The Clinical Spectrum of Acute Coronary Syndromes: Experience from a Major Center in Kerala

KJ Raihanathul Misiriya*, N Sudhayakumar**, S Abdul Khadar***, Raju George***, VL Jayaprakash†, Joseph M Pappachan‡

Abstract

Background: The clinical profile and the mortality rate among patients with acute coronary syndromes (ACS) are not well studied in Kerala.

Aims: To determine the clinical characteristics, mortality rate and possible risk factors for high mortality among patients with ACS.

Settings and design: Retrospective study conducted at Kottayam Medical College, a large teaching hospital.

Patients and methods: Successive cases presenting with ACS to the coronary-care unit between May 2005 and December 2006 were included. Cases were grouped into ST-segment elevation myocardial infarction (STEMI) and non-ST-segment elevation myocardial infarction/unstable angina (NSTEMI/UA) for the purpose of analysis.

Statistical analysis: Univariate analysis using chi square test and unpaired t test.

Results: Among 1865 patients treated for ACS, 1359 (72.9%) were males. One hundred fifty (8.04%) died during treatment. One thousand forty-four (56%) had STEMI and 376 of them (36%) occurred between 12 pm and 6 pm.

One hundred twenty-five patients (11.97%) with STEMI died. Significantly higher mortality rates were observed among females (22.8% vs. 9%; p<0.001), cases with inferior wall infarctions (17% vs. 7%; p=0.001) and cases not receiving thrombolysis (15% vs. 10%; p=0.005). Diabetes mellitus (OR=1.96), age >75 years (OR=2.42) and higher Killip class at admission were associated with high mortality.

Eight hundred twenty five cases (44%) had NSTEMI/UA. Twenty five of them (3.05%) died. Higher proportion of cases with NSTEMI/UA in comparison to STEMI had hypertension (43% vs. 29.02%; p<0.001) and diabetes mellitus (41.05% vs. 23.95%; p=0.001), and had been females (34.96% vs. 21%; p=0.002). Mortality rate was higher among females (4.5% vs. 2.2%; p=0.016)

Conclusions: The mortality rates in ACS and STEMI remain high in this hospital. Subjects with diabetes mellitus, females and elderly individuals had greater mortality rates and are high risk groups.

Introduction

Coronary artery disease (CAD) is the leading cause of mortality and morbidity in the world and acute coronary syndromes (ACS), which encompass unstable angina (UA), non-ST-segment elevation myocardial infarction (NSTEMI) and ST-segment elevation myocardial infarction (STEMI), are the commonest causes of mortality in patients with CAD. With the introduction of a huge armamentarium of invasive and noninvasive therapeutic strategies, the mortality related to ACS has significantly reduced in the developed world over the past 20 years. But the mortality remains high among Indians. The prevalence of CAD and the incidence of ACS also are very high among Indians. India has the highest burden of ACS in the world. The rising incidence of ACS in Indians may be related to the changes in the lifestyle, the westernization of the food practices, the increasing prevalence of diabetes mellitus and probably genetic factors.

CREATE registry, the largest data from Indian patients with ACS, has shown that the pattern of ACS among Indians is much different from that of the Western populations. The health status of Kerala population differs from that of other Indian states owing to its higher literacy rate, better distribution of its healthcare manpower among rural and urban areas, and its better access to healthcare institutions. The clinical spectrum, the age and gender-specific differences and the mortality rate in patients with ACS are not studied properly in Kerala on a large-scale basis. In this background, this study was performed using the data extracted from the case records of patients treated with ACS between May 2005 and December 2006 in the Department

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of Cardiology of Kottayam Medical College, one of the biggest referral centers and a tertiary-care teaching hospital of Kerala.

