Original Article

Study of differences in presentation, risk factors and management in diabetic and nondiabetic patients with acute coronary syndrome

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ABSTRACT

Objectives: To compare clinical characteristics, treatment, and utilization of evidence-based medicines at discharge from hospital in acute coronary syndrome (ACS) patients with or without diabetes at a tertiary care cardiac center in India. **Methods:** We performed an observational study in consecutive patients discharged following management of ACS. We obtained demographic details, comorbid conditions, and cardiovascular risk factors, physical and biochemical parameters, and management. Descriptive statistics are reported. **Results:** We enrolled 100 patients (diabetics = 28) with mean age of 59.0 ± 10.8 years (diabetics 59.3 ± 11.6, nondiabetics 58.9 ± 8.5). Forty-nine patients had ST-elevation myocardial infarction (STEMI) (diabetics = 14, 28.7%) while 51 had nonSTEMI/unstable angina (diabetics = 14, 27.4%) (P = nonsignificant). Among diabetics versus nondiabetics there was greater prevalence (%) of hypertension (78.6% vs. 44.4%), obesity (25.0% vs. 8.3%), abdominal obesity (85.7% vs. 69.4%) and sedentary activity (89.2% vs. 77.8%), and lower prevalence of smoking/tobacco use (10.7% vs. 25.0%) ($P < 0.05$). In STEMI patients 28 (57.1%) were thrombolysed (diabetes 17.8% vs. 31.9%), percutaneous coronary interventions (PCI) was in 67.8% diabetics versus 84.7% nondiabetics and coronary bypass surgery in 21.4% versus 8.3%. At discharge, in diabetics versus nondiabetics, there was similar use of angiotensin converting enzyme inhibitors (67.9% vs. 69.4%) and statins (100.0% vs. 98.6%) while use of dual antiplatelet therapy (85.7% vs. 95.8%) and beta-blockers (64.3% vs. 73.6%) was lower ($P < 0.05$). **Conclusions:** Diabetic patients with ACS have greater prevalence of cardiometabolic risk factors (obesity, abdominal obesity, and hypertension) as compared to nondiabetic patients. Less diabetic patients undergo PCIs and receive lesser dual anti-platelet therapy and beta-blockers.

Key words: Acute coronary syndrome, diabetes, management

Introduction

Cardiovascular complications are more common among diabetic patients and are usually associated with a significantly greater risk of morbidity and mortality than in nondiabetic subjects.[1] Presence of diabetes worsens prognosis in acute coronary syndrome (ACS). The relative risk of myocardial infarction (MI) is 50% greater in diabetic men and by 150% greater in diabetic women compared to age-matched nondiabetic subjects.[2] Sudden cardiac death is 50% more frequent in diabetic men and 300% more frequent in diabetic women compared to age-matched

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nondiabetic controls.[2] Diabetes also influences outcomes following ACS, and therefore, secondary prevention in diabetic individuals is equally critical. Consequently, the diabetic patient needs special management and monitoring, with a view to the prevention, control, and treatment of the various manifestations of coronary artery disease.[3] All patients with ACS require evidence-based treatments such as lifestyle advise and drugs including antiplatelets, angiotensin converting enzyme inhibitors (ACEIs), or angiotensin receptor blockers (ARBs), beta-blockers, and lipid-lowering medications (statins) therapy to prevent death, and secondary complications.[4] This is especially important in patients with diabetes. This study was conducted to assess clinical characteristics, management, and prognosis in ACS patients with or without diabetes presenting to a tertiary care hospital.

Methods

The study protocol was approved by the Institutional Ethics Committee, and individual written consent was obtained from all the patients. Demographic details, clinical characteristics, lifestyle factors, and prescribed treatment were obtained in successive patients presenting to the hospital with a diagnosis of ACS. Diagnosis of ACS was confirmed by the presence of typical chest pain or uneasiness, combined with electrocardiographic changes, and cardiac enzyme elevation. The patients were recruited over a 12-month period from July 2011 to June 2012.

