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Clinical Presentation and short term Mortality in Elderly Diabetics and Non-Diabetics with Acute Myocardial Infarction

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Abstract

Introduction: *Coronary artery disease is an important cause of mortality in India, accounting for about more than 25% of deaths. About 1/3rd of the acute coronary syndrome patients had diabetes mellitus.(1) Most of the patients were above 50 years of age with 13.3% above 70 years. Diabetes mellitus leads to dysfunction of vascular endothelium and accelerated atherosclerosis. Diabetes increases the risk of developing coronary artery disease by 2-4 folds.(2) The risk of developing an acute coronary syndrome and of death after an acute myocardial infarction is increased among patients with CAD when associated with Diabetes. Complications and mortality due to acute myocardial infarction are more in the elderly than the young. The late seeking of medical care in cases of diabetics is also a factor.*

Aim of the Study: *To study the differences, if any, in the presentation of Acute Myocardial Infarction in Elderly Diabetic and Non–Diabetic patients.*

Materials and Methods: *This study was conducted in Tamil Nadu Government Multi Super Speciality Hospital, Omandurar Government Estate, Chennai. from January 2018 to December 2019 (24 months)100 Patients admitted to the Intensive Cardiac Care Unit, Cardiac were included in the study. Persons satisfying the inclusion criteria were assessed based on history, clinical examination, ECG changes, cardiac biomarkers, and diabetic status. Patients will be followed up 30 days after discharge.*

Results: *64 patients were male and 36 female. 24 (24%) of them were diabetic.13 (20.31%) of the males and 11 (30.56%) of the females had diabetes mellitus. 82 (82%) patients presented with chest pain, while 18 (18%) reported no chest pain. 47 (57.32%) patients had chest pain lasting more than 4 hours, of whom 10 (21.28%) were diabetic. 35 patients (45.12%) presented within 4 hours of the onset of chest pain. Of them, 8 (22.86%) were diabetic. There was no significant difference between the two (p = 0.86). 52 patients presented with radiation of chest pain. 11 (21.15%) were diabetic. 41 were non-diabetic (78.85%). There was no significant difference between the two groups. (p = 0.81). Out of 37 patients who had inferior wall myocardial infarction 9 were diabetic. 17 patients had combined inferior and posterior wall myocardial infarction. 5 of them were diabetic. 1 out of the 9 cases of lateral wall myocardial infarction was diabetic. There was a single case of new-onset left bundle branch block. Of the 93 cases of ST-elevation myocardial infarction, 84 were thrombolysed. Door to needle time was less than 30 minutes in 40 (47.62%) cases. Of the 18 diabetics who were thrombolysed, door to needle time was less than 30 minutes in 8 (44.44%) patients. There was no significant difference indoor to needle time in diabetic and non-diabetic patients. (p-value = 0.76).*

Conclusion: *According to the current study, hyperglycemia has a substantial impact on in-hospital course in both diabetic and non-diabetic patients. In diabetic patients particularly, hyperglycemia was independently predictive of in-hospital death. In diabetic patients, admission serum glucose level has a good predictive value for in-hospital death.*

Keywords: *Coronary Artery Disease, Diabetes Mellitus, Diabetic Keto Acidosis, American Diabetes Association.*

Introduction

Cardiovascular problems are a major cause of mortality in India, causing >25% of deaths. Coronary heart disease in India has reached epidemic proportions. Indians develop cardiovascular disease at an earlier age. In the CREATE study, more than 60% of patients who presented with the acute coronary syndrome (ACS) developed ST-elevation myocardial infarction.[1] Non-ST elevation ACS was more common in the elderly. 30.4% of acute coronary syndrome patients had diabetes mellitus.[2] 70% of patients were above 50 years of age and 13.3% were above 70 years. ST-elevation myocardial infarction carried 30-day mortality of 8.6% and non- ST-elevation cases3.8%. Diabetes mellitus is associated with endothelial dysfunction of vessels promoting atherosclerosis. The risk of developing coronary artery disease (CAD) is increased by 2 – 4 fold by developing diabetes. Among persons with CAD, diabetes increases the risk of developing an acute cardiovascular event and of death after acute myocardial infarction.[4] Elderly patients with acute myocardial infarction fare worse than young patients. The elderly diabetics are at a greater risk of developing myocardial infarction, recurrent myocardial infarction, and cardiac dysfunction. Diabetic patients seek medical care late and they are less likely to receive thrombolytic therapy.[5] The in-hospital mortality is higher in diabetic patients in contrast to non –diabetics, as is the 30-day mortality. However, there have not been sufficient studies on the influence of diabetes mellitus in the presentation and outcome of acute myocardial infarction in the elderly population.[6] Compared with individuals without diabetes, diabetic patients have a two- to fourfold increased risk of coronary heart disease (CHD) Diabetic patients also have an approximately two-fold higher risk of short-term mortality after acute myocardial infarction (AMI), even after adjustment for the extent of CHD. However, in the thrombolytic era, ~90% of diabetic patients will survive beyond the early 30-day period How diabetes affects the long-term prognosis of these early survivors of AMI is less certain.[7] Some but not all recent studies have found that diabetes is independently associated with late mortality after hospitalization for AMI. However, these studies were limited to 6- to 12-month follow-up of subjects enrolled in therapeutic trials. The incidence of diabetes increases with age until about age 65 years, after which both incidence and prevalence seem to level off. As a result, older adults with diabetes may either have the incident disease (diagnosed after age 65 years) or long-standing diabetes with onset in middle age or earlier.[8]

