

## Gender differences in demographics, treatment and outcome of Thai patients with acute myocardial infarction at King Chulalongkorn Memorial Hospital

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**Background** : *To determine whether there are gender differences in the demographics, treatment and clinical outcome of Thai patients with acute myocardial infarction in King Chulalongkorn Memorial Hospital. We examined data from consecutive acute myocardial infarction patients who were admitted with between January 1993 and December 1995.*

**Methods** : *We reviewed the clinical and laboratory data from each acute myocardial infarction patient in the hospital. The variables including demographics, type of medical therapy and procedures, length of hospital stay and clinical outcome (death and cause of death).*

**Results** : *In comparison with Thai men (n = 217), women experiencing acute myocardial infarction (n = 84) in King Chulalongkorn Memorial Hospital were older (mean  $\pm$  SD, 69.7  $\pm$  10.0 vs. 60.3  $\pm$  12.2 year), with 98.8 % of them older than 50 years (compared with 77.0 % of men,  $p < 0.001$ ). Women had more diabetes (46.9 % vs. 27.9 %,  $p < 0.001$ ) but did less smoking (21.9 % vs. 70.0 %,  $p < 0.001$ ). Thai female patients presented with cardiogenic*

*shock (Killip class 4) more often than males did (18.8 % vs. 9.7 %,  $p = 0.03$ ). Treatment with thrombolytic therapy was less frequent in women (20.1 % vs. 32.8 %,  $p = 0.06$ ) with the same reperfusion rates and tended to have higher in-hospital mortality rates than men (22.3 % vs. 18.3%,  $p = 0.42$ ).*

**Conclusions** : *Our data documents important gender differences in demographics, treatment and outcome of acute myocardial infarction in Thai patients. These findings may be useful for further improvement of gender-oriented prevention, health promotion and treatment.*

**Key words** : *Gender differences, Acute myocardial infarction, Thai.*

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**วัตถุประสงค์** : เพื่อศึกษาความแตกต่างในเรื่องลักษณะทางคลินิก การรักษา และผลการรักษา  
ของผู้ป่วยกล้ามเนื้อหัวใจตายชายและหญิงในโรงพยาบาลจุฬาลงกรณ์

**วิธีการ** : ได้เก็บข้อมูลผู้ป่วยทุกรายที่รับไว้ในโรงพยาบาลจุฬาลงกรณ์ด้วยโรคกล้ามเนื้อหัวใจ  
ตายตั้งแต่ มกราคม พ.ศ. 2536 ถึง ธันวาคม พ.ศ. 2538 และวิเคราะห์ลักษณะทาง  
คลินิก การรักษา และผลการรักษาโดยวิธีสถิติเชิงพรรณนา

**ผลการศึกษา** : เปรียบเทียบผู้ป่วยชายไทย 217 ราย กับผู้หญิงไทย 84 รายที่เป็นโรคกล้ามเนื้อ  
หัวใจตายเฉียบพลันที่มาโรงพยาบาลจุฬาลงกรณ์ พบว่าผู้ป่วยหญิงมีอายุมากกว่า  
(mean  $\pm$  SD, 69.7  $\pm$  10.0 vs. 60.3  $\pm$  12.2 ปี) ผู้ป่วยหญิงที่อายุมากกว่า 50 ปี มี  
ถึง 98.8 % เทียบกับผู้ป่วยชาย 77.0 % ( $p < 0.001$ ) ผู้ป่วยหญิงเป็นเบาหวานมาก  
กว่า (46.9 % กับ 27.9 %,  $p < 0.001$ ) และผู้ป่วยหญิงสูบบุหรี่น้อยกว่าผู้ป่วยชาย  
(21.9 % กับ 70.0 %,  $p < 0.001$ ) ผู้ป่วยหญิงมาโรงพยาบาลด้วยอาการช็อค (Killip  
class IV) มากกว่าผู้ชาย (18.8 % กับ 9.7 %,  $p < 0.03$ ) ผู้ป่วยหญิงมีแนวโน้มที่จะ  
ได้ยา thrombolytic น้อยกว่า (20.1 % กับ 32.8 %,  $p < 0.06$ ) แม้ว่าผลการรักษา  
ด้วย thrombolytic (reperfusion rate) ไม่ต่างกัน นอกจากนี้พบว่าผู้ป่วยหญิงมีอัตราการ  
การตายในโรงพยาบาลสูงกว่าผู้ป่วยชาย แต่ไม่มีนัยสำคัญทางสถิติ (22.3 % กับ  
18.3 %,  $p = 0.42$ )

