Section: General Medicine

Original Research Article

CLINICAL PRESENTATION AND OUTCOME AMONG WOMEN AND MEN WITH ACUTE MYOCARDIAL INFARCTION TREATED WITH THROMBOLYSIS IN GOVERNMENT TERTIARY CARE HOSPITAL

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Abstract

Background: Acute myocardial infarction (AMI) is a major global health issue, causing 8.5 million deaths annually, with significant disparities in the incidence, presentation, and outcomes between men and women. This study aimed to compare the clinical presentation and outcomes between women and men with Acute Myocardial Infarction treated with thrombolysis in tertiary care hospitals. **Materials and Methods:** This prospective observational study included 150 patients admitted to and diagnosed with acute myocardial infarction at the Government Namakkal Medical College between 2022 and 2023. Patient history, physical examination, electrocardiography, and cardiac biomarkers were obtained. Thrombolytic therapy was administered to the patients and monitored during the in-hospital course. The TIMI risk score was used for the risk assessment. **Result:** The results showed that classical chest pain was more common in males 77.87% than in females 22.13%, while non-classical chest pain was more frequent in females 65.38% than males (34.62%), both with significant differences ($p<0.001$). Mortality was significantly higher in females (60%) than in males (40%) ($p=0.003$). There were no significant sex differences in the comorbidities, morbidity rates, or TIMI score categories. However, the overall TIMI scores were significantly different between males and females ($p=0.0208$). **Conclusion:** Significant sex differences were observed in clinical presentation, mortality, and overall TIMI scores among patients with AMI treated with thrombolysis. Males were more likely to experience classical chest pain, while females had higher mortality rates.

INTRODUCTION

Acute myocardial infarction (AMI) is a leading cause of morbidity and mortality worldwide. Globally, AMI is a leading cause of death, accounting for approximately 7.6 million fatalities annually.[1] The Estimated Global burden of AMI events that occurred in 2019 is about 17.9 million, contributing to 8.5 million deaths.[2] The prevalence of AMI varies across geographic regions and populations, with higher rates observed in developed countries due to the ageing population and the burden of cardiovascular risk factors. In India, AMI affects approximately 5 per 1000 individuals, with a rising trend observed in recent years.[3] Despite remarkable advancements in diagnosis and treatment, significant disparities persist in clinical presentation and outcomes between men and women. There are differences in the incidence and mortality rates of AMI according to age and sex. The incidence increases with age, affecting men earlier than women. However, women of similar ages have higher mortality rates.[4]

Several studies have highlighted variations in clinical presentation between sexes. Women often exhibit atypical symptoms such as dyspnoea, nausea, and fatigue, while men typically present with classic chest pain radiation.[5] These discrepancies can delay diagnosis and prompt intervention, contributing to poorer outcomes for women.[6] The socioeconomic factors further complicate healthcare delivery in government hospitals, potentially exacerbating these disparities. Previous research has also yielded conflicting evidence regarding the efficacy of thrombolytic therapy in women compared to that in men. While some studies suggest similar benefits,[7] others indicate higher bleeding risks and mortality rates in females.[8]

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Understanding these sex-specific outcomes within the resource-constrained environment of a government hospital is crucial for optimizing thrombolytic therapy protocols and improving patient care. Future research should focus on developing novel diagnostic tools, identifying emerging risk factors, and personalized treatment strategies based on sex differences. Continued advancements in stem cell therapy, gene therapy, and other regenerative medicine approaches hold promise in improving post-infarction recovery and preventing heart failure. Therefore, there is a need for research aimed at comprehensively examining the clinical presentation and outcomes of women and men with AMI treated with thrombolytic therapy in a government tertiary care hospital. By analysing demographics, presenting symptoms, diagnostic delays, and post-thrombolysis complications, we can identify potential sex disparities in access to timely diagnosis and effective treatment.

A comprehensive investigation with a specific in a government hospital will provide valuable insights for planning AMI management strategies to achieve equitable and optimal outcomes for both sexes. Thus, this study delves into the specific context of the presentation and outcome of AMI treated with thrombolysis in a government tertiary care hospital, where healthcare access and affordability are critical factors in patient management.