**Patients and Methods**

Case records of all the cases admitted to the coronary care unit under the Department of Cardiology of Kottayam Medical College between May 2005 and December 2006 were searched. Those cases with proven non-cardiac chest pain and those who were discharged before completion of the treatment for any reasons were excluded from the analysis. The cases were grouped into two: viz. those presented with STEMI and those presented with NSTEMI/UA, for the purpose of analysis. Cases of chest pain/ discomfort with elevation of ST segment in electrocardiographic (ECG) leads/ presumed new onset left bundle branch block in ECG were categorized as STEMI. Cases of angina at rest without ST segment elevation were categorized as NSTEMI if their cardiac Troponin T (Trop T) levels exceeded 0.1 nanogram/ml and as UA if their Trop T levels were lower.

The baseline clinical characteristics analyzed in each group were the age, gender, hypertension (blood pressure > 140/90 mm Hg and/ or those already taking treatment for hypertension), diabetes mellitus (fasting blood glucose >126 mg/dL and/or postprandial blood glucose >200 mg/dL and those who were on treatment for diabetes mellitus), dyslipidemia (cholesterol >190 mg/dL and/or triglycerides >200 mg/dL), smoking status, duration of chest pain before hospitalization, time of occurrence of the ACS, clinical course in the hospital, the mean duration of hospital stay and complications related to the ACS and its treatment.

In cases with STEMI, the details of the area of myocardium infarcted, the hemodynamic subset (Killip class I, fifty-two (5%) belonged to class II, forty-two (4%) to class III and sixty-three (6%) to class IV at the time of admission to the hospital. The time of onset of chest pain among patients with STEMI showing the circadian variation of cardiac events is depicted in Figure 1.

Among the patients with STEMI, 522 (50%) had inferior wall and 459 (43.97%) had anterior wall infarctions. Of the remaining 63 (6.03%) cases, 54 were lateral wall and nine were isolated posterior wall infarctions. Out of those with inferior wall infarctions, 216 (47.06%) cases had associated right ventricular infarctions, 32 (6.13%) had advanced second degree AV-block and 36 (6.9%) had complete heart block. Three hundred twenty-four patients could not be thrombolysed. The reasons for not administering thrombolytic therapy was the late presentation of cases in 210 (64.81%) patients, non-satisfactory ECG criteria in 216 (47.06%), absence of typical chest pain in 17 (5.25%) and contra-indications for thrombolysis in 19 (5.86%) patients. Thirteen patients (4.01%) died immediately after admission to the coronary care unit before administering thrombolytic therapy.

The mean duration of hospital stay in patients with STEMI was 5 ± 2 days. In-hospital complications noticed among patients with STEMI were post-myocardial infarction angina in 104 (9.96%), pericarditis in 84 (8.05%), reinfarction in 73 (6.99%), left ventricular failure in 73 (6.99%), ventricular septal rupture in 10 (1%) and severe mitral regurgitation in 10 (1%) patients.

### Results

Two thousand thirty-six cases were admitted to the coronary care unit during the study period with suspected ACS, of which, 1865 cases qualified the inclusion criteria and their data was analyzed in the study. Mean age of presentation was 58.3 ± 15.6 years. One thousand three hundred fifty-nine were males (72.9%). One hundred fifty (8.04%) patients died during the in-hospital treatment. A comparison of the clinical characteristics of patients with ACS is shown in the Table 1. In females with ACS, NSTEMI/ UA outnumbered STEMI (56.7% Vs 43.3%; p < 0.001); whereas in males STEMI outnumbered NSTEMI/UA (60.7% Vs 39.3%; p < 0.001). ACS cases with co-existent cardiovascular risk factors like diabetes mellitus, hypertension and smoking history did not reveal any statistically significant higher risk for death when compared to those without these risk factors.

### Patients with STEMI

Six hundred forty-six cases (61.9%) of STEMI presented with central chest discomfort, 296 (28.4%) with left-sided chest pain, 69 (6.6%) with right-sided chest pain and 16 (1.5%) with jaw pain. Seventeen cases presented with acute onset of palpitation and/or collapse due to ventricular tachycardia. The majority of cases were transported to the hospital by either ambulance or motor cars. Sex distribution and mean age of cases, mean duration of symptoms before admission, known major cardiovascular risk factors and treatments received in the hospital are depicted in Table 2. Mean time interval before receiving thrombolysis after hospitalization was 38±16 minutes. Forty-seven patients (4.5%) were referred for coronary interventions because of postinfarction angina.

