

## Acute Myocardial Infarction: Experience at a Teaching Hospital

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### Abstract

**Background:** To note patient characteristics, risk factors, use of streptokinase, complications, and mortality in subjects presenting with acute myocardial infarction.

**Methods:** This prospective, observational, case study was conducted at DHQ Teaching Hospital, Rawalpindi, from January 2001 to January 2002. All 95 patients who were admitted with a diagnosis of acute myocardial infarction during this period were included. Patients were managed in the standard way, initially in CCU and then in the medical ward. Data obtained was statistically examined using Epi Info 2000.

**Results:** Of the 95 patients, 70 (73.7%) were male and 25 (26.3%) female. Mean patient age was  $57 \pm 12.54$  years. Anterior wall was involved commonly (38.9% patients). Forty-nine (51.6%) patients received thrombolysis with streptokinase. Arrhythmias (57.9% patients) and cardiac failure (53.6% patients) were the commonest complications of acute myocardial infarction. Mean hospital stay was 8 days. 11.5% (n=11) patients died during hospital stay, of these 27.2% (n=3) received streptokinase. Age, sex, smoking, and sedentary life styles were common (>50%) risk factors for myocardial infarction.

**Conclusion:** Acute myocardial infarction is common in males and over the age of 50 years. Majority of these patients are candidates for thrombolytic therapy with streptokinase. Myocardial infarction related in-hospital mortality, even in a tertiary care setting, may be 11.5%.

### Introduction

Myocardial infarction (MI) is a leading cause of morbidity and mortality. It is defined as death or necrosis of myocardial cells. It is a diagnosis at the end

of the spectrum of acute coronary syndromes. Most cases of acute MI are due to sudden occlusion of a coronary artery by formation of a thrombus at the site of a fissured or ruptured atherosclerotic plaque.<sup>1</sup> MI occurs when myocardial ischemia exceeds a critical threshold and overwhelms myocardial cellular repair mechanisms that are designed to maintain normal operating function and homeostasis. Ischemia at this critical threshold level for an extended time period results in irreversible myocardial cell damage or death.<sup>2</sup>

Goals of therapy in acute MI are expedient restoration of normal coronary blood flow and maximum salvage of functional myocardium. These goals can be met by a number of medical interventions and adjunctive therapies. Availability of these therapies and interventions may vary from place to place. This study was done to note spectrum of acute MI in patients presenting at DHQ Teaching Hospital, Rawalpindi, patient characteristics, complications, and mortality of acute MI. Additionally, risk factors for MI plus the use and problems associated with streptokinase therapy were also noted.

### Materials and Methods

The study was conducted at DHQ Teaching Hospital, Rawalpindi, from January 2001 to January 2002. All patients admitted with diagnosis of acute myocardial infarction were included in the study. Acute myocardial infarction was diagnosed when any two of the following criteria were fulfilled: (1) chest discomfort for at least 30 minutes compatible with myocardial ischemia [dyspnoea of rapid onset was also accepted], (2) characteristic ECG changes like development of Q waves, persistent ST elevation, new bundle branch block, and (3) elevation of serum creatinine kinase [CK] levels to at least twice the upper limit, with an MB fraction higher than 6% of total level, or positive Troponin T test.<sup>3,4</sup>

Every patient was treated in standard way i.e., oxygen, narcotic analgesic, aspirin, nitrates, admission

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in CCU, cardiac monitoring and thrombolysis with streptokinase in appropriate circumstances. Streptokinase was not administered to patients who had absolute contraindications for its use or who arrived more than 12 hours after onset of chest pain. Patients also received beta-blockers, calcium channel blockers, angiotensin converting enzyme inhibitors, inotropic support, diuretics and heparin according to the clinical scenario. Detailed clinical examination and related investigations were performed in each subject to note other illnesses like diabetes mellitus, hypertension and chronic obstructive airway disease which were treated appropriately. Patients were subsequently shifted to respective male and female wards, and then discharged accordingly.

Based on detailed clinical evaluation and investigations, data was recorded regarding: (1) age (2) gender (3) streptokinase administration (4) clinical course and MI related immediate and early complications [cardiac failure, arrhythmias, re-infarction, post-MI angina, pericarditis, ventricular septal defect, and death etc] (5) risk factors for ischemic heart disease i.e., occupation [sedentary, non-sedentary], history of smoking, family history, lipid profile [cholesterol and triglycerides] (6) other illnesses e.g., diabetes mellitus and hypertension. This data was noted in each subject, converted into variables and analyzed using Epi Info 2000.

