

Atypical Manifestations of Women Presenting with Myocardial Infarction at Tertiary Health Care Center: An Analytical Study

Neethu Maria Joseph, Lakshmi Ramamoorthy, Santhosh Satheesh¹

Departments of Medical Surgical Nursing, College of Nursing, JIPMER and Department of Cardiology, JIPMER, Puducherry, and ¹Cardiology, JIPMER, Puducherry, India

ABSTRACT

Introduction: Typical chest pain symptoms are the cause that requires individuals to seek out medical care in Acute coronary syndrome(ACS). Evidence suggests, symptoms labelled as ‘atypical’ is more common in women with ACS. The present study focuses on the need for the implementation of a gender specific approach in the current scenario by identifying gender based differences that exist in clinical presentations of the patients with ACS. Early identification of women’s prodromal and acute symptoms of Myocardial Infarction is an important step in provision of appropriate treatment modality. Present study focus on need for implementation of gender-specific approach in current scenario by identifying gender based differences that exist in risk factors, clinical manifestations in patients presenting with MI. Methodology: Cross- sectional analytical study was conducted among 240 Participants (120 males and 120 females). Both men and women diagnosed with MI, who survived, stabilized after admission was included in the study. Consecutive sampling technique was used to select the participants. Data was collected on risk factors profile, clinical manifestations by administering structured questionnaire.

Results: Risk factors such as history of diabetes, history of dyslipidemia was found to be homogenous among both men and women. 60% of men were ever smokers. Hypertension and known IHD was noted to be significant in women ($p < 0.002$, $p < 0.001$) but men presented with higher BMI ($p < 0.030$). Females increasingly presented with atypical presentations when compared to males ($p < 0.005$). Women commonly had squeezing and tightness type of pain and men reported tightness, burning, pricking type of pain ($p < 0.003$). The majority of the women reported the onset of pain occurrence between 6am to 12 pm($p < 0.004$), whereas men significantly reported the onset of pain between 12 am -6 am($p < 0.001$). **Conclusion:** Gender based differences in risk factors and clinical presentation in men and women with myocardial infarction had been a focus in researches that emphasized need for focused assessment for women as they increasingly presents with atypical symptoms. The current study also supports the need of a gender specific approach to avoid delay in diagnosis and care of them.

KEYWORDS: Acute coronary syndrome, clinical manifestations, gender differences in MI, myocardial infarction, risk factor

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INTRODUCTION

Cardiovascular diseases (CVDs) are a major threat to the living society as its growth is devastating since decades. Primarily, these diseases occur due to interaction of many risk factors that are associated with an individual and modification of lifestyle plays an important role in improving heart disease.

Coronary artery disease (CAD) develops as a result of plaque deposition within coronary arteries. Formation

Address for correspondence: Dr. Lakshmi Ramamoorthy, JIPMER, Puducherry, India. E-mail: laxmi_ramamoorthy@yahoo.com

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of blood clot can result due to rupture of plaque causing ischemic changes in myocardium.^[1] Myocardial infarction (MI) occurs as result of prolonged myocardial cell ischemia with involvement of myocardial necrosis. The statistics revealed by the WHO showed an estimation of 17.5 million people died with the cause of CVD, which constitutes about 31% of all global deaths, and cardiac diseases will be leading causes of disability.^[2-4]

Several studies have been conducted in analyzing the epidemiology and case fatality of MI to identify the declining trends of mortality in CVD.^[5] Evidence shows sex-specific patterns and a diverged trend in the incidence of MI with an increased incidence in women and elderly. The cardiovascular disease has perceived to be primarily concerned with men. However, mortality and morbidity of this disease are taking a leading role in women who constitute about 48% of Indian population. Women mostly present with atypical presentations, and higher index of suspicion is required while evaluating women with MI.^[6-8]

METHODOLOGY

Cross-sectional analytical study was done among 120 males and 120 females who were admitted with MI in a tertiary care center in south India for the period of 1 year to identify difference in clinical presentation of patients with MI between men and women.

Typical chest pain is defined as sensation of pain in chest, mostly in the retrosternal region with nature of either squeezing, pressing, tightness, burning, heaviness which is radiating to neck, shoulder, and left arm. Other than these symptoms such as dizziness, sweating, shortness of breath, vomiting, palpitation, fainting, back pain, and fatigue was considered as atypical chest pain in this study.

Sample size was calculated in “n master 2.0” by using proportion of atypical clinical features in male and female as 29% and 42%, and considering finite population of MI patients in our settings during study period to be 250, and relative precision of 20%, with power as 80%, it was calculated to be sample size of 120 in each arm including 5% attrition.