**สรุป** : ลักษณะทางคลินิก การรักษา และผลการรักษาแตกต่างกันในผู้ป่วยโรคกล้ามเนื้อ  
หัวใจตายเฉียบพลันหญิงและชาย ข้อมูลเบื้องต้นคงมีประโยชน์ในการวางแผนการ  
รักษา และป้องกันโรคในอนาคต โดยเฉพาะในผู้หญิงไทย

Recent attention has increasingly been focused on the gender difference in various aspects of coronary artery disease, especially acute myocardial infarction (MI).<sup>(1-4)</sup> Several studies demonstrated that men have a better outcome in both placebo and thrombolytic therapy groups.<sup>(5-7)</sup> Many factors such as older age, severity of the disease, or higher prevalences of other medical illness in women have been proposed to be the causes of this adverse outcome,<sup>(8)</sup> including the high mortality rate of coronary artery disease in women in the United States.

In Thailand, coronary artery disease is one of the leading causes of death in adults. There have been several reports on acute MI in this country during the last decade.<sup>(9-16)</sup> However, only little epidemiological data has become available since 1990<sup>(17-18)</sup> and none was directly related to acute myocardial infarction in Thai women as compared with men. The present study describes gender differences in demographics, treatment and in hospital outcome in patients with acute MI admitted to King Chulalongkorn Memorial Hospital, a 1,500 – bed medical center affiliated with Chulalongkorn University in Bangkok, Thailand.

#### Materials and Methods

The inpatient medical records of consecutive acute MI patients admitted to the hospital were individually reviewed. They were validated according to standard diagnostic criteria, including clinical history of prolonged angina chest pain not relieved by rest or nitrates; serial electrocardiographic (ECG) tracings showing ST segment changes or Q wave (or both) consistent with acute MI; elevation of serum total and creatine kinase – MB (CKMB) exceeding two times of the upper limit of normal levels. For study

inclusion, a minimum of two out of these three criteria needed to be satisfied. Onset of chest pain was defined as the time when chest pain became prolonged or intensified enough to cause the patient to go to the hospital. Time to presentation was defined as the time that the patient arrived at our hospital or the referral hospital. Acute MI was classified as Q wave (anterior and inferior), non – Q wave and LBBB MI according to the ECG findings. The criteria for successful reperfusion were : > 50 % decrease in ST segments elevation of acute myocardial injury ECG pattern without angina chest pain, reperfusion arrhythmia observed within 90 min, after revascularization intervention or early peak of CKMB.

Differences in the clinical and demographic data between men and women with acute MI were examined using t – tests for continuous variables and chi - square tests for categorical variables.

#### Results

Between January 1993 and December 1995, 217 male and 84 female acute MI patients were treated. There was no obvious seasonal variation in the numbers of cases among both genders (Figure 1). The peak prevalence of cases in men was in January (winter) and women in May (rainy season). As noted in table 1 , the mean age of the female patients was 9 years older than the males ( $69.7 \pm 10$  vs.  $60.3 \pm 12$  years,  $p < 0.001$ ). Only 1.2 % of the women were younger than 50 years old whereas 23 % of the men were ( $p < 0.001$ ) and nearly half of the women, compared with one – fifth of the men, were older than 70 years old ( $p < 0.001$ ). About 15 % of all patients were referred from hospitals in Bangkok or nearby. Time from onset of chest pain to hospital presentation