Materials and Methods

IN This observational study Tamil Nadu Government Multi Super Speciality Hospital, Omandurar Government Estate, Chennai. from January 2018 to December 2019 (24 months)100 Patients admitted in Intensive Cardiac Care Unit, Cardiac were included in the study. Persons satisfying the inclusion criteria were assessed based on history, clinical examination, ECG changes, cardiac biomarkers, and diabetic status. Patients will be followed up 30 days after discharge. Inclusion Criteria: Patients of age ≥ 60 years (95). Acute myocardial infarction as defined below: For this study, Acute Myocardial Infarction was defined as the presence of rising and/or fall of cardiac biomarkers (Creatine Kinase – MB and/or cardiac Troponin-T) after the index pain with at least one value above 3 times the normal upper reference limit with at least one of the following: Symptoms of ischemia.ECG changes suggestive of new ischemia [new ST elevation of 1mm or new ST depression of 1mm in two contiguous leads OR new Left Bundle Branch block Development of pathological Q waves in the ECG. New regional wall motion abnormality on Echocardiography. Exclusion Criteria: Age < 60 years (95) Persons presenting more than 10 days after the onset of symptoms. Persons satisfying the inclusion criteria were assessed based on history, clinical examination, ECG changes, cardiac biomarkers, and diabetic status. Patients will be followed up 30 days after discharge. Risk stratification was done using the

TIMI score, calculated at admission. It was calculated separately for ST-elevation and Non-ST elevation myocardial infarction. A higher score meant a higher risk of complications and mortality.

Statistical Analysis

Statistical analysis was done using Epi-Info software, version 7.1.2.0. Continuous variables were presented as mean values with Standard Deviation. A Chi-square test was used for comparing categorical variables. Fischer Exact test was used for variables less than 5 in number to compare categorical data. Where necessary, Odd's ratio was calculated and presented. A probability value of <0.05 was considered statistically significant.

Results

Of the 100 patients studied 91 (91%) were < 80 years of age. Nine (9%) were ≥ 80 years. The mean age of the study population was 70.26 ± 13.44 years. The mean age of patients without diabetes was 70.21 ± 13.44 years. The mean age of the diabetic population was 70.42 ± 13.70 years.

Table: 1 Presenting Symptoms of Acute Myocardial infarction in Elderly Diabetics

	Frequency	Percent	95% CI Lower	95% CI Upper
Sweating	19	79.17%	57.85%	**92.87%**
Chest Pain	18	75.00%	53.29%	**90.23%**
Nausea	9	37.50%	18.80%	**59.41%**
Breathlessness	7	29.17%	12.62%	**51.09%**
Epigatric Pain	4	16.67%	4.74%	**37.38%**
Fatigue	**4**	**16.67%**	**4.74%**	**37.38%**

Table:1 Presenting symptoms in acute myocardial infarction were chest pain, sweating, breathlessness, epigastric pain, nausea, and fatigue. Among diabetics, 18 (75%) presented with chest pain, and 19 (79.17%) with sweating. Nausea was seen in nine (37.50%), breathlessness in seven (29.17%), and epigastric pain in four (16.67%). Fatigue was seen in four (16.67%) patients. Among non-diabetics, 64 (84.21%) presented with chest pain. Sweating was seen in 62 (81.58%), nausea in 34 (44.74%), and breathlessness in 21 (27.63%). Ten (13.16%) patients presented with fatigue and four (5.26%) with epigastric pain.