Aim

This study aimed to compare the clinical presentation and outcomes between women and men with Acute Myocardial Infarction treated with thrombolysis in tertiary care hospitals.

MATERIALS AND METHODS

This prospective observational study included 150 patients admitted and diagnosed with acute myocardial infarction in the Department of General Medicine at the Government Namakkal Medical College between 2022 and 2023 (12 months). This study was approved by the Institutional Ethics Committee before initiation, and informed consent was obtained from all patients.

Inclusion criteria

Patients aged > 30 years with newly diagnosed ST-elevation Acute myocardial infarction for thrombolysis were included.

Exclusion criteria

Patients with newly diagnosed ST-elevation Acute myocardial infarction contraindicated for thrombolysis and newly diagnosed non-ST-elevation acute myocardial infarction and unstable angina were excluded.

Methods

The patient's proper history was obtained, and a general physical and systemic examination was performed. Electrocardiogram (ECG) and cardiac biomarkers were obtained from all patients. Patients who were indicated for thrombolysis were considered thrombolytic after obtaining consent. The patient was monitored during the thrombolysis. After the thrombolysis, the patient was shifted to the IMCU and monitored during the in-hospital course and the risk assessment will be correlated with the TIMI score.[9]

Statistical analysis: Data are presented as mean, standard deviation, frequency, and percentage. Continuous variables were compared using an independent-sample t-test. Categorical variables were compared using Pearson's chi-square test to test the statistical significance of the cross-tabulation. Significance was defined as $p < 0.05$ using a two-tailed test. Data analysis was performed using the coGuide Research Enablement and Productivity (REAP) Version 1.2 (BDSS, Bengaluru, India; https://reapv2.coguide.in/).

RESULTS

Most patients were male 106 (70.7%), compared to 44 (29.3%) women. Most are skilled workers 99 (66%), followed by homemakers 21 (14%), semi-skilled workers 14 (9.3%), self-employed individuals 10 (6.7%), unskilled workers 2 (1.3%), unemployed 1 (0.7%), and 3 (2%) categorised as NA. The locality of residence indicates that 99 (66%) reside in rural areas, 27 (18%) in urban areas, 21 (14%) in semi-urban areas, and 3 (2%) are unspecified. Alcohol use was prevalent, with 70 (46.7%) current users, 13 (8.7%) past users, and 63 (42%) never users; 71 (47.3%) were current smokers, 73 (48.7%) never smoked, and 6 (4%) were past smokers.

Chewable tobacco usage shows 23 (15.3%) current users, 16 (10.7%) past users, and 110 (73.3%) never users. Medical conditions revealed high occurrences of classical chest pain in 122 (81.3%), type 2 diabetes mellitus in 60 (40%), pulmonary oedema in 36 (24%), and cardiogenic shock in 28 (18.7%), with lower incidences of obesity 24 (16%), dyslipidaemia 21 (14%), and a family history of coronary artery disease 14 (9.3%). Life-threatening arrhythmias, stroke, and asthma affect only a small percentage of patients. The TIMI score analysis showed that most patients score between 0-4 130 (86.67%), indicating a lower risk, while morbidity was observed in 52 patients (34.7%) and mortality in 20 patients (13.3%) [Table 2].

Among the ECG findings, anterior ST-elevation myocardial infarction (STEMI) was observed in 76 (50.7%) cases, followed by inferior STEMI in 72 (48%), and lateral and posterior STEMI in one (0.7%). Troponin T was positive in 43.3% of the patients, indicating myocardial injury, while 56.7% were negative. Tuberculosis was absent in 146 (97.3%) cases, and data for 4 (2.7%) cases were unavailable. The central nervous system examination was normal in 141 (94%) patients, with abnormalities noted in 9 (6%). Menstrual history revealed that 7 (4.7%) patients were postmenopausal, while 143 (95.3%) had no available data. Abdominal examination revealed that all patients had a soft

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abdomen with bowel sounds, and respiratory system findings consistently demonstrated bilateral lung air entry (B/LAE+). Examination of the cardiovascular system revealed normal heart sounds (S1S2+) in all patients. The final diagnosis indicated that 149 (99.33%) patients had abnormalities, with only 1 (0.67%) being normal [Table 3].

