GENDER DIFFERENCES IN PRESENTATION OF ACUTE MYOCARDIAL INFARCTION

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ABSTRACT

Objective: The purpose of this study was to determine the gender differences in the Presentation of Acute Myocardial Infarction.

Design: Observational study.

Setting: National Institute of Cardiovascular Diseases - Karachi, study was carried outfrom 1st Sept. 2006 to 31st December 2006.

Method: Consecutive 1008 patients were included in this study with definite evidence of first episode of AMI.

Results: There were 758 (75.1%) men and 250 (24.8%) women. Women were on average 7 years older than the men (58 vs 51 years, p=<0.01). 13% of female patients were menstruating while 87% were non-menstruating. 9.3% of our patients were under the age of 40 years. 13% of women and 9% of men were obese. Women more frequently had hypertension (67% vs 37%, p=<0.001), DM (38% vs 22%, p=<0.001). More of the men were cigarette smokers (60% vs 8%, p = <0.001). Women had more in-hospital complications (38% vs 25%, p= <0.01), and mortality (13.4% vs 5.5%, p = <0.001). Women were less likely than men to be eligible for thrombolytic therapy (54% vs 77%).

Conclusion: These results indicates that women were 6 years older than men presented with AMI and more likely to have hypertension, DM and Pre-infarction angina. The in-hospital complication and mortality were higher in female patients than male. Less women were elegible for thrombolytic theropy on arrival compared to men.

Key Words: Acute myocardial infarction, Women.

INTRODUCTION

Despite impressive advances in diagnosis and management over the past three decades, acute myocardial infarction continues to be a major health problem in the industrialized world and is becoming an increasingly important problem in developing countries[1]. In the United States nearly 1.0 million patients annually suffer from acute myocardial infarction. More than 1.0 million patients with suspected AMI are admitted yearly to coronary care unit in the United States[2].

Coronary artery disease is the most common cause of death in women as well as men all over the world. In American women is the leading cause of death and a significant cause of morbidity[3]. In the United States coronary artery disease specially the MI claims approximately 1 out of 3 deaths, making nearly 600,000 deaths each year[4,5,6]. Of the 250,000 annual deaths from CAD in women, 100,000 occur in women younger than 65 years of age. Even in pre-menopausal women death from CAD is almost equal to that from breast cancer[7,8]. Early mortality following myocardial infarction in higher in women than in men[9,10,11]. And females are at a greater risk for both fatal and non-fatal complication than male[12]. In Framingham study, the 12 months mortality rate after a recognized myocardial infraction was 34% for women compared with 19% for men.[13]

Previously we were lacking the data about the frequency of AMI in women and its in hospital complications in both sex. This data provides us predictors of high risk population by which we can manage this group in better way and laying down better guidance for medical professionals.

MATERIAL AND METHODS

The present prospective study was carried out from 1st Sept. 2006 to 31st December 2006, at the National Institute of Cardiovascular Diseases (Karachi). Consecutive 1008 patients admitted to coronary care unit or medical wards through emergency room, with a first episode of AMI were included in the study. There were 758 men and 250 women. The diagnosis of AMI was based on WHO (1971) criteria i.e. a clinical history of central chest pressure, pain or tightness lasting 30 minutes or more along with the development of characteristic serial ECG changes; Q/QS with major ST / or T wave abnormalities, dynamic ST depression or elevation, or dynamic T wave changes on comparison of two recent ECG and /or elevation of cardiac enzymes level to at least one and half to twice the upper limit of normal Patients not fulfilling the WHO criteria of AMI, having previous history of MI or ECG showed significant Q wave, h/o Coronary artery bypass surgery, or prosthetic heart valve replacement / Congenital or valvular heart disease, LBBB and having cardiomyopathies were excluded from the study.

A detailed history was taken from each patient at the time of admission. A summary of daily clinical events vital signs, standard 12 lead ECG interpretation, routine laboratory tests, procedures, complications, and medication were recorded from the patients progress sheet, at the time of admission and throughout the course of hospitalization.