### Results

Of the 95 patients admitted with diagnosis of myocardial infarction, 70 (73.7%) were males and 25 (26.3%) females. Mean patient age was  $57 \pm 12.54$  years. 60 (63.1%), and 35 (36.8%) patients had sedentary and non-sedentary occupations respectively. 50 (52.6%) patients were smokers, including 45 males and 5 females. 24 (25.2%), 50 (52.6%), and 21 (22.1%) patients belonged to lower, middle, and upper socioeconomic class respectively. Family history was positive in 30 (31.5%) patients. 18 (19%) patients were diabetic, 25 (26.3%) hypertensive, 20 (21%) obese, and 10 (10.5%) had hypercholesterolemia.

Eighty eight (92.6%) patients presented with MI for the first time, while the remaining had suffered at least one previous episode of myocardial infarction. 37 (38.9%) patients had anterior wall MI, 27 (28.4%) inferior, 8 (8.4%) posterior, 2 (2.1%) indeterminate, and 21 (22.12%) had myocardial infarction in more than one territory. 11 (11.5%) patients died during hospital

stay. 7 (63.6%) of these were male, and 4 (36.4%) female, ( $p < 0.65$ ). Two (2.1%) patients left against medical advice while the remaining 82 (86.3%) were discharged after an average length of stay of 8 days. Arrhythmias were observed in 55 (57.9%) patients, cardiogenic shock in 9 (9.4%), cardiac failure in 51 (53.6%), recurrent MI in 7 (7.3%), post-MI angina in 40 (42.1%), mitral regurgitation in 4 (4.2%), pericarditis in 12 (12.6%), and deep venous thrombosis in 4 (4.2%) patients. Cardiogenic shock ( $n=7$ ) and fatal arrhythmias ( $n=4$ ) were the cause of death in patients who expired.

Streptokinase was administered to 49 (51.5%) patients, 39 (55.7%) males and 10 (40%) females. Of the 11 (11.57%) patients who died during hospital stay 3 (27.2%) received streptokinase, while the rest did not ( $p < 0.16$ ). Comparison of various MI related complications in streptokinase recipients, and non-recipients are given in Table I. Rash ( $n=3$ ), urticaria ( $n=2$ ), transient hypotension ( $n=7$ ), and minor bleeding from IV access sites ( $n=6$ ) were observed in streptokinase recipients. None of these led to discontinuation of streptokinase.

**Table I: MI Related Complications in Thrombolysed, and Non-Thrombolysed Patients.**

Complications	Thrombolysed Patients (No and %)	Non-thrombolysed Patients (No and %)
Arrhythmias	35 (71.4%)	20 (43.4%)
Cardiogenic shock	3 (6.1%)	6 (13%)
Cardiac Failure	23 (46.9%)	28 (60.0%)
Post-MI angina	10 (20.4%)	30 (65.2%)
Recurrent MI	2 (4.0%)	5 (10.8%)
Pericarditis	2 (4.0%)	10 (21.7%)
Death	3 (6.1%)	8 (17.3%)
Mitral regurgitation	2 (4.0%)	2 (4.30%)
Deep venous thrombosis	—	4 (8.60%)

## Discussion

Worldwide, acute myocardial infarction is the commonest cause of death.<sup>1</sup> In-patient hospital mortality in cases of acute MI before establishment of coronary care units was 23-40%.<sup>5</sup> Later this mortality fell to 16-18%.<sup>6</sup> As thrombolytic agents became readily available, it further decreased to 5-10%.<sup>1</sup> South Asians including Pakistanis have poor short-term survival following acute MI.<sup>7</sup> 11.5% of our patients with acute MI died. In-hospital mortality of patients with Q wave MI was 23.8% in a local study by Karim et al.<sup>8</sup> 10.8% acute MI related in-hospital mortality was observed in a study from Aga Khan University Hospital, Karachi.<sup>9</sup> Memon and Samad noted 5.8% mortality in similar 4731 patients.<sup>10</sup>

Acute myocardial infarction occurs more frequently in persons older than 45 years.<sup>2</sup> Mean patient age in our series was 57 years. In similar Pakistani studies, mean age of patients varied from 53 to 59 years.<sup>8, 10, 11</sup> Males constituted the majority of our patients (73.6%). At the international level, male predominance in acute MI exists up to approximately 70 years, when the genders converge to equal incidence.<sup>2</sup> Various local studies have substantiated the same.<sup>10, 11</sup> A considerable number of studies have documented the fact that there are gender related differences in outcome of patients with acute MI.<sup>3</sup> A higher mortality rate for women with acute MI has also been observed in population based studies.<sup>12</sup> Our results do not show a significant relation between gender and MI related mortality ( $p < 0.65$ ).