On categorizing the patients according to the hemodynamic subsets, 887 patients (85%) with STEMI belonged to Killip class I, fifty-two (5%) belonged to class II, forty-two (4%) to class III and sixty-three (6%) to class IV at the time of admission to the hospital. The time of onset of chest pain among patients with STEMI showing the circadian variation of cardiac events is depicted in Figure 1.

Among the patients with STEMI, 522 (50%) had inferior wall and 459 (43.97%) had anterior wall infarctions. Of the remaining 63 (6.03%) cases, 54 were lateral wall and nine were isolated posterior wall infarctions. Out of those with inferior wall infarctions, 216 (47.06%) cases had associated right ventricular infarctions, 32 (6.13%) had advanced second degree AV-block and 36 (6.9%) had complete heart block. Three hundred twenty-four patients could not be thrombolysed. The reasons for not administering thrombolytic therapy was the late presentation of cases in 210 (64.81%) patients, non-satisfactory ECG criteria in 216 (47.06%), absence of typical chest pain in 17 (5.25%) and contra-indications for thrombolysis in 19 (5.86%) patients. Thirteen patients (4.01%) died immediately after admission to the coronary care unit before administering thrombolytic therapy.

The mean duration of hospital stay in patients with STEMI was 5 ± 2 days. In-hospital complications noticed among patients with STEMI were post-myocardial infarction angina in 104 (9.96%), pericarditis in 84 (8.05%), reinfarction in 73 (6.99%), left ventricular failure in 73 (6.99%), ventricular septal rupture in 10 (1%) and severe mitral regurgitation in 10 (1%) patients.

### Table 1: The comparison between the clinical parameters among patients with NSTEMI/ UA and those with STEMI

<table>
<thead>
<tr>
<th>Variable</th>
<th>NSTEMI/ UA n (% of cases)</th>
<th>STEMI n (% of cases)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>821 (44.02)</td>
<td>1044 (55.98)</td>
<td>0.003</td>
</tr>
<tr>
<td>Males</td>
<td>534 (65.04)</td>
<td>825 (79)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Females</td>
<td>287 (34.96)</td>
<td>219 (21)</td>
<td>0.002</td>
</tr>
<tr>
<td>Hypertension</td>
<td>353 (43)</td>
<td>303 (29.02)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>337 (41.05)</td>
<td>250 (23.95)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>213 (25.94)</td>
<td>273 (26.15)</td>
<td>0.93</td>
</tr>
<tr>
<td>Mortality</td>
<td>25 (3.05)</td>
<td>125 (11.97)</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>
Commonest arrhythmia encountered was ventricular premature beats that occurred in 418 (40.04%) patients. Other arrhythmias observed were accelerated idioventricular rhythm (AIVR) in 188 (18%), ventricular tachycardia (VT) in 146 (13.98%), atrial fibrillation (AF) in 84 (8.05%) and ventricular fibrillation (VF) in 56 (5.36%) patients.

One hundred twenty five (11.97%) patients with STEMI died during the treatment. Patients with age > 75 years had higher mortality rates (compared to younger individuals) and 39 (24.8%) out of 157 patients in this group died during treatment [Odd's ratio for death (OR)=2.42 (95% CI: 1.52-3.41; p <0.001)]. Fourty five (18%) out of 250 diabetic patients with STEMI died and diabetes mellitus was associated with higher mortality risk [OR = 1.96 (95% CI: 1.29-2.97; p = 0.001)]. But patients with hypertension and smoking history did not show statistically significant higher risk for death.

