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Acute Myocardial Infarction and its Associated Adverse Effects on Elderly and Young

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Abstract

Aims: To study the myocardial infarction and its associated adverse effects on both the elderly and young in the selected population.

Method: A total of 169 patients admitted to the emergency medical unit of Sri Ramachandra Medical College & Research Institute were selected for this study from January 2019 to March 2019.

Patient demographic details, results of biomarkers, cardiac markers, cardiac enzymes, appropriate risk stratification scores, ECG, 2D ECHO, comorbidities, and other details were collected and recorded.

Statistical significance was done using SPSS version 20.0. Frequencies with percentages, mean, standard deviation and Chi-square test were done. A p-value of <0.05 was considered statistically significant.

Results: Out of 169 MI patients males were higher than females. 46 to 64 years of patients were higher. Diabetes followed by hypertension was the high number of co-morbidities found among the MI patients. Elevator STEMI and NSTMI were found higher, among the 169 MI patients small vessel disease was found higher, multi-dimensional interventional approaches (medical treatment, surgical intervention, thrombolytic agents used) were followed to reduce the mortality rate was

8.9% and the recovery days were 7 to 28 days. STEMI (<0.001) and NSTEMI (0.05) were statistically significant among age groups. Dyspnea (0.001) and Diaphoresis (0.009) were the significant symptoms in age-wise groups of MI patients. Hypertension (0.001), prior CAD (0.004), smoking (0.001), and anti-platelets (0.002) were the significant co-morbidities found in the age-wise group of MI patients.

Troponin I and T (0.001) is the significant biological marker for MI patients. KILLIP classification (0.001), recovery/mortality rate (0.0037), and recovery days of 1-27 days (0.0052) were statistically significant among the MI patients. As per Kruskal Wallis test cardinal clinical markers such as Wall Motion Score Index (0.027), Door to Needle (Thrombolysis) (0.001), Left Ventricular Ejection Fraction at admission (0.003), and at discharge (0.009) were statistically significant in MI patients. The mean duration of time factors that affect MI are is Heart Rate (HR), Diastolic Blood Pressure (DBP), Oxygen Saturation (SpO2), Respiratory Rate (RR), and Left Ventricular Ejection Fraction (LBEF).

Conclusions: MI requires special attention, and as males were found higher, a periodic checkup of male patients for cardiac markers, an advice sheet consisting of bringing the MI patient without delay, on the admission of MI patients, a multi-dimensional interventional approach of treatment with medicines, surgical intervention, and usage of thrombolytic agents will reduce the morbidity and mortality rate due to MI. This study also concludes, that as in recent years, even young individuals are suffering from MI, age group >25 years requires periodic checkups for MI.

Keywords: Acute Myocardial Infarction, Coronary Heart Disease, Cardiovascular Disease, ST-segment elevation myocardial infarction (STEMI), Non-ST segment elevation myocardial infarction (NSTEMI), Percutaneous Transluminal Coronary Angioplasty, Wall Motion Score Index

Introduction

Myocardial Infarction is one of the leading diseases among mankind bringing a higher percentage of morbidity and mortality, still, in the last 40 years, great understanding and insights have been developed year by year, and day by day bringing a higher percentage of improved survival. The elderly with Acute Myocardial Infarction (AMI) have been reported to present with more atypical symptoms[1].

AMI is associated with significantly higher mortality in the elderly compared with the young, yet the elderly are treated more aggressively than the young. Thrombolytic therapy has the greatest effect on the elderly even though there is an increased risk of hemorrhagic stroke[2].

The benefits of aspirin, angiotensin-converting enzyme (ACE) inhibitors, and beta-blockers in AMI have been substantiated in numerous trials, but their usage in elderly AMI patients may be lower than in younger patients[3].

Acute myocardial infarction (AMI) remains a primary reason for morbidity and mortality globally AMI in young populations which can lead to death in their life, resulting in a major public health crisis is not intensively investigated.

Although the prevalence of AMI has decreased in older patients, younger individuals who experience AMI have not had the same declines in cardiovascular events, especially men[4].

Previous studies have shown that risk factors such as tobacco use, obesity, and diabetes may be important factors in young people with MI symptoms to worsen the prognosis of the disease and show a higher percentage of infection in young STEMI patients than in old patients[5].

Furthermore.

there is no clear definition of how young AMI patient needs to be classified, and, although current research and guidelines focus on the elderly as >45 years, a study by Safdar et al shows that young women patients were more prone to AMI with evaluated key baseline, angiographic features, long hospital stay, and long-term follow-up[6].