Table: 2 Duration of Chest Pain in Elderly Patients with Acute myocardial Infarction

	Chest Pain Duration	
	≤ 4 Hours	**> 4 Hours**
Diabetic	8	**10**
Non-Diabetic	**27**	**37**

Table:2 82 (82%) patients presented with chest pain, while 18 (18%) reported no chest pain. 47 (57.32%) patients had chest pain lasting more than 4 hours, of whom 10 (21.28%) were diabetic. 35 patients (45.12%) presented within 4 hours of the onset of chest pain. Of them, 8 (22.86%) were diabetic. There was no significant difference between the two (p =0.86).

Table: 3 Pattern of Radiation of Chest Pain in Elderly Patients with Acute Myocardial Infarction

Radiation	Radiation of Chest Pain
No radiation	**30**
Left Shoulder	**24**
Left Arm	**21**
Neck	**17**
Right Shoulder	**15**
Right Arm	**12**
Both Arms	**7**
Both Shoulders	**6**
Shoulders and Neck	**6**
Arms and Neck	**2**
All Areas	**1**

Table :3 Of the 82 patients who presented with chest pain 30 (36.59%) had no radiation. 24 had radiation to left shoulder (29.27%), 21 to left arm (25.61%), 17(20.73%) to neck, 15 (18.29%) to right shoulder, and 12 (14.63%) to right arm. Of these, seven (8.54%) had radiation to both arms. Six (7.31%) had radiation to both shoulders. Six (7.31%) had radiation to the shoulders and neck. Two (2.44%) had radiation to the arm and neck. One patient had radiation to all these areas.

Table: 4 Diabetes And Radiation of Chest Pain

	Chest Pain Radiation	
	Present	**Absent**
Diabetic	11	**7**
Non-Diabetic	**41**	**23**

Table: 4 52 patients presented with radiation of chest pain. 11 (21.15%) were diabetic. 41 were non-diabetic (78.85%). There was no significant difference between the two groups. (p = 0.81)

Table: 5 Presenting Symptoms in Patients without Chest Pain

	Frequency	Percent	95% CI Lower	95% CI Upper
Sweating	11	61.11%	35.75%	**82.70%**
Breathlessness	7	38.89%	17.30%	**64.25%**
Fatigue	7	38.89%	17.30%	**64.25%**
Nausea	5	27.78%	9.69%	**53.48%**
Epigastric Pain	**2**	**11.11%**	**1.38%**	**34.71%**

Table: 5 In patients presenting without chest pain, 11 (61.11%) had sweating. Seven (38.89%) patients presented with fatigue. Seven (38.89%) had breathlessness, 5 (27.78%) had nausea and 2 (11.11%) had epigastric pain.

Table: 6 Pattern of Wall Involvement in Myocardial Infarction

Wall involvement	Inferior Wall	Anterior Wall	Inferior + Posterior	Lateral Wall	New LBBB
Frequency	28	27	12	8	**1**
Percent	36.84%	35.53%	15.79%	10.53%	**1.32%**
95% CI Lower	26.06%	24.88%	8.43%	4.66%	**0.03%**
95% CI Upper	**48.69%**	**47.34%**	**25.96%**	**19.69%**	**7.11%**

Table:6 Of the 100 patients studied, 93 (93%) had ST-elevation myocardial infarction and 7 (7%) had non-ST elevation myocardial infarction. 36 patients presented with anterior wall myocardial infarction, of which 9 were diabetic. Out of 37 patients who had inferior wall myocardial infarction 9 were diabetic.17 patients had combined inferior and posterior wall myocardial infarction. 5 of them were diabetic. 1 out of the 9 cases of lateral wall myocardial infarction was diabetic. There was a single case of new-onset left bundle branch block.

Table: 7 Time to Treatment in Elderly Patients with Acute Myocardial Infarction

Time to Treatment in Hours	Diabetic	Non-Diabetic
≤ 4	10	**42**
4 to 12	12	**29**
>12	**2**	**5**

Table: 7 52 patients presented within 4 hours of the onset of symptoms. 10(19.23%) of them were diabetic. 41 presented within 4-12 hours of symptom onset. 12 (29.27%) of them were diabetic. Seven patients presented more than 12 hours after the beginning of symptoms. Two of them (28.57%) were diabetic.