Patients admitted as AMI, their final diagnosis had made at discharge or death, based on serial cardiac enzymes, ECG, and if needed echocardiography.

RESULTS

A total of 1008 were included in the study with the definite evidence of first episode of AMI. There were 758 (75.1%) male and 250 (24.8%) female, with a male and female ratio of 3.02%.

PATIENTS CHARACTERISTICS

AGE AND SEX

Women were 7 years older than men, with mean age of 58 ± 11 (years) and 51 ± 11 (yrs) ($p < 0.001$), respectively. The ratio of women to men increased from 1:3 in patients < 40 years of age to 1:0.3 in patients > 70 years of age. In the age range of 50 - 59 years, the ratio of women to men became equal, .

PULSE AND BP

The mean pulse (per min) was significantly higher in female than male (86 ± 13.1 vs 81 ± 11.7, $p = < 0.001$). The mean SBP (mm Hg) was higher in female than male, while DBP (mm Hg) was statistically not different among gender.

OCCUPATION

In 250 female patients, 238 (95%) were house wives, while 8 (3%) were working women and rest of 4 (<2%) women were retired professionals. In male patient, 31% belonged to professional class, 23% were businessman, 22% manual workers, and 22% retired, while 2% were jobless.

RISK FACTORS PROFILE

Women smokers were less in number than men smoker (8% vs 60%, $p = < 0.001$), while tobacco chewing was more common in female than male (23% vs 10%, $p = <0.001$). 7% of female and 24% male patients were non smoker.

The proportion of patients experiencing no pre-infarction angina, angina of recent onset was more common in women than men (17% vs 7%, $p = <0.01$).

Hypertension was more common in women than men (67% vs 37%, $P = 0.001$), The incidence of DM was also significantly more common in women than men (38% vs 22%, $p = <0.001$), while family history of IHD was more common in male than female patients (17% vs 11%, $p = <0.05$).

TYPE OF INFARCTION

There were no significant difference among gender in Q-wave and non Q-wave infarction, although the incidence of Q-wave infarction was more common than non Q-wave. Women were more likely to have non Q-wave MI as a discharge diagnosis (20% vs 16%, p = NS), while men were more likely than women to manifest Q-wave infarction (86% vs 82%,

P = NS), but statistically not significant.

LAB INVESTIGATIONS

The peak level of CK-MB, SGOT and LDH were not significantly different among gender. The mean serum cholesterol levels were higher than normal in both groups, but statistically not significant. The level of HDL, LDL and triglycerides were not different among gender, although they were higher than their normal range.

THERAPEUTIC AGENT USED

The SK therapy was given more in male patients than female (30% vs 11%, p = <0.001). The overall SK therapy was given in only 26% of patients, 46% did not get SK therapy, while in 28% of patients, it was not indicated.

MORTALITY

Mortality of hospitalized patients with AMI was higher in women than men (13.4% vs 5.3%, p = <0.01). Mortality was 36% on the same day in women and 22% in men.

FIG 1 - MEAN AGE AMONG AMI PATIENTS (n = 1008)

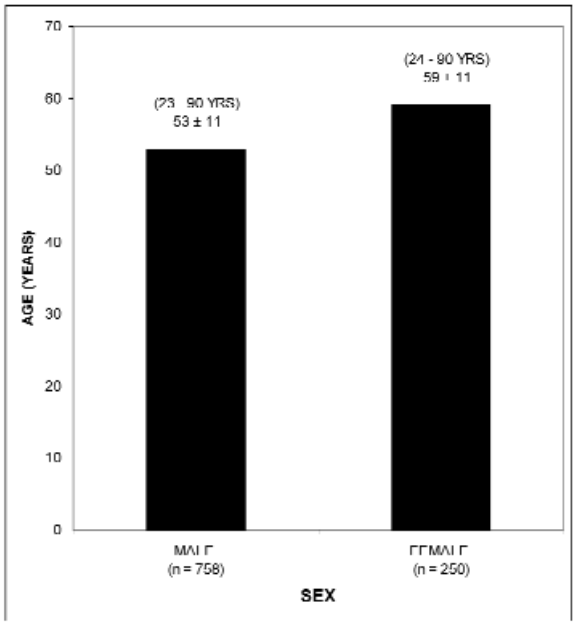
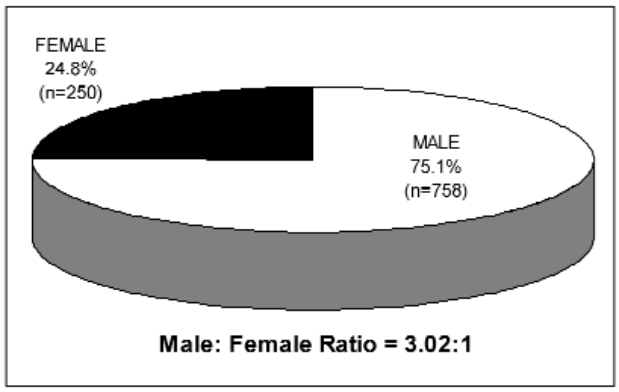