The mean age of 58.51 ± 12.59 years, with a mean ejection fraction (EF) of 44.28 ± 6.74, indicative of moderate cardiac function. Haematological parameters showed a mean haemoglobin level of 13.25 ± 1.81 g/dL and a platelet count of 264,753.33 ± 314,002.36, with red blood cell (RBC) counts of 4,364,733.33 ± 639,575.88 cells/µL. Liver function markers included total bilirubin at 0.75 ± 0.27 mg/dL and SGPT/AST at 55.13 ± 61.76 U/L, while renal markers showed a mean serum creatinine of 1.05 ± 0.78 mg/dL and blood urea at 34.65 ± 12.36 mg/dL.

Electrolyte levels were stable with sodium (Na+) at 135.76 ± 12.75 mmol/L and potassium (K+) at 4.00 ± 0.48 mmol/L. The mean systolic and diastolic blood pressures were 130.57 ± 27.52 mmHg and 83.47 ± 13.98 mmHg, respectively. Random blood sugar (RBS) averaged 169.80 ± 91.04 mg/dL, while inflammatory markers such as total white blood cell (WBC) count showed a mean of 12,131.87 ± 22,084.33 cells/µL. The TIMI score was 3.01 ± 1.75, moderate risk, and vital signs included a mean pulse of 82.51 ± 17.18 bpm and SPO2 of 159.97 ± 783.68 (at 0 hours) [Table 4].

Classical chest pain was more common in males 95 (77.87%) than in females 27 (22.13%), while non-classical chest pain was reported by females 17 (65.38%) compared to males 9 (34.62%), both with significant differences ($p<0.001$). Mortality was higher in females 12 (60%) than in males 8 (40%) ($p=0.003$). There were no significant sex differences in the prevalence of type 1 ($p=1$), type 2 diabetes mellitus ($p=0.608$), dyslipidaemia ($p=0.06$), hypertension ($p=0.802$), morbidity ($p=0.158$), cardiogenic shock ($p=0.372$), life-threatening arrhythmias ($p=0.15$), pulmonary oedema ($p=0.545$), or stroke ($p=1$). The TIMI score category showed higher risk scores (5-8 and 9-14) in females, but this was a significant difference ($p=0.092$) (Table 5). There was a significant difference in the proportion of sex according to the TIMI score (out of 14) ($p=0.0208$) [Table 6].

Table 1: TIMI risk score.

High-risk features	Points
Age < 65 years	0
Age 65-74 years	2
Age ≥75 years	3
Diabetes, Hypertension, or Angina	1
Systolic Blood Pressure	3
Heart Rate >100/min	2
Killip class II-IV	2
Weight	1
Anterior wall MI or Left LBBB	1
Time to Therapy > 4 hours	1

Table 2: Demographics, lifestyle factors, clinical characteristics, and outcomes of the study

		Frequency (%)
Gender	Male	106 (70.7%)
	Female	44 (29.3%)
Occupation	Self- employed	10 (6.7%)
	Skilled	99 (66%)
	Semi-skilled	14 (9.3%)
	Unskilled	2 (1.3%)
	Homemaker	21 (14%)
	Unemployed	1 (0.7%)
	NA	3 (2%)
Locality (Area of residence)	Rural	99 (66%)
	Urban	27 (18%)
	Semiurban	21 (14%)
	NA	3 (2%)
Alcoholic	Past	13 (8.70%)
	Current	70 (46.70%)
	Never	63 (42%)
	NA	4 (2.70%)
Smoker	Past	6 (4%)
	Current	71 (47.3%)
	Never	73 (48.70%)
Chewable tobacco	Past	16 (10.70%)
	Current	23 (15.30%)
	Never	110 (73.3%)
	NA	1 (0.7%)
Risk factors	Asthma	2 (1.30%)
	Obesity	24 (16%)
	Classical chest pain	122 (81.30%)
	Non-classical chest pain	26 (17.30%)