Table: 8 Door to Needle Time in Elderly Patients with Acute Myocardial Infarction

	Door to Needle Time	
	≤ 30 Minutes	**> 30 minutes**
Diabetic	8	**10**
Non-Diabetic	**32**	**34**

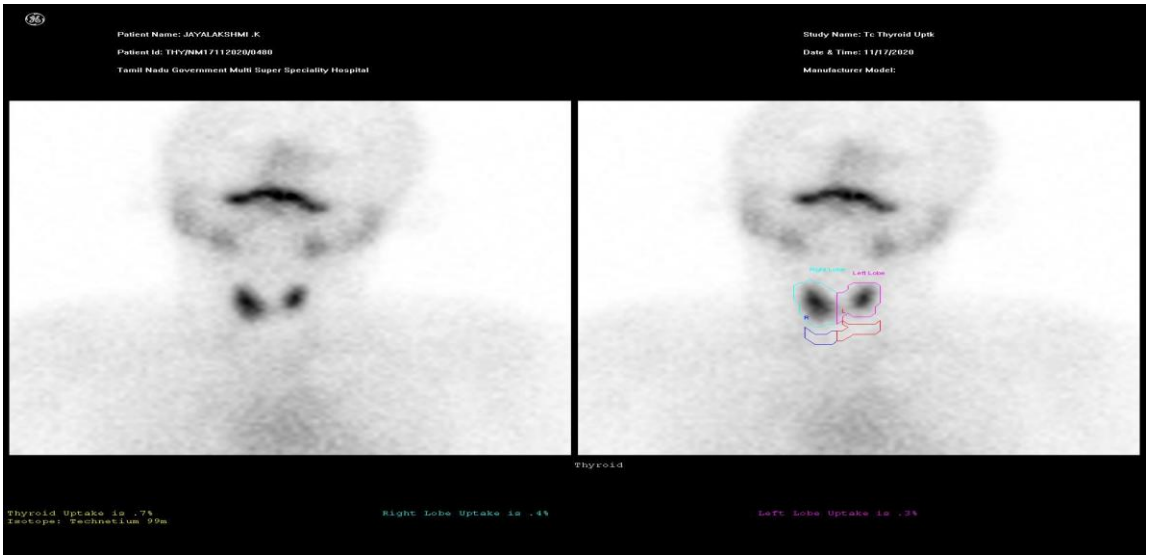
Table: 8 Of the 93 cases of ST-elevation myocardial infarction, 84 were thrombolysed. Door to needle time was less than 30 minutes in 40 (47.62%) cases. Of the 18 diabetics who were thrombolysed, door to needle time was less than 30 minutes in 8 (44.44%) patients. There was no significant difference indoor to needle time in diabetic and non-diabetic patients. (p-value = 0.76).

Table: 9 Killip Class

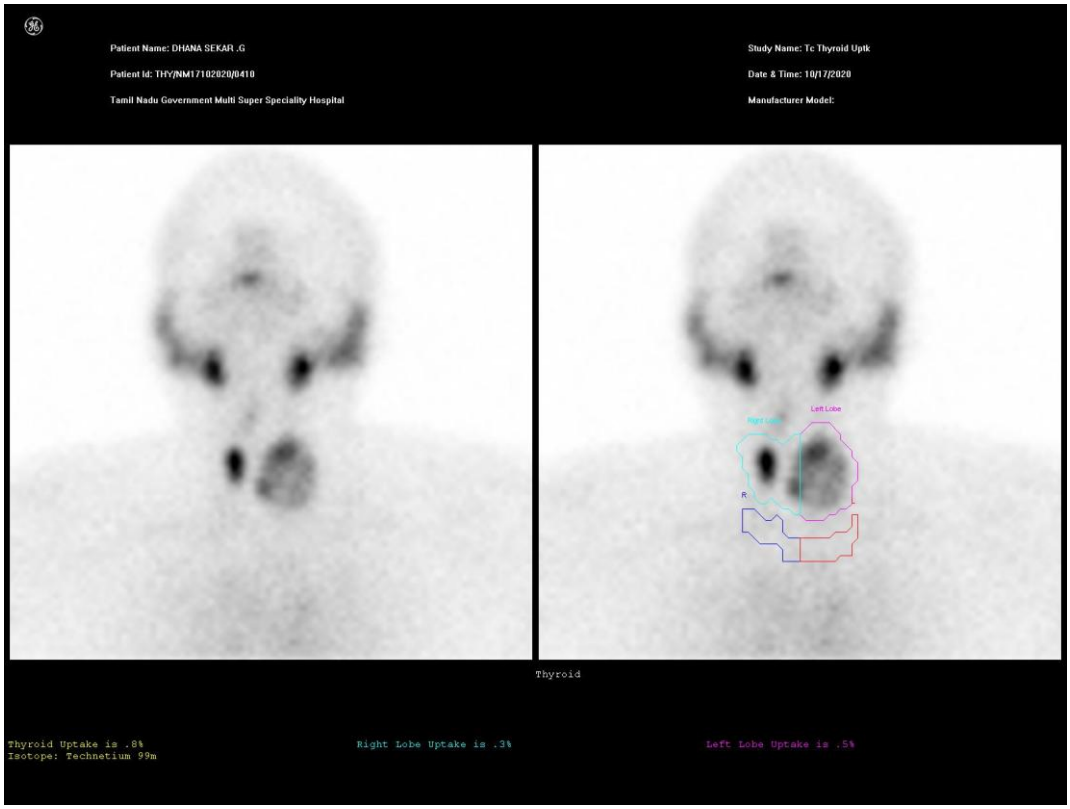
Killip class	Frequency	Percent	95% CI Lower	95% CI Upper
1	73	73.00%	63.20%	**81.39%**
2	20	20.00%	12.67%	**29.18%**
3	5	5.00%	1.64%	**11.28%**
4	**2**	**2.00%**	**0.24%**	**7.04%**