FIG 2 - SEX DISTRIBUTION AMONG AMI PATIENTS (n = 1008)



The mean age of the patient expired was higher as compared to live patients (62 + 10.5 vs 54.3 + 11, p = 0.01). The DM was identified as features associated with a higher mortality rate (10.4% vs 5.5%), p = <0.01. The death rate was higher in those who did not receive SK therapy (9% vs 3.6%, p = <0.01),

COMPARATIVE PROFILE OF MENSTRUATING AND NON-MENSTRUATING WOMEN WITH AMI

AMI was less common in menstruating women (13%) than non menstruating (8%). There were 33 women with history of menstruation with mean age of 40 ± 5.4 years, and 217 were non-menstruating with mean age of 62 ± 8.5 years There were no differences in weight, height, BMI and duration of hospital stay among both groups. The history of pre-infraction angina and DM were more common an statistically significant in menstruating than non-menstruating women. The site of infarction was not different among both groups. The incidence of complication were more in non-menstruating women than menstruating (40% vs 22%, p = <0.01). SK therapy was given more in menstruating women (20.5%) than non-menstruating (9.8%). Mortality was higher in non-menstruating women than menstruating women, but statistically not significant (16% vs 11%, p = NS). In relation to BMI with mortality, BMI was significantly higher in menstruating women than non-menstruating (29.8 ± 1.6 vs 25.5 ± 3.8, p = <0.01).

DISCUSSION

Coronary artery disease, leading cause of death in the US, has decreased among men in the last decade, but evidence suggests that it is becoming increasingly prevalent in women. The incidence of CAD peaks about a decade later in women than in men. After age 40, it is the leading cause of death in women and by age 70, the incidence is equivalent to that in men. Women have a worse prognosis after MI than do men, with both a higher incidence of early and late mortality and a higher incidence of re-infarction.[14,15]

It has been mentioned that IHD is on the increase in the developing countries[16,17,18] and more so in Pakistan[19,20,21,22]. In the early 1950s and 1960s, sporadic reports from different hospital of Pakistan, showed a gradual increase in the admission of CAD patients. In 1962, Pirzada et al showed that only 7 patients were admitted during 1944 and 1948 with the diagnosis of IHD including AMI. This number increased to 53 during 1949 to 1953. In 1954 to 1956, two hundred and nineteen admissions were IHD including AMI. The total increased in incidence between 1944 and 1948 was 1.7% whereas it 1966 increased to 37.8%[23].

After 20 years of these reports, Samad et al 1995 reported that, the incidence of CAD has increased even further and it has reached up to 74% in 1987. In the present study, the incidence of CAD remains high i.e. 73%.

Although CAD is the most common cause of death in women, its greater prevalence in men has tended to lead to an underestimate of the extent of the problem in women[24]. In the present study, a large number of consecutive MI patients were enrolled, including 758 male and 250 female. Virtually all studies reported in our country to date have included fewer women than men.

There is gender related difference in the incidence of CAD. The incidence of CAD was less common in women as compared to men, but the trend has now changed as shown in table. In the present study, the incidence of CAD was increased in female and male - female ratio stands at 3.02:1. Furthermore, in patients with AMI, the sex ratio becomes equal at 50 - 59 years and reverses after the age of 60 years.