was quite long and not different in the genders ( $2,011.2 \pm 2,525.7$  range from 10 to 20,160 vs.  $2,070 \pm 2,784.1$  range from 30 to 10,080 minutes respectively). Female patients presented with cardiogenic shock twice as often as males (18.8 % vs. 9.7 %,  $p = 0.03$ ). Female patients also stayed in the hospital a few days longer than males ( $16.5 \pm 14.5$  vs.  $14.2 \pm 11.5$  days  $p = 0.09$ ). Regarding coronary artery disease (CAD) risk factors, diabetes mellitus was about twice more common in the female patients (46.9 vs. 27.9 %,  $p < 0.001$ ), but smoking was over three times more common in males (70 vs. 21.9,  $p < 0.001$ ). The prevalence of a family history of CAD was quite low in both groups (1.3 vs. 1.8 %, NS). The ECG finding of acute MI were Q wave MI in 81.8 % of the males vs. 76.1 % of the females. Non - Q wave 17.7 % vs. 19 % and new left bundle branch block 0.5 % vs. 4.8 %, respectively. (Table 2) There was no significant difference in numbers of patients with acute Q wave and non - Q wave MI among women and men but women were more likely to present with new left bundle branch block MI ( $p < 0.01$ )

The treatments of acute MI, including oral

or intravenous drugs, intravascular devices and interventional procedures, were similar in men and women. (Table 3) However, thrombolytic therapy was more commonly used in men than women (32.8 vs. 20.6 %,  $p = 0.06$ ) without any difference in time from onset of chest pain to needle and in reperfusion rate. The reasons for no thrombolytic therapy in both genders were late presentation in about half of the patients and missed diagnosis and contraindication for thrombolytic therapy for the remainder.

Even though there were no significant gender-based mortality rate differences with thrombolytic therapy, without thrombolytic therapy, with Q wave and with non - Q wave MI groups, women had more of a tendency toward increased overall in - hospital mortality than men (22.3 vs. 18.3 %, NS). (Table 4) However, male patients with thrombolytic therapy had a lower mortality rate than those without it (8.6 vs. 29.4 %,  $p = 0.0019$ ) whereas female patients lost this significant benefit from thrombolytic therapy. In the female group, the non - Q wave MI seemed to have better outcome than Q wave MI (mortality rates of 6.3 vs. 26.5 % respectively,  $p < 0.08$ ).

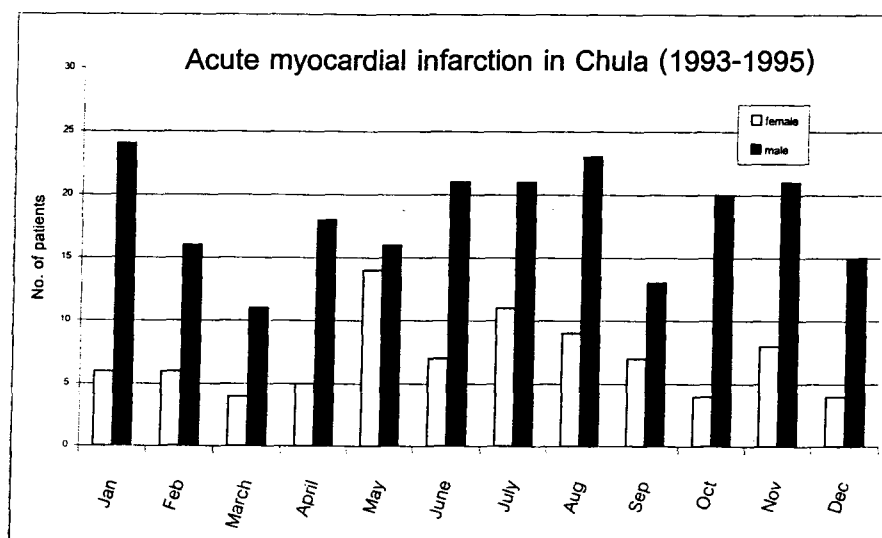


Figure 1. Numbers of acute myocardial infarction male and female patients according to month in the year 1993 to 1995.