Females with STEMI had higher mortality rates when compared to males (22.8% vs. 9%; p < 0.001). Mortality rate was higher among patients with inferior wall infarctions when compared to anterior wall infarctions (17% vs. 7%; p = 0.001). Those who received thrombolytic therapy had a lower mortality rate (10% vs. 15%; p = 0.005). The mortality rate increased steadily with advancing age, with lowest rate in those who were less than 50 years of age (5.6%). The mortality rates in other age-groups were: 51 to 65 years – 10.6%, 66 to 80 years – 18.6% and 81 to 95 years – 20.3%. The mortality rates in various hemodynamic subsets were as follows: Killip class I – 5.6%, class II – 17.4%, class III – 29.8% and class IV – 83.3%.

Table 2: The baseline characteristics among males and females with ST-segment elevation myocardial infarction (STEMI).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total. n (%)</th>
<th>Males. n (%)</th>
<th>Females. n (%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age</td>
<td>59 (R= 22–94)</td>
<td>56 (R= 22–90)</td>
<td>69 (R= 38–94)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Mean duration of symptoms before hospitalization.</td>
<td>3.5hr (R= 0.5–32 hrs)</td>
<td>3.3hr (R= 0.5–28 hrs)</td>
<td>5.2hr (R= 1.5–36 hrs)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Symptom duration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not known</td>
<td>25 (2.39)</td>
<td>25 (3)</td>
<td>0</td>
<td>--</td>
</tr>
<tr>
<td>&lt; 6 hours</td>
<td>643 (61.59)</td>
<td>527 (63.88)</td>
<td>116 (53)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>7 – 12 hours</td>
<td>164 (15.71)</td>
<td>107 (13)</td>
<td>57 (26)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>13 – 24 hours</td>
<td>95 (9.1)</td>
<td>82 (10)</td>
<td>13 (6)</td>
<td>0.01</td>
</tr>
<tr>
<td>More than 24 hours</td>
<td>117 (11.2)</td>
<td>84 (10.12)</td>
<td>33 (15)</td>
<td>0.01</td>
</tr>
<tr>
<td>Smoking history</td>
<td>487 (46.65)</td>
<td>487 (59.03)</td>
<td>0</td>
<td>--</td>
</tr>
<tr>
<td>Hypertension</td>
<td>303 (29.02)</td>
<td>215 (26.06)</td>
<td>88 (40.18)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>250 (23.95)</td>
<td>182 (22)</td>
<td>68 (31)</td>
<td>0.005</td>
</tr>
<tr>
<td>Dyslipiedemia</td>
<td>273 (26.15)</td>
<td>198 (24)</td>
<td>75 (34)</td>
<td>0.005</td>
</tr>
<tr>
<td>Thrombolysis</td>
<td>720 (68.97)</td>
<td>592 (71.76)</td>
<td>128 (58.45)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Other therapy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspirin/ clopidogrel</td>
<td>985 (94.35)</td>
<td>782 (94.79)</td>
<td>203 (92.69)</td>
<td>0.13</td>
</tr>
<tr>
<td>ACE inhibitors/ ARB</td>
<td>697 (66.76)</td>
<td>541 (65.58)</td>
<td>156(71.23)</td>
<td>0.03</td>
</tr>
<tr>
<td>Beta blockers</td>
<td>840 (80.46)</td>
<td>668 (80.97)</td>
<td>172 (78.53)</td>
<td>0.17</td>
</tr>
<tr>
<td>Statins</td>
<td>756 (72.41)</td>
<td>582 (70.55)</td>
<td>174 (79.45)</td>
<td>0.02</td>
</tr>
<tr>
<td>Nitrates</td>
<td>658 (63.03)</td>
<td>523 (63.39)</td>
<td>135 (61.64)</td>
<td>0.16</td>
</tr>
<tr>
<td>Heparin</td>
<td>675 (64.66)</td>
<td>536 (64.97)</td>
<td>139 (63.47)</td>
<td>0.19</td>
</tr>
</tbody>
</table>

n = number of patients, R = range, p values < 0.05 is statistically significant.
Mechanisms of Death in STEMI

Ventricular pump failure was the commonest cause of death that occurred in 52 (41.6%) patients. The other causes of death were ventricular fibrillation in 36 (28.8%), asystole in 28 (22.4%) and electromechanical dissociation in 4 (3.2%) and multi-factorial in 5 (4%) patients. Asystole was more common in inferior wall infarction when compared to anterior wall infarctions (28% vs. 7%; p = 0.001). Electromechanical dissociation was seen only in anterior wall infarctions.