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	Diabetes mellitus type 1	2 (1.30%)
	Diabetes mellitus type 2	60 (40%)
	Dyslipidaemia	21 (14%)
	Epilepsy	2 (1.30%)
	Family history of coronary artery disease	14 (9.30%)
	RWMA	150 (100%)
	Cardiogenic shock	28 (18.70%)
	Pulmonary oedema	36 (24%)
	Stroke	2 (1.3%)
	Life-threatening arrhythmia	5 (3.33%)
TIMI score	0-4	130 (86.67%)
	5-8	18 (12%)
	9-14	2 (1.33%)
Morbidity	Yes	52 (34.7%)
	No	98 (65.3%)
Mortality	Yes	20 (13.3%)
	No	129 (86%)
	NA	1 (0.7%)

Table 3: Clinical findings, diagnostic results, and final diagnoses of the study

		Frequency (%)
ECG STEMI	Anterior	76 (50.70%)
	Inferior	72 (48%)
	Lateral	1 (0.70%)
	Posterior	1 (0.70%)
Troponin T	Positive	65 (43.3%)
	Negative	85 (56.7%)
Tuberculosis	No	146 (97.3%)
	NA	4 (2.7%)
Central nervous system	Normal	141 (94%)
	Abnormal	9 (6%)
Menstrual history LMP	Menopause	7 (4.7%)
	NA	143 (95.3%)
Per abdominal examination	Soft, BS+	150 (100%)
Respiratory system	B/LAE+	150 (100%)
Cardiovascular system	S1S2+	150 (100%)
Final Diagnosis	Normal	1 (0.67%)
	Abnormal	149 (99.33%)

Table 4: Physiological, haematological, biochemical, and clinical parameters of the study

Variables	**Mean ± SD**
Age	58.51 ± 12.59
Alkaline phosphatase	52.75 ± 19.37
Blood urea	34.65 ± 12.36
Chloride	108.63 ± 25.46
Diastolic bp (mm of hg)	83.47 ± 13.98
Direct bilirubin	0.43 ± 0.19
EF	44.28 ± 6.74
Haemoglobin	13.25 ± 1.81
Indirect bilirubin	0.34 ± 0.26
MR number	15,178.02 ± 10,377.19
Mean corpuscular haemoglobin (MCH)	36.71 ± 16.46
Mean corpuscular haemoglobin concentration (MCHC)	35.02 ± 3.11
Mean corpuscula r volume (MCV)	82.09 ± 18.12
Packed cell volume (PCV)	103.53 ± 797.04
Platelet count	264,753.33 ± 314,002.36
Potassium (K+)	4.00 ± 0.48
Pulse	82.51± 17.18
Random blood sugar (RBS)	169.80 ± 91.04
Red blood cells (RBC)	4,364,733.33 ± 639,575.88
SGOT/ ALT	50.78 ± 62.53
SGPT/ AST	55.13 ± 61.76
SPO2 (at 0 hour)	159.97 ± 783.68
Serum creatinine	1.05 ± 0.78
Sodium (Na+)	135.76 ± 12.75
Systolic BP (mmHg)	130.57 ± 27.52
TIMI score (Out of 14)	3.01 ± 1.75
Temperature	101.48 ± 70.83
Total bilirubin	0.75 ± 0.27
Total count (WBC)	12,131.87 ± 22,084.33

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Table 5: Comparison of clinical characteristics, comorbidities, and outcomes based on gender

		Gender		P value
		Male	Female	
Classical chest pain	Yes	95 (77.87%)	27 (22.13%)	< 0.001
	No	11 (39.29%)	17 (60.71%)	
Non-classical chest pain	Yes	9 (34.62%)	17 (65.38%)	<0.001
	No	96 (78.05%)	27 (21.95%)	
	NA	1 (100%)	0	
Diabetes mellitus Type 1	Yes	2 (100%)	0	1
	No	104 (70.27%)	44 (29.73%)	
Diabetes mellitus Type 2	Yes	41 (68.33%)	19 (31.67%)	0.608
	No	65 (72.22%)	25 (27.78%)	
Dyslipidemia	Yes	13 (61.90%)	8 (38.10%)	0.06
	No	93 (73.23%)	34 (26.77%)	
	NA	0	2 (100%)	
Hypertension	Yes	57 (72.15%)	22 (27.85%)	0.802
	No	48 (68.57%)	22 (31.43%)	
	NA	1 (100%)	0	
Morbidity	Yes	33 (63.46%)	19 (36.54%)	0.158
	No	73 (74.49%)	25 (25.51%)	
Mortality	Yes	8 (40%)	12 (60%)	0.003
	No	97 (75.19%)	32 (24.81%)	
	NA	1 (100%)	0	
Cardiogenic shock	Yes	18 (16.98%)	10 (22.73%)	0.372
	No	86 (81.13%)	34 (77.27%)	
	NA	2 (1.89%)	0	
Life-threatening arrhythmia	Yes	2 (1.89%)	3 (6.82%)	0.15
	No	104 (98.11%)	41 (93.18%)	
Pulmonary oedema	Yes	24 (22.64%)	12 (27.27%)	0.545
	No	82 (77.36%)	32 (72.73%)	
Stroke	Yes	2 (1.89%)	0	1
	No	103 (97.17%)	44 (100%)	
	NA	1 (0.94%)	0	
TIMI score category	0-4	96 (90.57%)	34 (77.27%)	0.092
	5-8	9 (8.49%)	9 (20.45%)	
	9-14	1 (0.94%)	1 (2.27%)	