Table 1. Demographics in selected characteristics in patients with acute myocardial infarction.

	Men (n = 217)	Women (n = 84)	p Value
Age (yr, mean $\pm$ SD)	60.3 $\pm$ 12	69.7 $\pm$ 10	< 0.001
Age group, No. (%)			
25 – 50 yr	50 (23.0)	1 (1.2)	
51 – 60 yr	61 (28.1)	14 (16.7)	
61 – 70 yr	59 (27.2)	31 (36.9)	
> 70 yr	47 (21.7)	38 (45.2)	< 0.001
Chest pain onset to presentation, min.	2011.2 $\pm$ 2525.7	2070.6 $\pm$ 2784.1	NS
Refer from other hospital, No. (%)	12 (14.1)	32 (14.6)	NS
Hospital stay (days, mean $\pm$ SD)	14.2 $\pm$ 11.5	16.5 $\pm$ 14.5	0.09
CAD risk factors, (%)			
Diabetes mellitus	27.9	46.9	< 0.001
Hypertension	39.5	42.2	NS
Hypercholesterolemia	48.7 (n = 199)	50.0 (n = 72)	NS
Smoking	70.0	21.9	< 0.001
Family history of CAD	1.3	1.8	NS
Prior CAD, (%)	33.0	37.0	NS
Killip Class, No. (%)			
4 (cardiogenic shock)	21 (9.7)	16 (18.8)	-
1 – 3	196 (90.3)	69 (81.2)	0.03
LV ejection fraction, mean $\pm$ SD (No.)	46.1 $\pm$ 14.6 (146)	41.9 $\pm$ 15.3 (54)	0.04

CAD, coronary artery disease; LV, left ventricle; NS, not statistically significant.

Table 2. Classification of acute myocardial infarction according to serial electrocardiogram.

	Men (n = 215)	Women (n = 84)	p Value
Acute myocardial infarction			
Q wave MI, No. (%)	176 (81.8)	64 (76.1)	0.08
Anterior wall, No.	105	38	-
Inferior wall, No.	71	26	-
With RV infarction, No.	2	2	-
With Posterior infarction, No.	6	0	-
Non Q wave MI, No. (%)	38 (17.7)	16 (19)	NS
Left Bundle Branch Block, No. (%)	1 (0.5)	4 (4.8)	< 0.01

RV indicate right ventricle; NS, not statistically significant.

Table 3. Treatment of acute myocardial infarction patients.

	Men	Women	p Value
	(n = 215)	(n = 84)	
Thrombolytic therapy, No./Q MI (%)	58/177 (32.8)	14/68 (20.6)	0.06
Streptokinase	55	14	-
r-tPA	3	0	NS
Time from chest pain onset to needle (min, mean $\pm$ SD)	121.8 $\pm$ 95.9	103.8 $\pm$ 62.4	NS
Reperfusion, No. (%)	37 (68.5)	8 (66.7)	NS
Aspirin, No. (%)	211 (96.3)	77 (90.6)	NS
Intravenous nitroglycerin , No. (%)	176 (80.4)	65 (76.5)	NS
Intravenous heparin, No. (%)	74 (33.8)	23 (27.1)	NS
$\beta$ - blocker, No. (%)	60 (27.4)	25 (29.4)	NS
Calcium channel blocker , No. (%)	15 (6.8)	6 (7.1)	NS
Intravenous nitroglycerin, No. (%)	176 (80.4)	65 (76.5)	NS
ACE – Inhibitors, No. (%)	70 (32.1)	20 (23.8)	NS
Temporary pace maker, No. (%)	22 (10.1)	10 (11.8)	NS
IABP, No. (%)	9 (4.1)	4 (4.8)	NS
Primary PTCA, No. (%)	17 (7.8)	3 (3.6)	NS
Emergency CABG, No. (%)	6 (2.7)	2 (2.3)	NS

No./Q MI, No. of thrombolytic therapy cases/ No. of Q wave MI plus left bundle branch block MI cases; r-tPA, recombinant tissue plasminogen activator; ACE – Inhibitors, angiotensin converting enzyme inhibitors; IABP, intraaortic balloon counterpulsation; CABG , coronary arterial bypass graft; NS, not statistically significant.