STEMI in the elderly

There were 157 patients above the age of 75 years with STEMI in the present study and their clinical characteristics are compared with those at younger ages as shown in Table 3.

Out of the 157 elderly patients with STEMI, 39 died (mortality rate 25%) and the mortality rate was higher among the female patients (28%). Those who received thrombolytic therapy had higher rate of mortality (29.6% vs. 14.3%; p = 0.05). The reason for not administering thrombolytic therapy was delayed presentation among 41 cases.

Patients with NSTEMI/UA

Of the 821 patients in this group, 612 (74.54%) had raised levels of Trop T (> 0.1 nanogram/ml) and they were categorized as NSTEMI cases and the remainder were grouped as unstable angina cases. Among the NSTEMI/UA cases, 482 patients (58.7%) presented with central chest pain, 267 (32.5%) with left-sided chest pain and 58 (7.1%) with right-sided chest pain. 14 cases (1.7%) were admitted with palpitation/collapse secondary to ventricular tachycardia.

Mean duration of hospital treatment was 4.6 ± 2.3 days. Sex distribution and mean age of cases, mean duration of symptoms before admission, known major cardiovascular risk factors

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total. n (%)</th>
<th>Males. n (%)</th>
<th>Females. n (%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of cases</td>
<td>821 (100)</td>
<td>534 (65)</td>
<td>287 (35)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Males</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td></td>
<td></td>
<td>0.92</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td></td>
<td></td>
<td></td>
<td>0.09</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inferior wall infarction</td>
<td></td>
<td></td>
<td></td>
<td>0.01</td>
</tr>
<tr>
<td>Anterior wall infarction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thrombolytic therapy</td>
<td></td>
<td></td>
<td></td>
<td>0.94</td>
</tr>
<tr>
<td>Mortality in those receiving thrombolyis</td>
<td></td>
<td></td>
<td></td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

n = number of patients, R = range, p values < 0.05 is statistically significant.
and treatments received in the hospital are depicted in Table 4. Twenty-nine patients (3.53%) were referred for coronary interventions because of persistent angina despite adequate medical treatment.

In-hospital complications noticed in patients with NSTEMI were left ventricular failure in 18 cases (2.2%), mitral regurgitation in 6 (0.7%) patients and upper gastrointestinal bleeding in 8 (0.97%) cases. Commonest arrhythmia encountered was ventricular premature beats that occurred in 316 (38.5%) patients. Other arrhythmias observed were accelerated idioventricular rhythm (AIVR) in 17 (2.1%), ventricular tachycardia (VT) in 27 (3.3%), atrial fibrillation (AF) in 29 (3.5%) and ventricular fibrillation (VF) in 3 (1.2%) patients.

Among the patients with NSTEMI/UA females had higher mortality rate but there were no statistically significant differences in the mortality rates between those with and without the history of smoking, diabetes mellitus and hypertension.

Discussion

Of the 1865 cases of ACS that qualified the inclusion criteria, 56% had STEMI and 44% had NSTEMI/UA. Mean age of presentation of STEMI cases was 59 years and that of NSTEMI/UA was 58.5 years. Higher mean age at presentation was noticed among females in both categories (69 yrs and 67 yrs respectively). About 69% of STEMI cases received thrombolytic therapy. Maximum number (36%) of STEMI cases occurred between 12 pm and 6 pm. 11.97% of STEMI cases died during treatment and ventricular pump failure was the commonest cause of death (41.6%). Females, cases not receiving thrombolysis and those with inferior wall infarctions, higher Killip class at admission, diabetes mellitus and age more than 75 years, had higher mortality rates. Higher proportion NSTEMI/UA cases in comparison to STEMI cases had hypertension (43% vs. 29.02%), diabetes mellitus (41.05% vs. 23.95%) and had been females (34.96% vs. 21%). 3.05% of NSTEMI/UA cases died during hospital treatment and females had higher mortality risk (4.5%).

