Risk stratification by SYNTAX score in patients with multivessel disease or left main coronary artery disease has been reported [3].

Scientists have found that diabetes mellitus is an important cardiovascular risk factor of premature myocardial infarction in women. Once MI occurred, diabetic patients are more prone to be presented without ST segment elevation (NSTEMI) that induces a delayed diagnosis and treatment [4]. The missing optimal therapeutic time-window of reperfusion of culprit coronary artery has been associated with negative composite events, including extensive myocardial infarction, prolonged admission duration, and a higher mortality rate. Those who survived NSTEMI and were discharged from the hospital tended to have recurrent coronary artery events [5]. The present study was conducted to assess effects of diabetes mellitus on interventional outcome in patients with non-ST-myocardial infarction.
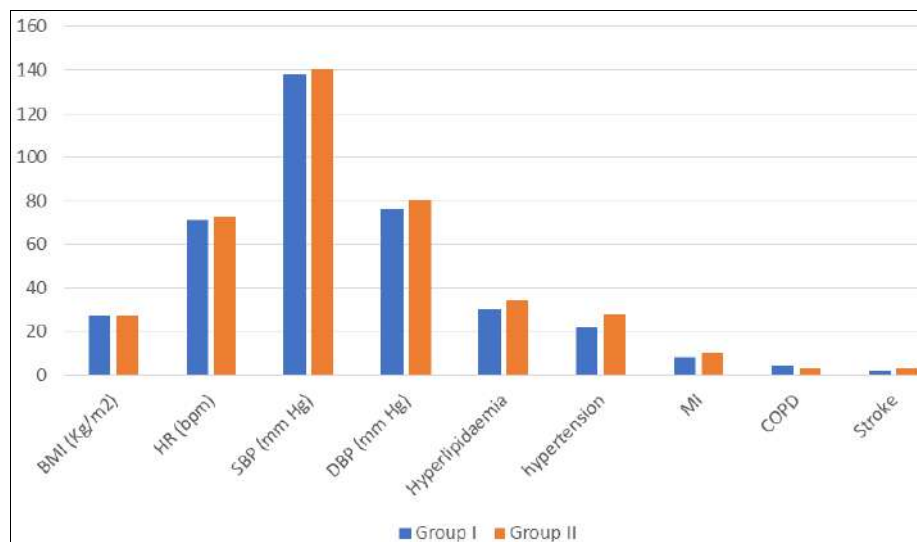
Materials and Methods

The present study comprised of 78 patients who had DM and MI of both genders. The consent was obtained from all enrolled patients.

Data such as name, age, gender etc. was recorded. The diagnosis of medical history was according to the International Classification of Diseases-9th Revision and International Classification of Diseases-10th Revision (ICD-9/10). Patients with HbA1c >6.9% were considered as suboptimal DM control. Parameters such as mortality, cardiovascular readmission, and recurrent MI were recorded. We divided patients into 2 groups. Group I were STEMI and group II were MI patients without presentation of ST-segment elevation as NSTEMI. A follow-up was performed at 3 months, 6 months, 12 months, and 24 months. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table 1: Distribution of patients

Total- 78		
Gender	Males	Females
Number	40	38

Table 1 shows that out of 78 patients, males were 40 and females were 38.

Table 2: Baseline characteristics

Parameters	Group I	Group II	P value
BMI (Kg/m^2)	27.3	27.5	0.94
HR (bpm)	71.4	72.8	0.92
SBP (mm Hg)	138.4	140.2	0.82
DBP (mm Hg)	76.2	80.4	0.71
Hyperlipidaemia	30	34	0.05
hypertension	22	28	0.04
MI	8	10	0.12
COPD	4	3	0.15
Stroke	2	3	0.17

Table 2, graph 1 shows that BMI (Kg/m2) was 27.3 in group I and 27.5 in group II. The mean HR (bpm) was 71.4 in group I and 72.8 in group II. SBP (mm Hg) was 138.4 in group I and 140.2 in group II. DBP (mm Hg) was 76.2 in group I and 80.4 in group II. Hyperlipidaemia was seen in 30 in group I and 34 in group II, hypertension was seen in 22 in group I and 28 in group II. MI was seen in 8 in group I and 10 in group II, COPD was seen in 4 in group I and 3 in group II and stroke in 2 in group I and 3 in group II. The difference was significant ($P < 0.05$).