Table 4. Mortality of acute myocardial infarction patients.

	Men	Women	p Value
	(n = 215)	(n = 84)	
In – hospital mortality, No. (%)	40 (18.3)	19 (22.3)	NS
Cardiac death, No.	31	14	NS
Arrhythmic death, No.	22	8	NS
In – hospital mortality, No. (%)			
With thrombolytic	5 (8.6)*	3 (21.4)	NS
Without thrombolytic	35 (29.4)*	16 (29.6)	NS
In – hospital mortality, No. (%)			
Non Q wave MI	7 (18.4)	1 (6.3) #	NS
Q wave MI	33 (18.6)	18 (26.5) #	NS

\* p = 0.0019, # p = 0.08

## Discussion

Our data showed the gender differences in demographics, treatment and outcome of acute MI patients in our hospital. Women patients were older, more likely to have diabetes and less likely to be smokers than men, the same features found in the western world<sup>(19-20)</sup> whereas there were no differences in other coronary artery disease risk factors among Thai male and female patients. A positive family history of coronary artery disease as a risk factor for coronary heart disease in Europeans and Americans<sup>(21-23)</sup> was found in about 62 – 76 % of the female acute MI patients and 62 % in the males. Surprisingly, only 1.3 % of the male and 1.8 % of the female patients in this study had family histories of coronary artery disease in their first – degree relatives. Further study should be conducted to confirm this finding. However, this data suggests that environmental factors may play the more major roles in the pathogenesis of acute MI in Thai patients. These include hypercholesterolemia, hypertension, smoking in Thai males and diabetes in Thai females. Thai women, especially those of older age, have a common lifestyle of less physical activity and exercise than men and a tendency to become over – weight after middle – age. These differences in lifestyle may contribute to increase the incidence of diabetes among Thai women.

Women presented to our hospital with cardiogenic shock (Killip class 4) twice as often as men (18.8 vs. 9.7 % respectively) whereas in the western world, the prevalence of Killip class 4 is only 0.9 – 1.9 % in women and 0.4 – 1.6 % in men,<sup>(19-20)</sup> and women in those countries and are more likely to present

with congestive heart failure (Killip class 2) than men (14 – 21.4 % vs. 9.3 – 15.4 %, respectively)<sup>(19-20)</sup> but we found no difference in prevalence of Killip class 2 among women and men (21.2 vs. 22.1 %, respectively). This may be due to the higher prevalence of diabetes (especially in women), very late presentation and other unidentified factors in our patients.

Seventy five of the 215 males (34.8 %) and 17 of the 84 female patients (20.2 %) received thrombolytic therapy and primary PTCA as the initial treatment, comparable to 34 % male and 23.6 % female patients receiving thrombolytic and alternative reperfusion strategy in the US National Registry of Myocardial Infarction 2 database.<sup>(20)</sup> Because of a trend toward an increased utility of thrombolytic therapy in male patients and significantly decreased in – hospital mortality rates in males with thrombolytic therapy, the total mortality rate in male Q wave MI patients tended to decrease, compared to females (Table 4). However, this observation is not true in non – Q wave MI where female patients seemed to have better outcomes than males in terms of in – hospital mortality (6.3 vs. 18.4 % respectively). Further investigations are needed before we can make any conclusion on these findings.

## Conclusions

Our data documents important gender differences in demographics, treatment and outcome of acute myocardial infarction in Thai patients. These findings may be useful for future improvement of gender – oriented prevention, health promotion and treatment.



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