Prevalence, risk factors and short term outcomes of acute myocardial infarction in Baghdad teaching hospital, 2019


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Abstract:

Background: The incidence of coronary artery disease and related mortality is expected to be raised dramatically in developing countries. Results from the Global Burden of Disease Study 2017 revealed that cardiovascular diseases were the second leading cause of non-communicable diseases (NCD) burden. Aim of study: To estimate the prevalence, risk factors and short term outcomes of patients with acute myocardial infarction. Patient and methods: A prospective cross-sectional study conducted among patients who were admitted to the coronary care unit (CCU) at Baghdad teaching hospital, 3rd floor for the period from July/2019 to October/2019 where the patients were conveniently selected for participation after verbal consent was taken from them. Full history, examination, ECG, cardiac enzymes, Echo was done to all participants. Results: Fifty-four out of 500 patients with inclusion criteria were registered. 70.4% of patients had STEMI and 29.6% had NSTEMI, the most common affected age group was 60-69 years old with the mean age being 59±11 years, and males were at greater risk with a male/female ratio 2:1. The most common risk factor was hypertension (61%). Eighteen patients (33.3%) of study population developed complications, the most common complication was mitral regurgitation. Conclusion: Prevalence of myocardial infarction in our tertiary hospital was not common. The most common risk factor was hypertension. The complications of myocardial infarction were frequent and the acute mitral regurgitation was the most prominent one.

Key words: Myocardial infarction, risk factors, prevalence, hypertension, mitral regurgitation

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Introduction:

Myocardial infarction (MI): is irreversible death (necrosis) of a portion of the myocardium that usually results from an imbalance in oxygen supply and demand. It is considered part of a spectrum referred to as acute coronary syndrome (ACS) which includes unstable angina, non–ST-segment elevation MI (NSTEMI) and ST-segment elevation MI (STEMI). Acute coronary syndrome may present as new phenomenon in patients with no previous history of heart disease or against a background of ischemic heart disease (1).

An analysis of death certificates from the World Health Organization (WHO) database demonstrated that the incidence of CAD and related mortality is expected to rise dramatically in other developing countries including India, Latin America, the Middle East and Sub-Saharan Africa, with an estimated 80% increase, from approximately 9 million in 1990 to a projected 20 million by 2020. (2), (3).

Although the clinical presentation of a patient is a key component in the overall evaluation of acute MI, many events are either “silent” or are not clinically recognized by patients.
Clinical presentation of symptomatic patients with myocardial infarction: (1) Chest pain (which is the most common presentation of MI) which could be typical or atypical pain depending on the site of chest pain, whether there is radiation or not, exacerbating and relieving factors. Dyspnea. Features of heart failure (orthopnea, paroxysmal nocturnal dyspnea). Cough. Other associated symptoms (sweating, fever, palpitation, nausea, vomiting or abdominal pain).

Diagnosis of acute MI: The electrocardiogram (ECG) is the most important diagnostic tool in the initial evaluation of patients in whom an acute coronary syndrome (ACS) is suspected in the emergency department. (4)

ECG criteria of STEMI:
- ST segment elevation of greater than 1mm in limb leads and more than 2mm in precordial leads.
- Diminution in the size of R wave
- In transmural infarction development of pathological Q wave
- T wave becomes inverted because of a change in ventricular repolarization, this change persists after the ST segment has returned to normal.

ECG criteria of NSTEMI:
- ST segment depression and T wave changes
- This can be accompanied by loss of R waves in the absence of Q waves

Laboratory tests used in the diagnosis of myocardial infarction (MI) include the following:

- Cardiac biomarkers/enzymes: The American College of Cardiology/American Heart Association (ACC/AHA) and the European Society of Cardiology (ESC) guidelines recommend cardiac troponin as the only cardiac biomarker that should be measured at presentation in patients with suspected MI, due to its superior sensitivity and accuracy. Troponin is a contractile protein that is not normally found in serum; it is released only when myocardial necrosis occurs. (5)
  - Complete blood cell (CBC) count
  - Comprehensive metabolic panel
  - Lipid profile

Imaging studies:
- For individuals with highly probable or confirmed acute MI, coronary angiography can be used to definitively diagnose or rule out coronary artery disease. (6)
- Echocardiography is highly recommended and is required to evaluate ventricular function and wall-motion abnormalities. It is also used to identify pericardial effusion, ischemic mitral regurgitation, and cardiac tamponade that may complicate acute MI. (7)
- The use of myocardial perfusion imaging (MPI) with single-photon emission CT (SPECT) or positron emission tomography (PET) scanning in the emergency department for low-risk patients has a low yield for detecting ischemia. (8)