Details of presentation and risk factors had been obtained. Smokers were patients with present smoking or regular nonsmoked tobacco use. Former tobacco users were also identified. Physical activity was classified as mild, moderate, or severe based on the WHO criteria.[5] Overweight was defined as body mass index (BMI) 25.0–29.9 kg/m^2, obesity as BMI ≥30 kg/m^2, abdominal obesity as waist circumference >90 cm in men, and >80 cm in women according to the WHO guidelines.[5] Subjects were defined as hypertensive when a person was either a known hypertensive or had multiple readings over the course of hospitalization of ≥140/90 mmHg.[5] Dyslipidemia was defined according to the National Cholesterol Education Program guidelines.[6] The patients were classified as diabetics if they had been previously diagnosed were receiving hypoglycemic therapy or repeatedly has high fasting blood glucose levels (>126 mg/dL at >2 measurements) during admission. Details of medical and interventional coronary management were prospectively recorded for each patient by interview of patients and treating physicians.

Statistical analysis

SPSS (SPSS Inc., Chicago, USA; version 13.0 for Windows) was used for the data analysis. Numerical variables are reported as a mean and standard deviation. Descriptive statistics is reported. Differences in continuous variables have been determined by independent *t*-test and χ^2 test as used for ordinal variables. $P < 0.05$ was considered significant.

Results

The CONSORT statement and flowchart of patients in the study are shown in Figure 1. Five hundred and fifty patients with ACS were admitted to the hospital. Majority of these patients were transferred from other hospitals more than 5 days after the acute event (n = 389) and 15 (2.7%) died and not included in the study. One hundred and forty-six patients were eligible, and 46 did not agree to participate in the study or had screen failure, and finally, 100 patients were included in this study. The baseline demographic and clinical characteristics are shown in Table 1. Mean age was 59.0 ± 10.8 years; it was 59.3 ± 11.6 years in diabetics and 58.9 ± 8.5 years in nondiabetics. Overall, 49 patients had ST-elevation MI (STEMI) while 51 had nonSTEMI or unstable angina. In diabetics as compared to nondiabetics, there was the similar prevalence of STEMI (50.0% vs. 48.6%) as well as nonSTEMI (50.0% vs. 51.4%). Among diabetics versus nondiabetics, there was greater prevalence of hypertension (78.6% vs. 44.4%), obesity (25.0% vs. 8.3%), abdominal obesity (85.7% vs. 69.4%), and physical inactivity (89.2% vs. 77.8%) ($P < 0.05$). Lifestyle factors in diabetics versus nondiabetics were - smoking and/or tobacco use (10.7% vs. 25.0%), high fat intake (78.6% vs. 76.4%), high salt intake (53.6% vs. 59.7%), high calorie intake (35.7% vs. 48.6%), low fiber intake (64.3% vs. 54.9%), low fruits and vegetables intake (53.6% vs. 52.8%), and

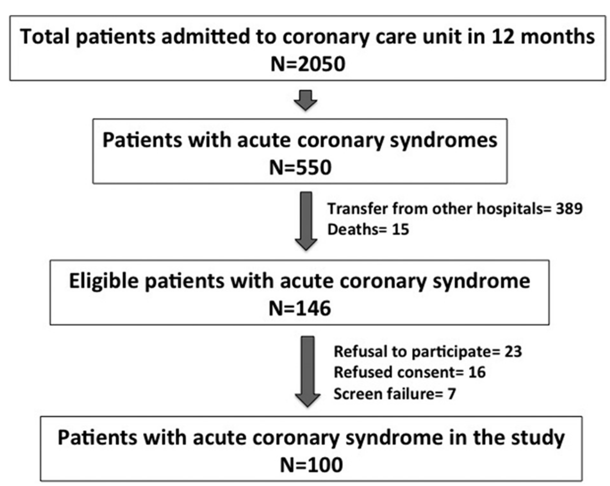

Figure 1: CONSORT statement depicting the study flow

Table 1: Demographic, lifestyle, and clinical characteristics in diabetic and nondiabetic patients with acute coronary syndrome