However, young AMI patients have different risk factors, clinical manifestations, and prognoses than older patients, making them an important issue for patients, their caretakers, and their treating physicians[7].

A study published in the United States showed, that in 20 years, AMI Medicare fees is declined, hospitalization rates declined, improvements found in 30-day mortality, and there is an improvement in readmissions also[8].

Gasior

, P et al report that there is scarce literature data on the clinical characteristics, natural history, and prognosis of young patients with acute myocardial infarction, and still, we need to acquire a wide knowledge that is important to reduce mortality by MI[9].

Benjamin, E. J et al reported that benefits and better care for patients with cardio vascular health issues may include greater positive and immediate psycho logical functioning, best lifestyle modification, good health behaviors such as quitting smoking, balanced diet, needed physical activity, and practicing a balanced weight) health factors like lower cholesterol levels, normal blood pressure, and controlled glucose control will contribute to reducing mortality due to cardio vascular health issues[10].

Iragavarapu et al explained that Acute Coronary Syndrome (ACS) is one of the potentially life-threatening health conditions that are frequently found in elderly individuals and even in young people. Risk factors such as smoking, diabetes, hypertension, high cholesterol, and a family history of cardiac makers can be observed and proper intervention in the golden hour may save these individuals from mortality due to MI[11].

Because of the increasing burden on health care systems associated with MIs in the elderly, differences in the clinical picture, and difficulties in dealing with elderly patients with myocardial infarction (MI) [12].

Coronary heart disease (CHD) is the leading cause of death in Western countries. Acute myocardial infarction (AMI) in young people was relatively rare in western countries a few years back, but in recent years, the AMI in young is increasing, hence this present study aims at the age-based distribution of AMI in our study population[13].

Based on Prabhakaran, D et al study, they reported that Cardiovascular problems are a major cause of mortality in India, causing >25% of deaths, and a state-wide distribution was not available; hence we bring this complete study on MI[14].

Cardiovascular disease (CVD) and MI produce a very immense health issues along with economic burdens globally.

The major and vital clinical heart issues and circulatory disease are stroke, rhythm disorders congenital (heart) disease, subclinical atherosclerosis, acute coronary and chronic coronary heart disease valvular disease, heart failure, peripheral (arterial) disease venous disease, and MI and the related associated outcomes such as poor quality of life, poor clinical management, adverse economic costs makes cardiac health issues as a prime clinical condition needs to be addressed, hence our present study aims were to estimate the clinical characters of AMI vary by age, to determine the course of AMI, the difference in presentation, risk factors, complications, management and outcome of elderly patients with acute myocardial infarction and young patients with acute myocardial infarction hospitalized in

the intensive cardiac care unit (ICCU) of the tertiary care hospital.

Ethical clearance

This study was approved by the Institutional Ethical Committee and provided with a clearance certificate to conduct the study.

Inclusion criteria

Patients with age ≥21 years willing to give consent, elevation in the electrocardiogram, LDH, Creatine kinase, Troponin T, Cardiovascular Resonance Imaging, and positive for aspartate transaminase.

Exclusion criteria

Patients < 21 years of age, patients unwilling to give consent, patients discharging against medical advice, and patients with illnesses such as sepsis, or poisoning were excluded from the study.

Materials and methods

Methodology

Study Subjects

For a period of 3 months, at the emergency medicine unit, of Sri Ramachandra Medical College & Research Institute, 169 patients were selected to conduct this study after their inclusion criteria were fulfilled such as patients with age ≥21 years willing to give consent.

Informed consent Form

Informed consent was obtained from the patient relatives before the inclusion of the case in the study. Patient details were collected in a Proforma.

Clinical History and Data collection

In this observational study patient's demographic details, results of biomarkers, cardiac markers, cardiac enzymes, appropriate risk stratification scores, ECG, 2D ECHO, volume status, hemodynamic status, prior habits, drug intake, previous medical co-morbidities, and details of chronic medications were collected and recorded.

Investigations

Patients with the elevation in electrocardiogram[15], Lactate dehydrogenase (LDH) [16], Creatine kinase[17], Troponin T and I[18], aspartate transaminase [19].

Elevation in Electrocardiogram

The ST Elevation Myocardial Infarction (STEMI), Non-ST Elevation Myocardial Infarction (NSTEMI) were defined based on standards of the European Society of Cardiology, American College of Cardiology Foundation, the American Heart Association, and the World Heart Federation and recorded. The definitions are below

ST Elevation Myocardial Infarction (STEMI)

Based on the ECG diagnosis, the STEMI is defined as new ST-segment elevation at the J point in two contiguous leads with the cut-points: >0. 1 m V in all leads other than leads V2 - V3, and for leads, V2 - V3, the following cut points apply: ≥0. 2 m V in men, ≥ 40 years, ≥0.25 m V in men < 40 years, or ≥0. 15 m V in women and these results were recorded for analysis[20].