As a general rule, initial therapy for acute MI is directed toward restoration of perfusion as soon as possible to salvage as much of the jeopardized myocardium as possible. This may be accomplished through percutaneous coronary intervention (PCI), or coronary artery bypass graft (CABG), surgery should be done. (9) Medical thrombolytic therapy: using anticoagulants like heparin and antiplatelet like aspirin and clopidogrel. (10) Other drugs that are used to control underlying diseases and complications associated with MI (hypertension, DM,
hyperlipidemia, arrhythmia and heart failure): Beta blocker or Ca channel blocker, Nitroglycerin, narcotic analgesic drugs and ACE inhibitors. Statins should be given to all patients with ACS irrespective of lipid profile. (11)

Complications of acute myocardial infarction: (MI) include arrhythmic complications (the cause of death within the first hour after acute MI), mechanical complications, left ventricular aneurysm formation, ventricular septal rupture, associated right ventricular infarction, ventricular pseudoaneurysm, and other complications. (12)

**Aim of study:** To estimate the prevalence, risk factors and short-term outcomes of patients with acute myocardial infarction.

**Patient and methods:**
A prospective cross-sectional study conducted among patients who were admitted to the coronary care unit (CCU) at Baghdad teaching hospital, 3rd floor for the period July-October/2019 for management and follow-up where the patients were conveniently selected for participation after verbal consent was taken from them. All patients who consented and who presented with dynamic ECG (STEMI and NSTEMI) +/- Troponin were included in this study while patients with the following conditions were excluded: patients with bundle branch block, arrhythmia (atrial fibrillation, ventricular fibrillation…etc), previous heart surgery, prosthetic heart valve, pacemaker and congenital heart disease.

Full history, examination, ECG, cardiac enzymes and echocardiography were done to all participants.

Data was collected from the participants by interviewing them through questionnaire paper. Conditions were as good as possible regarding patients’ status (in pain, drowsy, not in mood, etc…), room and time availability. Answers were ticked depending on patients responses after comparing them to fixed operational definitions that were provided in the proposal before data collection in order to ensure unbiased documentation. This is an observational study that requires no intervention, and only includes collection of clinical data and questionnaire items. All patients participating in the study received a brief explanation of the goal, methods and value of the study before being asked for their verbal consent.

The interviews were done using paper-based questionnaires which were kept safe and only accessed during data entry.

**Statistical analysis:**
Data capture and statistical analysis done on SPSS, version 23.0 (IBM Corporation, Armonk, NY, USA). For quantitative variables, means, standard deviations and frequencies were calculated with their 95% confidence intervals. Discrete variables were presented in number and percentage. For all analyzes, a value of p<0.05 was considered statistically significant.

**Results:**
A total of 545 patients were admitted to the coronary care unit at Baghdad teaching hospital for the period from July to October/2019. Patients who presented with acute myocardial infarction (STEMI/NSTEMI) and met the inclusion criteria were 54 patients out of 545 that participated in our study. Of those 54 patients, 38 (70.4%) had ST elevation
myocardial infarction (STEMI) and 16(29.6%) had non ST elevation myocardial infarction (NSTEMI), as shown in figure (1).

We found that 36(66.66%) patients were males in which 27(50%) had STEMI and 9(16.66%) had NSTEMI while 18(33.33%) were females in which 11(20.37%) of them had STEMI and 7(12.96%) had NSTEMI. The male/female ratio is 2:1, as shown in figure (2).

The mean age was 59 (+/-11) and the most common affected age group was from 60 to 69 years old with a total of 20(37%) patients: 15(27.8%) had STEMI and 5(9.25%) had NSTEMI, as shown in table (1).
The most common risk factor was hypertension. 38 (70.3%) patients of study population were hypertensive in which 29 of them had STEMI and 9 had NSTEMI while the rest were normotensive, as shown in figure (3).

Table 1: Frequency of MI (STEMI/NSTEMI) among age groups.

<table>
<thead>
<tr>
<th>Age groups</th>
<th>STEMI</th>
<th>NSTEMI</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 20 years old</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>20-29 years old</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30-39 years old</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>40-49 years old</td>
<td>8</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>50-59 years old</td>
<td>7</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>60-69 years old</td>
<td>15</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Above 69 years old</td>
<td>7</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>16</td>
<td>54</td>
</tr>
</tbody>
</table>

The most common risk factor was hypertension. 38 (70.3%) patients of study population were hypertensive in which 29 of them had STEMI and 9 had NSTEMI while the rest were normotensive, as shown in figure (3).