Graph 1: Baseline characteristics

Table 3: Predictors for all-cause mortality

Risk factors	HR	P value
Hyperlipidaemia	1.72	0.05
hypertension	0.75	0.04
MI	2.31	0.01
COPD	1.37	0.02

Table 3 shows that hyperlipidaemia, hypertension, MI and COPD were independently related with all-cause mortality.

Discussion

Diabetes increases the risk of cardiovascular outcomes and mortality in patients with established cardiovascular disease (CVD) [6]. Patients with diabetes with no history heart disease have the same risk for future cardiovascular death as nondiabetic patients with a history of myocardial infarction (MI) [7]. Patients with diabetes have not experienced the reduction in mortality rates that recently has been observed in nondiabetic people [9]. These observations, plus the fact that the prevalence of diabetes is likely to double during the first quarter of the 21st century, suggest that the importance of diabetes as a cardiovascular risk factor will increase substantially [10]. Several previous studies have shown that patients with diabetes have higher mortality and morbidity rates than nondiabetic patients after an acute MI. This increased risk is also evident after implementation of both modern revascularization and pharmacological treatment strategies [11, 12]. The present study was conducted to assess effects of diabetes mellitus on interventional outcome in patients with non-ST-myocardial infarction.

We found that out of 78 patients, males were 40 and females were 38. Malmberg *et al*. [13] assessed the 2-year prognosis of diabetic and nondiabetic patients who were hospitalized with unstable angina or non–Q-wave myocardial infarction. Overall, 1718 of 8013 registry patients (21%) had diabetes. Diabetic patients had a higher rate of coronary bypass surgery than nondiabetic patients but had similar rates of catheterization and angioplasty. Diabetes independently

predicted mortality as well as cardiovascular death, new myocardial infarction, stroke, and new congestive heart failure. Moreover, compared with their nondiabetic counterparts, women had a significantly higher risk than men. Interestingly, diabetic patients without prior cardiovascular disease had the same event rates for all outcomes as nondiabetic patients with previous vascular disease.

We observed that BMI (Kg/m2) was 27.3 in group I and 27.5 in group II. The mean HR (bpm) was 71.4 in group I and 72.8 in group II. SBP (mm Hg) was 138.4 in group I and 140.2 in group II. DBP (mm Hg) was 76.2 in group I and 80.4 in group II. Hyperlipidaemia was seen in 30 in group I and 34 in group II, hypertension was seen in 22 in group I and 28 in group II. MI was seen in 8 in group I and 10 in group II, COPD was seen in 4 in group I and 3 in group II and stroke in 2 in group I and 3 in group II. Johannen et al. [14] analyzed consecutive patients undergoing high-risk PCI. There were 276 patients (age 70 years, 74% male) who underwent high-risk PCI. Eighty-six patients (31%) presented with DM (insulin-dependent DM: $n = 24$; non-insulin-dependent DM: $n = 62$). In-hospital MACCEs occurred in 9 patients (3%) with a non-significant higher rate in patients with DM. In patients without DM, the survival rate was insignificantly higher than in patients with DM (93.6% vs. 87.1%; $p = 0.07$). One-year survival was not significantly different in DM patients with more complex coronary artery disease (SYNTAX I-score ≤ 22: 89.3% vs. > 22: 84.5%; $p = 0.51$). In selected high-risk patients undergoing high-risk PCI, DM was not associated with an increased incidence of in-hospital MACCEs or a decreased one-year survival rate.

We found that hyperlipidaemia, hypertension, MI and COPD were independently related with all-cause mortality. Zhifeng Li et al. [15] aimed at investigating long-term follow-up outcomes of diabetic patients discharged with NSTEMI. A total of 743 diabetic patients with MI enrolled for analysis, with 132 patients being recognized as NSTEMI. The mean age was 70.4±8.3 years. The mean follow-up was 21.3±6.1 months. NSTEMI (hazard ratio [HR] 1.55, 95% confidence interval [CI] 1.08-2.23), age ≥75 years (HR 1.17, 95% CI 1.04-1.31), hypertension (HR 1.51, 95% CI 1.03-2.21), heart failure (HF) (HR 3.23, 95% CI 2.28-4.57), and previous MI (HR 2.01, 95% CI 1.44-2.79) were independent risk factors for all-cause mortality. Administration of beta-blocker (HR 0.62, 95% CI 0.45-0.85) was associated with a lower incidence of all-cause mortality. Predictors for cardiovascular mortality included elderly, hypertension, HF, previous MI, and MI with atypical chest pain.