Age, male sex, smoking, hyperlipidemia, diabetes mellitus, hypertension, type A personality, family history, and sedentary life style are risk factors for development of myocardial infarction. We noted all these. According to a local study by Yaqoob, smoking, hypertension and hyperlipidemias are common risk factors in patients with acute MI.<sup>13</sup> A study by Shariief and Zaman concluded that age of more than 50 years, diabetes mellitus, and a positive family history are significant risk factors for ischemic heart disease in our population.<sup>14</sup>

Principal causes of in hospital mortality and morbidity among patients with acute MI are heart failure, cardiogenic shock, angina, myocardial rupture, and lethal arrhythmias. Rhythm disturbances were the commonest MI related complication in our patients. These mainly included ventricular premature beats, ventricular tachycardia, and heart blocks. In coronary care units, some abnormality of cardiac rhythm is

noted in 72 to 96% patients with acute myocardial infarction.<sup>15</sup> Ventricular premature beats occur in as many as 90%, while ventricular tachycardia may manifest in up to 40% patients with acute MI.<sup>16</sup> Heart blocks are seen in up to 16% patients.<sup>16</sup>

Cardiac failure, post-MI angina, pericarditis, recurrent MI, mitral regurgitation, and deep venous thrombosis were the other complications noted by us. Cardiac failure is a common complication of acute myocardial infarction and is the principal cause of death among these patients.<sup>17</sup> Mild heart failure occurs in about 40% of patients with acute MI.<sup>18</sup> Early recurrent angina, especially after successful reperfusion may occur in up to 58% patients.<sup>19</sup> In MILIS (Multicentre Investigations of the Limitation of Infarct) study, pericarditis was found in 20% patients following acute MI.<sup>20</sup> Average incidence of pericarditis in these settings is 14% when presence of a friction rub is required for diagnosis.<sup>21</sup> Reinfarction has been reported to occur in approximately 10% patients during the first 10 days of MI.<sup>22, 23</sup> Following MI, incidence of mitral regurgitation is about 4%.<sup>24</sup> Bed rest and cardiac failure in post-MI period predispose to venous thrombosis and subsequent pulmonary embolism. Up to 25% patients with acute MI develop deep venous thrombosis.<sup>25</sup> Our results correspond with these findings.

51.5% of our patients received thrombolytic therapy with streptokinase. Estimates of the proportion of patients with acute MI who are suitable for thrombolytic therapy are variable. In England 70 to 80% patients are suitable, while in USA this figure varies between 25 to 33%.<sup>6</sup> High proportion of south Asians received thrombolytic treatment compared to their white counterparts in an English study (81.2% v 73.8%).<sup>7</sup> 58 and 62% patients with acute MI received thrombolysis in two studies from Bahrain and Kuwait respectively.<sup>26, 27</sup> 29% patients with acute MI received thrombolysis in a local study from Karachi.<sup>9</sup> In a study by Memon and Samad, 30% men and 11% females received thrombolytic therapy.<sup>10</sup>

Mortality in patients given thrombolytic drugs sufficiently early is 10-12%. This is 33% less than mortality in patients who don't receive thrombolysis.<sup>28</sup> In an overview of thrombolytic trials, short-term mortality in patients receiving thrombolysis was 9.6% compared to 11.5% in controls.<sup>29</sup> In a double-blind trial of streptokinase for myocardial infarction, mortality was 2.5% vs. 12.9% in patients receiving streptokinase or placebo.<sup>30</sup> Gardezi and colleagues noted 6.5% acute MI related in-hospital mortality in

thrombolysed patients, and 9.4% in non-thrombolysed patients.<sup>31</sup> Our results are comparable since 6.1% of streptokinase recipients, and 17.9% of non-recipients died during hospital stay. These figures correspond with GISSI-1 and ISIS-2 results, however mortality in non-thrombolysed group is more than what is noted in recent studies like USIM and NRM.<sup>32</sup> The probable reason for our non-significant P value is a small patient cohort.

Minor streptokinase related complications were observed in 36.7% (n=18) patients. Allergic reactions are seen in 1.7% patients receiving streptokinase.<sup>33</sup> Hypotension is more commonly seen in acute MI patients receiving streptokinase.<sup>34</sup> It can occur in 4-10% patients.<sup>35</sup> Bleeding is the commonest complication of streptokinase therapy. Majority of bleeding episodes occur at IV access sites. Intracranial hemorrhage can occur in 0.5% recipients.<sup>36</sup> Our results are comparable.

The authors realize that this study has potential limitations, the main one being the relatively small number of patients. It is possible that the practice in our hospital may not be representative of the practice in other hospitals in Pakistan. A population-based study, incorporating patients from all hospitals in Pakistan, and development of national registry for acute myocardial infarction can accurately reflect the practice in our country.

## Conclusions

Acute myocardial infarction is more commonly seen in males, and subjects over the age of 50 years. Majority of patients (>50%) receive thrombolytic therapy with streptokinase. Arrhythmias, cardiac failure, and post-MI angina are common complications of acute MI. Thrombolysed patients have less complications compared to non-thrombolysed patients. Streptokinase administration is not associated with significant side effects. In-hospital acute MI related mortality is 11.5%. No significant gender associated mortality difference is noted. Majority of patients can be discharged after a one week hospital stay.

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