Table: 9 73 (73%) patients presented in Killip class 1. 20 (20%) had Killip class 2 at admission. Five (5%) and two (2%) patients had Killip classes 3 and 4 at admission, respectively.

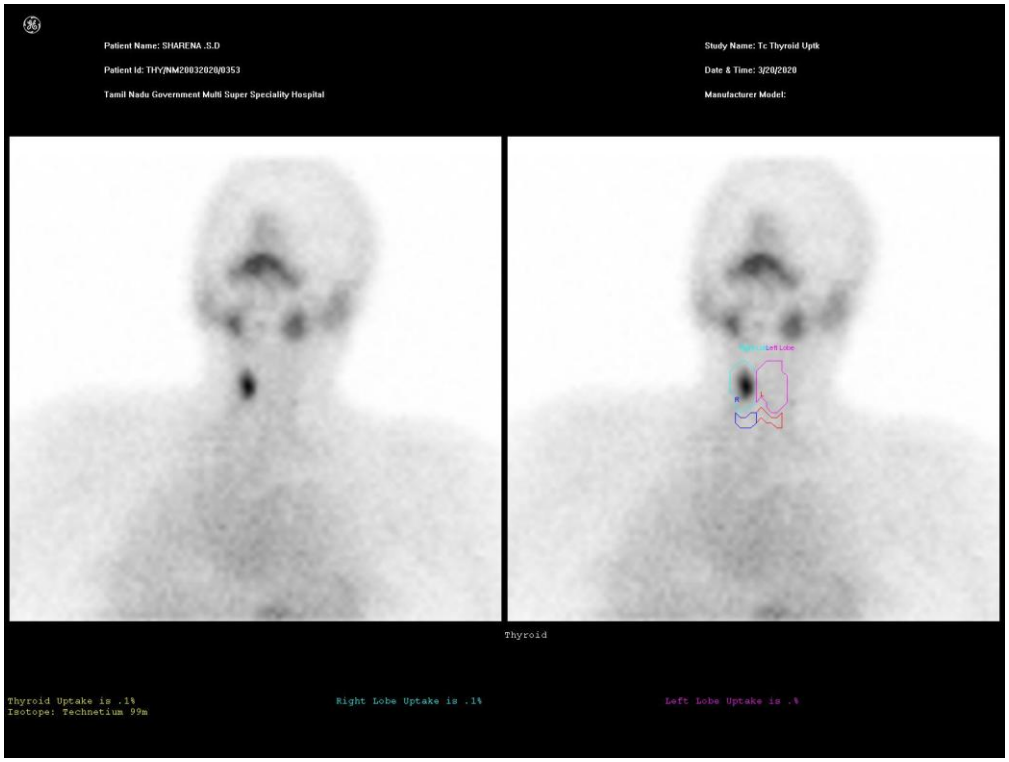
Picture 1: Depicting Irregular and Patchy Tracer Concentration in the Minimally Enlarged Thyroid Gland in Elderly Diabetic Patients with Myocardial Infraction