Variables	Description	Nondiabetic (*n*=72)	Diabetic (*n*=28)	*P*
Demographic variables				
Mean age	Mean age±SD	58.9±11.6	59.3±8.5	0.860
Education	None	8 (11.1)	5 (17.9)	0.368
	Any school	16 (22.2)	10 (35.7)	0.167
	University/higher	48 (66.7)	13 (46.4)	0.062
Occupation	Employed	42 (58.3)	10 (35.7)	0.042
	Retired	21 (29.2)	9 (32.1)	0.770
	Homemaker	4 (5.6)	5 (17.9)	0.053
	Unemployed	5 (6.9)	4 (14.3)	0.249
Socioeconomic status	Upper middle	28 (38.9)	15 (53.6)	0.183
	Lower middle	44 (61.1)	13 (46.4)	0.182
Lifestyle variables				
Tobacco use	Never	47 (65.3)	23 (82.1)	0.098
	Former	7 (9.7)	2 (7.1)	0.685
	Current	18 (25.0)	3 (10.7)	0.115
High fat intake	Deep fried food or red meat>3/week	55 (76.4)	22 (78.6)	0.815
High salt intake	Salty foods or fast foods>3/week	43 (59.7)	15 (53.6)	0.576
High calorie intake	Sugary drinks or sweets>3/week	35 (48.6)	10 (35.7)	0.093
Low fiber intake	Whole grains/high fiber foods<5/week	39 (54.9)	18 (64.3)	0.529
Low fruits and vegetable intake	Fruits or vegetables<5/week	38 (52.8)	15 (53.6)	0.997
Physical activity	None	20 (27.8)	9 (32.1)	0.666
	Sedentary	36 (50.0)	16 (57.1)	0.521
	Mild/moderate	16 (22.2)	3 (10.7)	0.187
Current alcohol use		5 (6.9)	1 (3.6)	0.523
Past medical history				
Hypertension		32 (44.4)	22 (78.6)	0.002*
Hypertension duration		6.6±6.4	9.1±7.7	0.241
Family history of premature CAD		12 (16.7)	5 (17.9)	0.886
Physical parameters				
Body mass index	Mean kg/m2±SD	25.4±3.7	27.8±3.4	0.004*
Waist circumference	Mean cm±SD	94.5±11.4	98.8±12.1	0.095
Obesity	BMI>30 kg/m2	6 (8.3)	7 (25.0)	0.044*
Abdominal obesity	Waist>90 cm men, >80 cm women	50 (69.4)	24 (85.7)	0.032*
Systolic blood pressure	Mean BP mmHg±SD	129.7±19.8	130.2±18.5	0.924
Diastolic blood pressure	Mean BP mmHg±SD	78.5±11.7	77.7±13.6	0.741
Heart rate	Mean per min±SD	78.6±13.2	77.7±13.6	0.763
Biochemical parameters				
Total cholesterol	≥200 mg/dl	29 (40.3)	13 (46.4)	0.575
Triglyceride	≥150 mg/dl	37 (51.4)	17 (60.7)	0.401
LDL-cholesterol	≥130 mg/dl	30 (41.7)	14 (50.0)	0.451
HDL-cholesterol	<40 mg/dl men/<50 mg/dl women	52 (72.2)	21 (75.0)	0.778

*Significant. Numbers in parentheses are percentage. CAD: Coronary artery disease, SD: Standard deviation, BP: Blood pressure, BMI: Body mass index, LDL: Low-density lipoprotein, HDL: High-density lipoprotein

alcohol use (3.6% vs. 6.9%) [*P* = nonsignificant, Table 1]. Compared to patients without diabetes, diabetic patients had greater mean heart rate and BMI ($P < 0.05$). Prevalence of obesity, abdominal obesity, and hypertension was also greater in diabetic patients [$P < 0.05$, Table 1].

In STEMI, patients 28 (57.1%) were thrombolysed (diabetics 17.8% vs. 31.9%). In diabetics versus nondiabetics, percutaneous coronary intervention (PCI) was in 67.8% versus 84.7% ($P < 0.05$) and coronary artery bypass grafting (CABG) surgery was in 21.4% versus 8.3%. At discharge, 91 patients were on dual antiplatelets, aspirin, or thienopyridine (clopidogrel, prasugrel, or ticagrelor) (diabetics 85.7%, nondiabetics 95.8%), 71 patients were on ACEIs or ARBs (diabetics 71.4%, nondiabetics 70.8%), 71 patients were on beta-blockers (diabetics 64.3%, nondiabetics 73.6%), 99 patients were on lipid-lowering agents (diabetics 100%, nondiabetics 98.6%), 19 patients were on diuretics (diabetics 21.4%, nondiabetics 18.1%), and 7 patients were on calcium channel blockers (diabetics 14.3%, nondiabetics 4.2%) [Table 2].