In the GISSI-II trial, 19.9% patients were female. In ISIS-III and IV trials, female were 27% and 26% respectively. In the present study, 23% were female patients with AMI. So the incidence of AMI in female patients was not different in our population, compared with western population.

In contrast to some western data, the highest incidence of AMI in our population was fifth and sixth decade, while western data showed the highest incidence in sixth and seventh decade, i.e. they presented a decade later than our population[14,24].

Tofler et al, 1987, evaluated data from the Multi centre Investigation of the Limitation of Infarct Size (MILIS), and reported that women with MI on average were 4 years older than men. IN Framingham Heart Study, women were 7 year older than men at the time of recognized MI[25]. In the present study, women were 6 years older than men who presented with MI.

The incidence of AMI in the younger Pakistani population is higher than that of western population. It has been appreciated that right from the early studies in Pakistan, a considerable percentage of AMI patients were very young with 7.3% to 21% of all cases studied being below 40 years of age[21]. In the early reports by Pirzada et al 1962, showed the incidence of AMI under 40 years of age was higher and about 11.2%, while Beg et al 1967, reported as 19.3%. The incidence of AMI, in younger population in UK was 3.5% and 5.3% in USA. In the present study the incidence of AMI under 40 years of age was 7.3%, which was comparatively still higher than the western data.

In the present study, the youngest male patients was 22 years of age and youngest female patient 26 years of age. Faruqui et al, 1983 reported the youngest female patient's age was 21 years and that of youngest male 22 years.

The incidence of AMI is also increasing in menstruating women. In the Framingham Heart Study, MI was found in only 0.19 per 1000 menstruating women. In Sweden, Bengtsson in 1973 found 0.03 per 1000 annual incidence of MI in women age 35 - 38 years. In 1976, Morris et al, showed 24 instance of female below forty years

having MI amongst 5158 patients over a period of 7 years. In the present study, the incidence of AMI in menstruating women was 11% which was significantly higher as compared to western reports. It has been pointed out by various studies that atherosclerotic CAD in younger menstruating female is almost always associated with one or more major risk factor[25].

TABLE - SEX RATIO OF CAD IN PAKISTAN

AUTHOR	YEAR	M: F RATIO
Pirzada et al	1962	6 : 1
Beg et al	1967	6.1 : 1
Khan et al	1973	6.5 : 1
Samad et al	1993	4.3 : 1
Memon et al	1994	3.4 : 1

In the present study, DM was a major risk factor common in menstruating women (41% vs. 33%, $p<0.05$) that in non-menstruating women.

CONCLUSION

The incidence of CAD has been increasing among both gender and more so among females. The male - female ratio of 6:1 in 1967 has increased to 3.4:1 in 2000 and now 3.02:1. In AMI, the M:F ratio becomes equal (1:1) at the age of 50 - 60 years, and reverses at more than 70 years of age (0:3:1). The incidence of AMI in women was 23%, which was comparatively same with western data. The highest incidence of AMI was seen in 5th and 6th decade in our population, while western population presents a decade later than our population.

Women were 6 years older than men, presented with MI, while in Framingham Heart Study; women were 7 year older than men at the time of recognized MI. The incidence of AMI under 40 years of age was significantly higher compared to western data.

Less female patients reach the hospital within 6 hours of onset of symptoms than male patients. Smoking was the leading risk factor in male patients. Hypertension, DM and pre-infarction angina were the major risk factor in women. Family history of IHD was more common in male patients than females.

REFERENCES

1. Chockalingam A, Balaguer-Vintro I: Impending Global Pandemic of cardiovascular Diseases; challenges and opportunities for the prevention and control of cardiovascular diseases in developing countries and economic in transition. Barcelona, Prous Science 1999.

2. American Heart Association: 1999 Heart and Stroke Statistical update. Dallas. American Heart Association, 1998.

3. Mosca L, Grundy SM, Judelson D, King K, Limacher M, Oparil S, et al. Guide to preventive cardiology for women. Circulation 1999; 99:2480-84.