Picture 2: Depicting Irregular and Inhomogeneous Tracer Concentration in Both Lobes of the Thyroid Gland. The Left Lobe is Enlarged and has A Prominent Cold Nodule in its Lower Pole. In Elderly Diabetic Patients with Myocardial Infraction



Picture 3: Depicting Minimally Enlarged, Reduced, and Irregular Tracer Concentration in the Right Lobe of the Thyroid Gland. There is no Tracer Uptake in the Clinically Prominent Left Lobe. In Elderly Diabetic Patients with Myocardial Infraction



Discussion

We studied the clinical presentation and short term mortality in 100 elderly patients withacutemyocardialinfarction.Themeanageofthes tudypopulationwas70.26±13.44 years. Of the study population, 24% (n=24) were diabetic. 30.56% (n=11) females and 20.31% (n=13) males had diabetes. This is consistent with earlier studies, where the incidence of diabetes is more with age and with the female gender. The mean age of patients without diabetes was 70.21 ± 13.44 years. The mean age of the diabetic population was 70.42 ± 13.70 years. The majority of the patients (91%) were between 60-80 years of age. 64 patients were male and 36female.Of the cases studied, 93% (n=93), had ST-elevation myocardial infarction and 7% (n=7) had non ST-elevation myocardial infarction. This conflicts with the previous studies.(8, 99). In contrast to the cases of ST-elevation myocardial infarction, Non-ST elevation myocardial infarction cases are more likely to get admitted to the wards. Here, they are usually treated as cases of unstable angina.[9] Evaluation of cardiac biomarkers can clinch the diagnosis. They are often not done due to financial constraints or maybe done too early before a sufficient rise occurs. It may explain this disparity.[10] In our study, the majority of the patients presented with typical symptoms. There was no significant difference in the clinical presentation of acute myocardial infarction between diabetics and non-diabetics. Chest pain, sweating, nausea, and breathlessness were the common presenting complaints. 18% (n=18) of patients presented without chest pain. These findings correspond to the findings of Libby P et al (We could not find any significant difference in the duration of chest pain between the diabetic and non-diabetic populations. In our study, the majority of the patients sought treatment within 4 hours of the onset of symptoms. This is in sharp contrast to the findings of the CREATE Study(8). This can probably be explained by the better access to transportation and healthcare facilities at present in Tamilnadu.[11] Greater awareness of the symptoms of myocardial infarction may also contribute to this observation. More than half the patients who presented with chest pain had no

radiation. This was as expected, given the high mean age of the study population. Common sites of radiation of chest pain included left arm, left shoulder, neck, right arm, and right shoulder in that order. Radiation of chest pain was not significantly different in the diabetic, as compared to the non-diabetic group.[12] Acute myocardial infarction in the elderly most commonly involved the inferior and anterior walls in both diabetic and non-diabetic patients. Majority of the patients presented in Killip class 1.[13] This is comparable to the findings of previous studies. Door to needle time was calculated for the patients who underwent thrombolysis. More than half of the patients had a door to needle time > 30 minutes. This was not significantly different for diabetics. One of the probable reasons for this delay would be the unwillingness of the bystanders to consent for thrombolysis, once the risks were fully explained.[14] In-hospital mortality was 25% (n=25) in the study population. this corresponds to the previous studies (78, 99). Of the surviving 75 patients, we contacted 38 patients regarding 30-day mortality. Of those contacted, 2 had expired over the period (day 8 to day 30).TIMI score was not a significant predictor of in-hospital mortality in elderly diabetics and non-diabetics. The score was calculated at admission. This fails to take into account any worsening that could have occurred during the hospital stay. This may be aprobable explanation for the difference from previous studies. Diabetes mellitus was a significant predictor of in-hospital mortality in the elderly. This corresponds to the findings of previous studies.[15]

Conclusion

Common presenting symptoms of acute myocardial infarction in the elderly include chest pain, sweating, nausea, and breathlessness. Typical symptoms are common in elderly patients with myocardial infarction, irrespective of diabetic status. Elderly diabetic patients with acute myocardial infarction had a significantly higher in-hospital mortality as compared to elderly non-diabetics

Source of Support- Nil
Conflict of Interest -None
Ethical Committee Clearance Was Approved By Institutional Ethical Committee.

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