Conclusion

Authors found that multiple risk factors contribute to a higher incidence of composite outcomes in diabetic patients with MI. STEMI poses a greater threat to adverse events.

References

1. Anselmino M, Bartnik M, Malmberg K, Rydén Euro L. Heart Survey Investigators. Management of coronary artery disease in patients with and without diabetes mellitus. Acute management reasonable but secondary prevention unacceptably poor: a report from the Euro Heart survey on diabetes and the heart. Eur J Cardiovasc Prev Rehabil. 2007;14:28-36.

2. Fishman SL, Sonmez H, Basman C, Singh V, Poretsky L. The role of advanced glycation end-products in the development of coronary artery disease in patients with and without diabetes mellitus: A review. Mol Med. 2018;24:59.

3. Xia WL, Zhao XD. Study on vascular function damage in patients with hypertension and type 2 diabetes. Diabetes New World. 2017;20:33-34.

4. Naito R, Miyauchi K. Coronary artery disease and type 2 diabetes mellitus. Int Heart J. 2017;58:475-480.

5. Chen W, Wang YP. Characteristics of coronary angiography in type 2 diabetes mellitus with coronary heart disease. J Chin Pract Diagn Ther. 2010.

6. Zera E, Zaimi E, Metalla M, Prifti S, Zera E. Diabetes mellitus, the important cardiovascular risk factor of premature myocardial infarction in women. Heart. 2012;98:E108-E109.

7. Abela GS, Kalavakunta JK, Janoudi A, Leffler D, Dhar G, Salehi N, et al. Frequency of cholesterol crystals in culprit coronary artery aspirate during acute myocardial infarction and their relation to inflammation and myocardial injury. Am J Cardiol. 2017;120:1699-1707.

8. Dr. DVS Priyadarshini, Dr. G Ravi Kumar. A prospective observational study on effects of acute myocardial infarction on cholesterol and cholesterol ratios- At a tertiary care centre. Int. J Adv. Biochem. Res. 2020;4(1):01-05. DOI: 10.33545/26174693.2020.v4.i1a.39

9. Rathod KS, Koganti S, Jain AK, Astroulakis Z, Lim P, Rakhit R, et al. Complete versus culprit-only lesion intervention in patients with acute coronary syndromes. J Am Coll Cardiol. 2018;72:1989-1999.

10. Marfella R, Sardu C, Calabrò P, Siniscalchi M, Minicucci F, Signoriello G, et al. Non-ST-elevation myocardial infarction outcomes in patients with type 2 diabetes with non-obstructive coronary artery stenosis: effects of incretin treatment. Diabetes Obes Metab. 2018;20:723–729.

11. Cho E, Rimm EB, Stampfer MJ, Willett WC, Hu FB. The impact of diabetes mellitus and prior myocardial infarction on mortality from all causes and from coronary heart disease in men. J Am Coll Cardiol. 2002;40:954-960.

12. Malmberg K, Rydén L. Myocardial infarction in patients with diabetes mellitus. Eur Heart J. 1988;03:259–264.

13. Malmberg K, Yusuf S, Gerstein HC, Brown J, Zhao F, Hunt D, et al., Investigators FT. Impact of diabetes on long-term prognosis in patients with unstable angina and non–Q-wave myocardial infarction: results of the OASIS (Organization to Assess Strategies for Ischemic Syndromes) Registry. Circulation. 2000 Aug 29;102(9):1014-9.

14. Johannsen L, Soldat J, Krueger A, Mahabadi AA, Dykun I, Totzeck M, et al. Impact of Diabetes Mellitus on Outcomes after High-Risk Interventional Coronary Procedures. Journal of Clinical Medicine. 2020 Nov;9(11):3414.

15. Li Z, Huang S, Yang R, Li J, Chen G. Long-term follow-up of diabetic patients with non-ST-segment elevation myocardial infarction. American Journal of Translational Research. 2021;13(12):13870.

16. Niu T, Fu P, Jia C, Dong Y, Liang C, Cao Q, et al. The delayed activation wave in non-ST-elevation myocardial infarction. Int. J Cardiol. 2013;162:107-111.