4. Manson JE, Tostenson H, Ridker PM, Satterfield S, Hebert P, O'Connor GT et al. The Primary prevention of myocardial infarction. N Engl J Med 1992; 326: 1406-16.

5. Solymoss BC, Marcil M, Wesolowska E, Gilfix BM, Lesperance J, Campeau L. Relation of coronary artery disease in women <60 years of age to the combined elevation of serum lipoprotein (a) & T. cholesterol to HDL cholesterol. Am J Cardiol 1993; 72: 1215-19.

6. Kannel WB, Thom TJ. Incidence, prevalence & mortality of cardiovascular diseases. The heart Incidence, prevalence & Mortality of cardiovascular diseases. The heart 1994; 8th ed.: 185–197

7. La Rosa JC. Some aspects of coronary risk & prevention factor in women. Proceedings of an NHLBI conference 1993: 31-35

8. Eaker ED, Chesebro JH, Sacks FM, Wenger NK, Wisnant, Winston M. Cardiovascular disease in women. Circulation 1993; 88: 1999-2009

9. Greenland P, Reiss HR, Gold Bourt U, Behar S, In hospital & one year mortality is 1, 524 women after Myocardial infraction, comparison with 4, 315 men. Circulation 1991;83: 484-91

10. Tofler GH, Stone PH, Muller JE, Willich SN, Davis VG, Poole WK, et al. Effect of gender &

race on prognosis after myocardial infarction adverse prognosis for Women particularly black Women. J Am coll cardiol 1987; 9: 473-82

11. Wenger NK, Speroff L, Packard B. Cardiovascular health & disease in women N Eng J Med 1993; 329: 247-56.

12. Weaver WD, White HD, Wilcox RG, Aylward EP, Morris D, Guerci A, et al. Compression of characteristics & out come among women and man with acute myocardial infraction death of with thrombolytic therapy. GUSTO-I Investigators; JAMA 1996; 275:777-82

13. Kannel WB, Sorlie P, Mc Namara PM. Prognosis after initial MI Framingham study. Am J Cardiol 1979; 44:53-59.

14. Kannel WB, Sorlie P, Me Namara PM. Progress after initial Myocardial infarction: The framingham Study. Am J Cardiol 1979: 44; 53-59.

15. Mc Anally, Corn Cr, Hamilton SF. Aspirin for the Prevention of vascular death in women. Ann Pharmacother 1992: 26:1530-1537.

16. Fox KM, Heart Disease in Asian in Britain. Br Med J 1998: 297: 311-312.

17. Ramaya KL, Swai ABM, Malarty DG. Prevalence of Diabetes and Cardiovascular disease risk factor in Hindu Indian Sub-communities of Tanzania. Br Med J. 1991: 303: 271-276.

18. Enas EA, Yusuf S, Meht JL. Prevalence of coronary artery disease in Asian Indian. Am J Cardiol 1992: 70: 945-949.

19. Pirzada MA, Khan AH, Coronary heart disease in West Pakistan Pak J Med REs 1962:2:9:37.

20. Raza M, Syed SA, Ischemic heart disease in Pakistan. Pak Heart J 1972:5:68 - 67.

21. Faruqui AMA, Heart disease in South Asia: Experience in Pakistan, Clinical essays on the heart. J W Hurts Part IV, Heart disease and geography 1983:1:313 - 338

22. Samad A, Memon MA, Arif M. Analysis of one year mortality of cardiovascular disease. Pak J Cardiol 1995:6:3 - 11.

23. Beg MA, Siddiqui MK, Abbasi AS. Atherosclerosis in Karachi. A retrospective study of coronary heart disease in cardiac admissions. J Pak Med Asso 1967:17:236 - 244.

24. Tofler GH, Stone PH, Muller JE, et al. Effect of gender and race on prognosis after myocardial infarction: adverse prognosis for women, particularly black women. J Am Coll Cardiol 1987:9:473 - 482.

25. Morris DC, Hurst JW, Lougue RB. Myocardial infarction in young women. Am j Cardiol 1976:38:299-304.