This study also showed a higher proportion of STEMI cases among patients with ACS as observed in the CREATE registry.12 The mean age at presentation of ACS cases (58.3 years) is also comparable with mean age of cases from the CREATE registry data (57.5 yrs). Though we observed an in-hospital mortality rate of 8.04% that was much higher than the mortality rate observed among ACS cases in the CREATE registry (5.6%), it was comparable to the mortality rates among patients, not undergoing coronary interventions, observed by others.15

The mean age at presentation of patients with STEMI was 59 years in this study, which is comparable to observations of CREATE registry14 and another study from South India,15 but there was a marked difference in the mean age at presentation among the female patients.16 The mean duration of symptoms before hospitalization among the patients admitted with STEMI was much lower than that was observed in other Indian studies10,12 and is similar to the trends observed in the Western studies.14 The low mean duration of symptoms before hospitalization observed in this study may be related to the better health awareness and the better access to the transportation systems among the population of Kerala.

Male preponderance was observed in the patients with STEMI at all age-groups and the sex ratios observed in both the younger and older age-groups were comparable to the sex ratios observed in another series reported from North India.17 Circadian variation of incidence of myocardial infarction, with an early morning peaking of events, were observed in Western studies and in a recent study18 reported from Singapore. Interestingly, 36% of STEMI cases in this study occurred between 12 pm and 6 pm. This is similar to the recent observations made by Sari et al from Turki.19 The exact reason for this peculiar phenomenon remains obscure, though genetic variations of the study population 19 and a prothrombotic state during physical inactivity after lunch20 may be put forth as possible explanations.

As observed in other studies,10,16 significantly higher numbers of females with STEMI had risk factors like hypertension, diabetes mellitus and dyslipidemia. The higher mean age at presentation of female patients in our series may be a contributing factor for the increased prevalence of these coronary risk factors among them.

Higher proportions of STEMI cases in our study, when compared to those from CREATE registry,12 received thrombolytic therapy (68.9% vs. 58.5%), beta blockers (80.5% vs. 57.5%), angiotensin II blocking agents (66.8% vs. 60.5%) whereas the proportion of cases that received anticoagulants was less (64.7% vs. 78.6%) and the use of antiplatelet agents was similar in both the groups.

Though the proportion of patients with anterior wall and inferior wall STEMI observed in this study was comparable to that observed by Jose et al.,10 the hemodynamic subsets (Killip class) did not match in both studies and we observed a higher proportion of cases (85%) in Killip class I and this may be one reason for the lower mortality rate observed in our study. But the higher in-hospital mortality rate among our STEMI cases compared to the mortality rate observed among cases from the CREATE registry12 (11.97% vs. 8.6%) may be related to the higher number of elderly patients in our study.

As expected, the mortality rates increased steadily with advancing age and advanced hemodynamic class (Killip class). Female patients with STEMI had higher mortality rates than males with STEMI as observed in other studies.8-11,16,17 The higher age at presentation of female patients and the associated comorbidities might have contributed to the increased mortality rate in females. Contrary to the earlier observations,22,23 cases with inferior wall STEMI in our study, had a higher mortality rate when compared to those with anterior wall STEMI. Right ventricular infarction and conduction system abnormalities encountered in many patients with inferior wall STEMI in our cases might explain this disparity in the mortality rates.

Univariate analysis showed that the presence of diabetes mellitus in patients with STEMI to be a significant predictor for high mortality as observed by others.24 But hypertension and history of smoking did not pose any higher risk for in-hospital mortality.