Non-ST Elevation Myocardial Infarction (NSTEMI)

Based on the ECG diagnosis, the NSTEMI is defined as the new horizontal or down-sloping ST depression ≥0.05 m V in two contiguous leads and/or T inversion ≥ 0.1 m V in two contiguous leads with prominent R wave or R/S ratio >1[21].

Myocardial Infarction in Elderly and Young

Based on the definitions in elderly and young, MI was defined as due to any cause in patients in the age groups of <45 years in young[22], and elderly ≥ 65 years, and data were collected and recorded based on the specific age groups[23].

Myocardial infarction Prognosis

While on admission, on monitoring, the patient's disease prognosis was calculated based on temporal stages such as acute from the first few hours to 7 days of admission

for MI, healing from 7 to 28 days, and healing after 29 days. The patient's data were recorded, and patients who recovered and were discharged or who were deceased were also recorded for further analysis.

Analysis

The analysis was carried out with the categorized data of the patients in age groups of 21 - 45 years, 46 - 64 years, and ≥65 years. The basic profile of the patients with MI was analyzed and expressed in numbers and percentages. The association between the age group's clinical markers and biological markers and cardinal clinical variations was analyzed, recorded, and expressed with statistical significance. The mean duration of time of factors affecting MI was also analyzed and expressed as a figure representation.

Statistical Analysis

This study data were analyzed using IBM, SPSS 25.0 versions[24]. For quantitative variables, mean ± SD, and for categorical variables, frequency and proportion has done along with Inter Quartile Range (IQR), and recorded. Inferential statistics were done for an explanatory variable by using the Shapiro-Wilk test and recorded. Clinical and biological markers associated with age groups were analyzed by ANOVA and Logistic regression and a P value < 0.05 was considered statistically significant.

Results

A total of 169 MI patients were admitted to the emergency unit and the data collected were analyzed in the basic profile of MI patients expressed in Table 1. Males were 97 with 57.4%, and females were 72 (42.6%) with a mean age of 59.88± 13.01 years (95% CI, 57.91 to 61.86). The patients were categorized based on their ages and patients with 21-45 years age groups were 29 with 17.2%, 46-64 years age groups were 78 (46.1%), and ≥65 years of age groups were 62 with 36.7%.

Table 1: Basic Profile of MI Study Patients

Variables	No (%)
Gender (n=169)	
Male	97 (57.4)
Females	72 (42.6)
Age Categories (in years) Mean±SD was 59.88± 13.01 years (95% CI, 57.91 to 61.86)	
21-45 years	29 (17.2)
46-64 years	78 (46.1)
≥65 years	62 (36.7)
Co-morbidities	
Diabetes Mellitus	96 (56.8)
Hypertension	90 (53.3)
Prior CAD	49 (29.0)
CKD	24 (14.2)
Smoking	25 (14.8)
Anti-plates	51 (30.2)
Elevation in Electrocardiogram	
STEMI	68 (40.2)
NSTEMI	101 (59.8)
Coronary Artery Vessel Disease (CAVG)	
Triple Vessel Disease (TVD)	58 (34.3)
Double vessel disease (DVD)	32 (18.3)
Small Vessel Disease (SVD)	62 (36.7)
Medical Treatment	
Atorvastatin	88 (52.1)
Aspirin	85 (50.3)
Clopilet	51 (30.2)
Prasugrel	11 (6.50)
Ticagrelor	42 (24.9)
Heparin	72 (42.6)
Surgical Intervention	
Percutaneous Transluminal Coronary Angioplasty (PTCA)	72 (42.6)
Coronary Artery Bypass Graft	63 (37.3)

(CABG)	
Thrombolytic Agent Used	
Streptokinase (STK)	7 (1.8)
Tenecteplase (TNK)	24 (7.7)
Recovery/Mortality Rate	
Recovered	154 (91.1)
Deceased	15 (8.9)
Recovery Days	
7-28 days	144 (93.5)
≥29 days	10 (6.5)

We also recorded the co-morbidities of the MI patients, and diabetes mellitus was in 96 (56.8%), hypertension was in 90 (53.3%), prior CAD was found in 49 (29.0%), CKD was observed in 24 (14.2%), and MI supreme co-morbidities smoking, anti-platelets were found in 25 (14.8%), and 51 (30.2%) respectively. Out of 169 MI patients, elevation in electrocardiogram STEMI was found in 68 (40.2%), whereas NSTEMI was found in 101 in 59.8% of MI patients (Table 1).