Discussion

This study shows that diabetic patients with ACS have a higher prevalence of cardiometabolic risk factors (obesity, abdominal obesity, and hypertension) than nondiabetics, and there was the lower use of PCI. There was the lower use of dual anti-platelet therapies and beta-blockers in patients with diabetes.

Table 2: Clinical characteristics, management, and treatment at discharge

Variables	Sub-variables	Nondiabetic (*n*=72)	Diabetic (*n*=28)	*P*
Median time (h); interquartile interval	Symptom onset to hospitalization	16 (10–38)	7 (9.2–39.2)	0.766
Distance (km)	Residence to hospital	16.3±11.8	24.3±22.2	0.021*
ECG findings	ST-segment elevation	36 (50.0)	14 (50.0)	1.00
	ST-segment depression	11 (15.3)	4 (14.3)	0.994
Diagnosis	Unstable angina	26 (36.1)	12 (42.9)	0.532
	NonSTEMI	11 (15.3)	2 (7.1)	0.227
	STEMI	35 (48.6)	14 (50.0)	0.996
In STEMI (*n*=49)	Thrombolysed	23 (65.7)	5 (35.7)	0.158
In-hospital management	Coronary intervention	67 (85.9)	25 (89.3)	0.532
	Medical management	5 (6.9)	3 (10.7)	0.532
	Anticoagulation	0 (0.0)	1 (3.6)	0.101
Type of intervention (*n*=92)	Percutaneous intervention	61 (91.0)	19 (76.0)	0.058
	Coronary bypass surgery	6 (9.0)	6 (24.0)	0.070
Drug therapies at discharge	Aspirin or clopidogrel	72 (100.0)	28 (100.0)	1.000
	Dual antiplatelets	69 (95.8)	24 (85.7)	0.055
	ACE inhibitors or ARBs	51 (70.8)	20 (71.4)	0.243
	Beta-blockers	53 (73.6)	18 (64.3)	0.035*
	Lipid lowering drugs (statins)	71 (98.6)	28 (100.0)	0.412
	Diuretics	13 (18.1)	6 (21.4)	0.699
	Calcium channel blockers	3 (4.2)	4 (14.3)	0.074

ECG: Electrocardiogram, STEMI: ST-elevation myocardial infarction, ACE: Angiotensin converting enzyme, ARBs: Angiotensin receptor blockers, *significant at $P<0.05$

Previous studies from India including large registries such as CREATE,[7] Kerala-ACS[8] and DEMAT,[9] have reported on patterns of ACS and therapies. These studies reported that STEMI was responsible for about half of all hospital admissions similar to this study. These studies also report a low use of various cardioprotective agents, especially beta-blockers, during hospitalization and at discharge. These studies did not study diabetic subgroups and our study, although small, is unique to address this question. Long-term follow-up studies from India have reported similar low use of beta-blockers in ACS patients.[10] Studies from developed countries such as multicountry Global Registry of Acute Coronary Events (GRACE) registry as well as British and North American ACS registries have shown similar results.[11-14] GRACE registry reported that beta-blocker use in diabetics (75.0%) was significantly lower than in nondiabetics (80%).[11] This indicates a physician-level barrier in prescribing beta-blockers to diabetics due to the popular misconception of greater side effects in this group.[12] Lower use of PCI and greater CABG surgery indicates greater prevalence of multivessel disease patients. Our results are similar to studies from other countries.[15]

This is a single-center study with a small sample size, and this is a major study limitation. Moreover, we evaluated patients at a tertiary care hospital, and more than 90% patients underwent some coronary intervention, and the findings may not reflect the general situation in India. Larger and multicentric studies are required to identify patterns of ACS in diabetes, management strategies, outcomes, and secondary prevention therapies. Long-term studies to assess adherence to therapies and lifestyle measures as well as long-term outcomes are also required. Other limitations of the study include lack of assessment of prehospital phase of ACS, details of symptoms, and in-hospital management. Our study is also underpowered to identify the importance of clinical outcomes.

Conclusion

Our study shows that diabetic patients with ACS have greater prevalence of obesity, abdominal obesity, and hypertension. These patients receive lesser PCI, dual antiplatelet therapies, and beta-blockers.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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