Inclusion criteria were both men and women diagnosed with MI, who survived and stabilized. Consecutive sampling technique was used to select the participants. Structured questionnaire was developed as data collection tool. The tool consisted section A which included sociodemographic data, section B included risk factor survey including body mass index (BMI), blood pressure (BP), nature of work, family history of CAD, level of physical exercise, dietary pattern, history

of smoking and alcoholism, comorbid illness. Section C included clinical presentation survey deals with description of pain, intensity of pain, location of pain, nature of pain, history of atypical presentation, time and circumstance of onset of pain. Permission was obtained from the Institute ethical committee, human studies, Reg. No: JIP/IEC/2016/1110. Ethical issues involved in the study were less than minimal risk. Informed consent was obtained from every participant after a brief explanation regarding the study by the investigator.

Statistical analysis

To compare the means of BP and weight, independent sample *t*-test was used. Chi-square/Fisher's exact test was used to compare the clinical characteristics, risk factors profile, location/nature of pain, and comparison of atypical manifestations. Mann–Whitney U-test was used for comparison of description of pain among men and women with MI.

RESULTS

The mean age of the participants was 54 versus 56 years among men and women. Groups were comparable in both systolic and diastolic pressure mean values. The male gender preponderance was noted in regard to higher BMI when compared to women ($P < 0.030$). Sedentary lifestyle pattern was prominent in women when compared to men which was significant at $P < 0.000$. The groups were found to be homogenous in other factors including family history of CAD, exercise pattern, dietary history, and previous history of MI [Table 1].

History of percutaneous coronary intervention, history of diabetes, and history of dyslipidemia were found to be homogenous among both men and women. Sixty percent of men were ever smokers. With regard to hypertension as comorbidity, there was increased frequency noted in

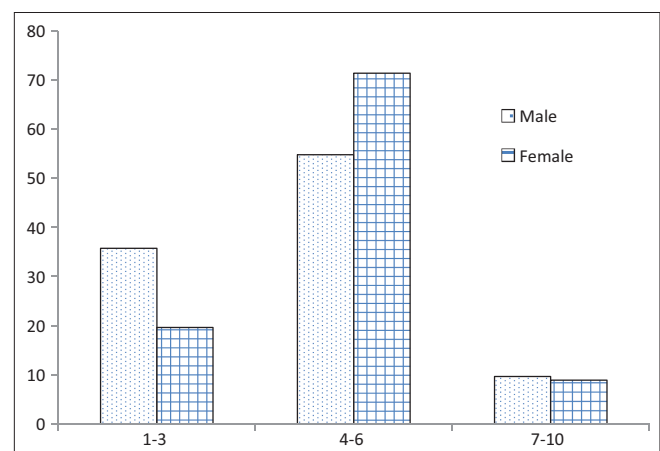


Figure 1: Comparison of intensity of pain among men and women with myocardial infarction # Mann–Whitney U-test, * $P < 0.05$. Numerical pain scale (scoring: 1–3 mild pain, 4–6 moderate pain, 7–10 severe pain)

Table 1: Clinical characteristics

Name of variables	Male (n=120), n (%)	Female (n=120), n (%)	P [#]
Age (years), mean±SD	54.8±10.04	56.8±9.84	0.107 [#]
Blood pressure			
Systolic BP	117.54±18.75	127.88±18.98	0.672 [#]
Diastolic BP	74.46±10.64	79.97±11.39	>0.995
Underweight	3 (2.5)	5 (4.2)	0.030 [*]
Normal weight	31 (25.8)	51 (42.5)	
Overweight	30 (25)	25 (20.8)	
Obese	56 (46.7)	39 (32.5)	
Sedentary lifestyle	53 (44.2)	103 (85.8)	<0.001 [§]
Family history of CAD	21 (17.5)	32 (26.7)	0.087 [§]
Previous MI	19 (15.8)	19 (15.8)	>0.995 [§]

[#]Independent sample *t*-test, ^{*}Fisher's exact test, [§]Chi square. SD: Standard deviation, BP: Blood pressure, MI: Myocardial infarction, CAD: Coronary artery disease