**Figure 3:** Relationship between MI (STEMI/NSTEMI) and hypertension.

The second prevalent risk factor was diabetes mellitus. 28 (51.85%) patients were diabetic: 23 had STEMI and 5 had NSTEMI while the rest were euglycemic, as shown in figure (4).
Figure 4: Relationship between MI (STEMI/NSTEMI) and diabetes mellitus.

Smoking is another risk factor that was observed but it was insignificant. 21 (38.9%) patients were smokers: 16 had STEMI and 5 had NSTEMI while 33 (61.1%) patients were nonsmokers, as shown in figure (5).

The short term outcome within 3 days of acute MI was also observed. 19 (35.2%) patients developed complications. The most common observed complication was mitral regurgitation constituting (20.37%). Heart failure constituted (9.25%), arrhythmia constituted (3.7%), ventricular septal defect (VSD) constituted (1.85%) while 38 (64.8%) patients did not develop any complication, as shown in table (2).
Discussion:
Acute myocardial infarction (AMI) is an ischemic necrosis of the heart muscle most often due to sudden occlusive thrombosis of a coronary artery. Its incidence is increasing in emerging countries. Numerous registers of sudden cardiac arrest (SCA) and myocardial infarction exist throughout the world and have provided valuable epidemiological and clinical information. (13-15)

The prevalence of acute myocardial infarction (STEMI/NSTEMI) in this study was 10.8% (54 out of 512 patients) in which STEMI constituted 70% and NSTEMI 30%. A study that was done in Tunisia at the cardiology department of the University Hospital of Setif (UHS) stated that the prevalence of MI (STEMI/NSTEMI) was 40% (2771 out of 6886 patients) and the clinical presentation was dominated by STEMI in 1454 patients (52.48%). NSTEMI accounted for 47.52% of cases (1317 patients). (16)

This current study shows that the frequency of STEMI among males was 50% and 20.4% for females while NSTEMI among males was 16.6% and 13% among females. While Tunisia study in revealed that STEMI in males constituted 37.8% and 14.6% females while NSTEMI among males was 32.1% and 15.4% females. (16). These differences in the prevalence of acute MI (STEMI/NSTEMI) and frequency among males and females might be due to difference in the sample size and duration of study.

The most participants age group were between 60-69 years old. The mean age was (59+/−11) years old. This finding was consistent with the Joury et al study which stated that the mean age was (56.43+/−12.8 years). (17)

The most common risk factor in our study was hypertension (70.3%), while the hypertension prevalence ranged from (33%–60%) among six participating countries from the Gulf region in (18). This mild elevation of prevalence of hypertension in our study in comparison with Nakanishi et al study could be due to delay in diagnosis of hypertension and it is mostly diagnosed during complication (myocardial infarction).

Diabetes was the second most common risk factor in which 28(51.85%) patients were diabetic while 26(48.14%) patients were euglycemic. According to the Second Gulf Registry of Acute Coronary Events (Gulf RACE-2) study the prevalence of diabetes mellitus was 39.5%(3137 out of 7930) among acute coronary syndrome patients. (18).
This high prevalence in our hospital is because the disease is often diagnosed in a late stage, poor compliance to medication or stress.

Most of the participants in this study were non-smokers as only 21(38.88%) patients were smokers. Findings from the Setif-AMI Registry (16) in Algeria and GULF-RACE2 (19) study showed that smoking prevalence was (24.36%), (35.7%) respectively. This difference of smoking prevalence because some patients were ex-smokers, smoked hookah, electronic cigarettes or other forms of smoking rather than tobacco.

Out of 54 patients, 19 (35.2%) of them developed short term complications. In Varun et al study, nearly all patients (98%) (563 of 573) developed complications (20). The most common complication among the study population was mitral regurgitation: 11 of 54 patients (20%) while in Varun et al study, mitral regurgitation was a rare complication and constituted only 39 (6.3%) of 573 patients (20). This difference might be due to their large sample size and modern evaluation of complications.

**Conclusion:**

Prevalence of myocardial infarction in our tertiary hospital was not common. The most common risk factor was hypertension. The complications of myocardial infarction were frequent and the acute mitral regurgitation was the most prominent one.

**References:**