An important and interesting observation in this study is the high number of patients over the age of 75 years with STEMI that is similar to the observations made by Western authors.25,26 The higher number of elderly individuals in Kerala population might have contributed to the increased mortality rate in females. Contrary to the earlier observations,22,23 cases with inferior wall STEMI in our study, had a higher mortality rate when compared to those with anterior wall STEMI. Right ventricular infarction and conduction system abnormalities encountered in many patients with inferior wall STEMI in our cases might explain this disparity in the mortality rates.

Another important observation noticed among the elderly patients with STEMI was the statistically significant higher mortality rate in those who received thrombolytic therapy when compared to those who did not receive thrombolysis. Delayed
presentation was the reason for not administering thrombolytic therapy among the majority of these cases and the reason for delayed presentation and lower mortality rate might have been less severe coronary disease among them.

The proportion of NSTEMI/UA among ACS cases in our study was slightly higher than that observed in the CREATE registry\(^{41}\) (44% vs. 39.4%) but the mean age of cases at presentation was comparable. Prevalence of hypertension and diabetes mellitus was higher among NSTEMI/UA cases when compared to STEMI cases as observed by the CREATE registry investigators. Higher proportions of NSTEMI/UA cases in our study, when compared to those from CREATE registry,\(^{12}\) received beta blockers (77.6% vs. 61.9%), lipid lowering drugs (71.3% vs. 53.9%) and ACE inhibitors or angiotensin II blocking agents (67.2% vs. 51.2%) whereas the proportion of cases that received anticoagulants was less (71.1% vs. 85.5%) and the use of antplatelet agents was similar in both the groups.

The mortality rate observed in patients with NSTEMI/UA was comparable to the observations made in other studies.\(^{12,27}\) Though females had higher mortality risk among NSTEMI/UA cases, presence of diabetes mellitus did not pose higher risk for mortality in them as observed among patients with STEMI. Prevalence of diabetes mellitus, dyslipidemia and hypertension was higher among females with NSTEMI/UA when compared to males, similar to the observations made among patients with STEMI.

**Conclusions**

The mortality rate of ACS (especially that of STEMI) still remains high in this hospital. The peak incidence of STEMI occurs between 12 Noon and 6 pm. Female patients with ACS have higher incidence of NSTEMI/UA than STEMI. Among the patients with STEMI, females and elderly individuals have significantly higher mortality rates. Diabetic patients with STEMI have greater risk for death. In the patients with STEMI, females, elderly individuals and those with diabetes mellitus should be managed more carefully to reduce the mortality rates. Female patients with NSTEMI/UA have higher mortality risk when compared to males and they should be managed more carefully.

**References**


**ANNOUNCEMENT**

6th Infectious Disease Certificate Course - IDCC 2009

6th - 13th September, 2009 • 8.30 a.m. to 4.30 p.m.

Venue : Hotel Taj Lands End, Bandra, Mumbai

ORGANISED BY

PD Hinduja National Hospital and Medical Research Centre, Mumbai, India with collaboration with Henry Ford Health Systems, Detroit, USA

Objective: Diagnosis, Management & Prevention of Infectious Diseases.

Focus : Acute Febrile Illnesses, Tuberculosis, HIV, Infections in ICU & Immunocompromised, Organ Specific Infections, PharmacoCology, Microbiology.

Format : Ward and Microbiology Rounds, Archived Cases, Interactive Lectures, MCQs, Work Mats, Visit to Infectious Disease Hospital.

Eligibility : Post-graduates in Medicine and Microbiology (Final year postgraduates may also be considered).

Registered procedure : Candidates to send shot bio-data with Demand Draft / Cheque of Rs.4,500/- in favour of PD Hinduja National Hospital and Medical Research Centre payable at Mumbai.

Candidate to make their own arrangement for accommodation.

Last date for registration : 30th June, 2009.

Course Information / Detailed Programme : www.hindujahospital.com/IDCC 2009

Inquiries : 022-24447204/5, marketing@hindujahospital.com

Course Co-ordinators : Dr. F.D. Dastur • Dr. Rajeev Soman • Dr. Camilla Rodrigues