Table 2: Risk factor profile in both genders

Name of variable	Frequency (%)		P [#]
	Male (n=120), n (%)	Female (n=120), n (%)	
Smoking	72 (60)	0	<0.001 ^{**}
Hypertension	51 (42.5)	75 (62.5)	<0.001 ^{**}
Diabetes	53 (44.2)	65 (54.2)	0.121
Dyslipidemia	21 (17.5)	24 (20.0)	0.620
Prior PCI	8 (6.7)	2 (1.7)	0.053
Comorbid illness			
Known IHD	17 (14.2)	39 (32.5)	0.001 ^{**}
Co-morbidities [*]	103 (85.8)	81 (67.5)	
History of menopause		94 (78.3)	
History of hypertension during pregnancy		17 (14.2)	

[#]Chisquare test, ^{**}*P*<0.001, ^{*}Bronchial asthma, hypothyroidism, COPD. COPD: Chronic obstructive pulmonary disease, PCI: Percutaneous coronary intervention, IHD: Ischemic heart disease

Table 3: Comparison of location of pain among both genders with myocardial infarction

Name of variable	Frequency (%)		P [#]
	Male (n=115), n (%)	Female (n=112), n (%)	
Retrosternal radiating down left arm	27 (23.9)	27 (24.3)	0.284
Left upper chest	52 (46.0)	47 (42.3)	
Epigastric	11 (9.7)	11 (9.9)	
Upper chest, intrascapular	5 (4.4)	15 (12.6)	
Left shoulder down both arms	8 (7.1)	7 (6.3)	
Substernal radiating to neck and jaw	12 (8.8)	5 (4.5)	

[#]Chi-square test

women (*P* < 0.002). Furthermore, known ischemic heart disease was observed as comorbidity among women than men (*P* < 0.001). Further, 78.3% of female participants have attained menopause. Seventeen had hypertensive disorder during pregnancy, among them 70.6% had taken treatment regimen for hypertensive disorders [Table 2].

Location of pain during MI did not vary among men and women including typical symptom of retrosternal pain radiating down left arm (23.7% vs. 24.3%). Although no statistical significance was noted in relation to atypical symptom between the groups, the increased frequency of pain was noted in the upper chest and intrascapular region among women (12.6% vs. 4.4%) [Table 3].

The onset of pain was very abrupt for both men and women. Constant mild chest pain was predominantly reported by men when compared to women, 28.3% versus 15% (*P* < 0.011). About 85% of females were presented with atypical manifestations such as dizziness, sweating, shortness of breath, vomiting, palpitation, fainting, back pain, and fatigue (*P* < 0.005) compared to 70% in men (*P* < 0.005) [Table 4].

The groups were comparable in the perception of severe pain. However, women had more perception of moderate pain, whereas men had more perception of mild pain and overall, it was statistically significant at *P* < 0.032 [Figure 1].

Table 4: Comparison of description of pain among men and women with myocardial infarction (n=240)

Name of variable	Frequency (%)		P [#]
	Male (n=120), n (%)	Female (n=120), n (%)	
Very abruptly	43 (35.8)	54 (45)	0.092
Began gradually and reached peak within several minutes	4 (3.3)	3 (2.5)	0.368
Began gradually and reached its peak after 30 min	28 (23.3)	19 (15.8)	0.092
Constant mild chest pain	34 (28.3)	18 (15)	0.011*
On and off chest pain	6 (5.0)	18 (15)	0.111
No chest pain	5 (4.2)	8 (6.7)	0.21

#Mann-Whitney U-test, *P<0.05

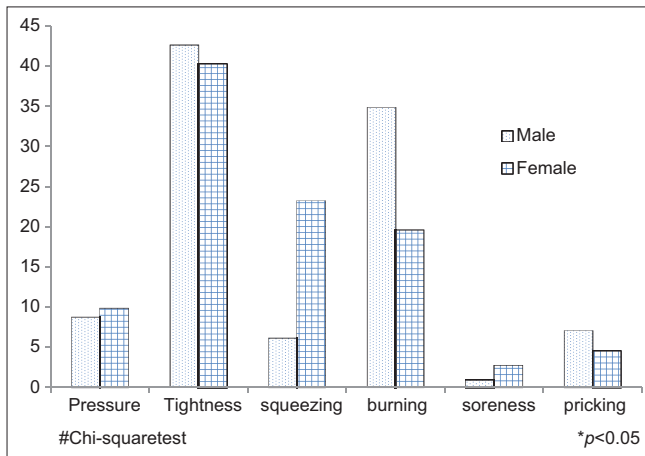


Figure 2: Comparison of nature of pain among men and women with

Majority of women reported the onset of pain occurrence between 6 am and 12 pm ($P < 0.004$), whereas men significantly reported the onset of pain during 12 am to 6 am ($P < 0.001$). Women commonly had squeezing (23.2%) and tightness (40.4%) type of pain whereas men reported tightness (42.6%), burning (34.8%), pricking (4.5%) type of pain which was statistically significant at $P < 0.003$ [Figures 2 and 3].