Table 6: Comparison of TIMI score according to gender

	Gender		P value
	Male	Female	
TIMI score (Out of 14) Mean ± SD	2.80 ± 1.39	3.52 ± 2.34	0.0208

DISCUSSION

In our study, a higher proportion of males 95 (77.87%) experienced classical chest pain during AMI than females 27 (22.13%), with significant differences (p<0.001). Haider et al. study and King-Shier et al. study also have similar findings of a higher proportion of males experiencing classical chest during AMI than females.[5,10]

In our study, a higher proportion of females 17 (65.38%) experienced non-classical chest pain than males 9 (34.62%), with significant differences. Khan et al. study found a higher proportion of females had non-classical chest pain than males.[11] The study done by Alexander et al. a multicentric study done in Tamil Nadu had findings like my study with females experiencing non-classical symptoms with significant differences (p<0.001) higher rates than males.[12]

In our study, there was no significant difference in the sex comorbidities in AMI. According to Keating et al. study, metabolic diseases like diabetes, and hypertension are more prevalent in males with AMI than females.[13] But, Kuehnemund et al. study, comorbidities such as hypertension have a higher prevalence among females with AMI than males with AMI. Among the study participants, there was no statistically significant difference between males and females in comorbidities such as diabetes mellitus type 1 (p=1.00) & type 2 (p=0.6), dyslipidemia (p=0.06) and hypertension (p=0.8).[14] In an Alexander et al. study done in Tamil Nadu, females with AMI had a higher prevalence of diabetes type 2 and hypertension.[12]

In our study, there was no significant difference in morbidity between the sexes. In addition, there were no statistically significant differences between the sexes in cardiogenic shock (p=0.372), life-threatening arrhythmia (p=0.15) pulmonary oedema (p=0.545), and stroke (p=1.00). The study done by Elgendy et al. finds that the overall morbidity in females treated with thrombolysis for AMI was significantly higher than in males.[15]

In our study, females 12 (60%) had significantly higher mortality rates (p=0.003) than males 8 (40%). This may be attributed to clinical presentation, delayed referral, delayed treatment initiation, socio-economic environment, gender bias, etc., In Mehta et al. study, females treated with thrombolytics for AMI had a higher mortality rate than males.[16] Also, the

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study done in Tamil Nadu by Alexander et al. finds females with AMI had higher mortality rates than males.[12]

In our study, there were no significant differences (p=0.092) in the TIMI score categories between males and females. A randomized trial study by GUSTO investigators showed that there were no significant differences in TIMI score categories.[17] However, there were statistically significant (p=0.0208) differences in overall TIMI scores between males and females with AMI treated with thrombolysis, which was similar to the study by Anand et al., where there were significant differences in overall TIMI scores between males and females. Even though there were no significant differences in categories of TIMI scoring between genders, there were significant differences in overall TIMI scoring between genders.[18]

CONCLUSION

Significant sex differences in clinical presentation, mortality, and overall TIMI scores were observed among AMI patients treated with thrombolysis. Males were more likely to experience classical chest pain, whereas females had higher mortality rates. However, no significant differences were found in the comorbidities, morbidity rates, or categorical TIMI scores.

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