DISCUSSION

Age distribution in the current study shows that the mean age of women is higher than men, however, there was no statistical significance in age distribution in both genders ($P < 0.10$). This distribution was comparable to findings of a European study where women had presentation of MI in later stage of life.^[8] Duraes *et al.* had similar findings which showed that the mean age of women was higher compared to men, 60.5 years versus 56.3 years, respectively. The later presentation of MI among women is possibly due to the effect of protective hormone, estrogen in premenopausal stage which slows the progression of atherosclerosis.^[9-11]

The current study shows that mean systolic and diastolic BP is higher among female participants when compared to men but was found statistically nonsignificant. Similar findings reported by Butala

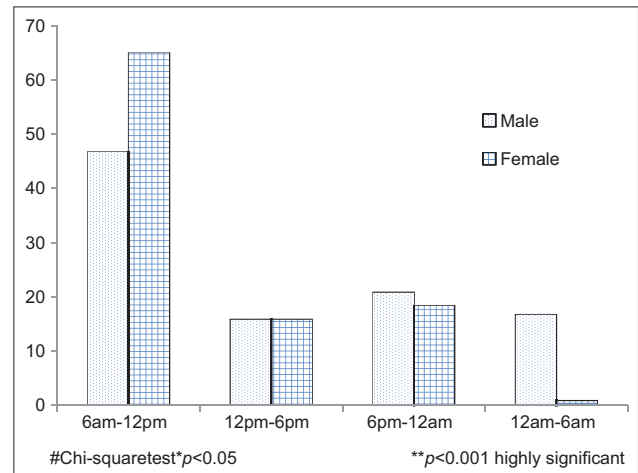


Figure 3: Comparison of time of onset of pain among men and women with myocardial infarction

et al. showed that mean systolic BP among women was 134.1 and among men was 130.6 ($P < 0.091$).^[12] Several contradicting studies reported gender-specific association of higher mean BP among women compared to men. The rising pattern of mean BP among female is assumed to be due to declining estrogen in postmenopausal stage.^[13,14]

The present study findings reported higher BMI among males. In contrast to this, numerous studies showed similarity in BMI distribution among men and women.^[12,14] The contradicting study findings in regard to BMI distribution may be possibly due to heterogeneity among population in terms of lifestyle, socioeconomic status, and dietary patterns.^[15] Hypertension was significantly noted in women ($P < 0.002$). Many previous studies had consistent results showing hypertension as a major risk factor among women.^[16-18]

The study findings show that predominant symptom exhibited by men and women is chest pain. When compared to men, females increasingly presented with atypical presentations such as dyspnea, nausea, vomiting, dizziness, sweating, and back pain ($P < 0.005$). In contrast to these findings, Berg *et al.* reported no significance in atypical presentations such as dyspnea, fatigue, neck pain,

and vomiting but showed significant prevalence of nausea, back pain, dizziness, and palpitation among women.^[19]

The present study did not find any gender-specific association in location of pain but shows higher presentation of females with intrascapular pain, this is contrast to earlier results which suggested increased pain in the right upper chest, sternum, and left side of chest in men whereas in women frequently reported pain in jaw, neck, throat, shoulder, left scapula had more frequency pain among men.^[20,21]

Women commonly had squeezing and tightness type of pain whereas men reported tightness, burning, pricking type of pain which was significant at $P < 0.003$. In consistent to the current findings, male presentation of burning type of pain was reported by Bösner *et al.*^[22]

The present study shows that majority of men had presented with STEMI ($P < 0.004$). Several studies reported similar findings of the current study, showing higher prevalence of STEMI among men when compared to women.^[22-26]

CONCLUSION

The current study supports the need of a gender-specific approach in treatment and nursing care of the patients with MI, as the study revealed differences in presentation of MI that leads to the use of over-the-counter drugs and hospitalization delays. An insight to the public has to be made as disparities still exist in the treatment delay even though a complex health-care sector has evolved. This study can be a future reference since primary care physicians should be empowered about these differences so that they can refer the patients in time and the awareness that has to be made into the outskirts of the public regarding the disease presentations so that the treatment delays can be solved to an extent.

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Conflicts of interest

There are no conflicts of interest.

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