We recorded the treatment given to the MI study patients, Atorvastatin 88 (52.1%) was given to MI patients followed by aspirin to 85 (50.3%) MI patients, Clopilet to 51 (30.2%), Prasugrel to 11 (6.50%), Ticagrelor to 42 (24.9%), and Heparin to 72 (42.6%) in MI patients. Among the 169 MI patients, Tenecteplase (TNK), the thrombolytic agent was used in 24 (7.7%) MI patients and, Streptokinase (STK) was used in 7 (1.8%) (Table 1).

The recorded Coronary Artery Vessel disease (CAVG) was classified as Triple Vessel Disease (TVD), and Double vessel disease (DVD), and was found in 58 (34.3%), and 32 (18.3%) respectively. Among the 169 MI patients, a small vessel disease was found in a higher number of patients 62 with 36.7%. Among the 169 MI patients, 135 patients underwent surgical intervention, among them Percutaneous Transluminal Coronary Angioplasty (PTCA) was done in 72 (42.6%), and Coronary Artery Bypass Graft (CABG) was done in 63 (37.3%) (Table 1).

We recorded the recovery and mortality rate of our MI study patients as described in Table 1. Among the 169 patients, 91.1% (n=154) of patients recovered, whereas 15 patients expired. Among the 154 recovered patients, 93.5% (n=144) of MI patients recovered within 7-28 days, whereas 6.5% (n=10) patients took a recovery duration of ≥29 days.

Based on the aims of the study, we wanted to know the association between the age of the MI patients found in clinical findings, hence we have categorized the 169 MI patients as 25-45 years of age (n=29), 46-64 years 64 (n=78), and ≥65 (n=62). Based on age groups the details of the clinical profile of MI patients were shown in Table 2.

Table 2: Based on Age Groups the Clinical Profile of MI patients

Profile of the Study Patients		**Age Group**			**Chi square**	**P value**
		25-45 (n=29)	**46-64 (n=78)**	**≥65 (n=62)**		
Gender	Male	19 (65.5%)	46 (59.0%)	32 (51.6%)	1.710	0.425
	Female	10 (34.5%)	32 (41.0%)	30 (48.4%)		
ST-segment elevation myocardial infarction (STEMI)	Present	21 (72.4%)	31 (39.7%)	16 (25.8%)	13.89	<0.001*
	Absent	8 (27.6%)	47 (60.3%)	46 (74.2%)		
Non-ST segment	Present	8 (27.6%)	47 (60.3%)	46 (74.2%)	6.34	0.05*

elevation myocardial infarction (NSTEMI)	Absent	21(72.4%)	31 (39.7%)	16 (25.8%)		
Angina (chest pain)	Present	21 (72.4%)	46 (59.0%)	41 (66.1%)	1.865	0.394
	Absent	8 (27.6%)	32 (41.0%)	21 (33.9%)		
Dyspnea (Shortness of breath)	Present	5 (17.2%)	23 (29.5%)	37 (59.7%)	19.962	<0.001*
	Absent	24 (82.8%)	55 (70.5%)	25 (40.3%)		
Fatique (Feeling overtired)	Present	3 (10.3%)	8 (10.3%)	9 (14.5%)	0.675	0.713
	Absent	26 (89.7%)	70 (89.7%)	53 (85.5%)		
Diaphoresis (unusual sweating)	Present	15 (51.7%)	19 (24.4%)	14 (22.6%)	9.417	0.009*
	Absent	14 (48.3%)	59 (75.6%)	48 (77.4%)		
Diabetes Mellitus	Present	15 (51.7%)	46 (59.0%)	35 (56.5%	0.458	0.795
	Absent	14 (48.3%)	32 (41.0%)	27 (43.5%)		
Hypertension	Present	8 (27.6%)	52 (66.7%)	30 (48.4%)	13.902	<0.001*
	Absent	21 (72.4%)	26 (33.3%)	32 (51.6%)		
Prior Coronary Heart Disease (CAD)	Present	1 (3.5%)	26 (33.3%)	22 (35.5%)	11.174	0.004*
	Absent	28 (96.5%)	52 (66.7%)	40 (64.5%)		
Smoking	Present	18 (62.1%)	5 (6.41%)	2 (3.2%)	62.352	<0.001*
	Absent	11 (37.9%)	73 (93.6%)	60 (96.8%)		
Anti-platelets	Present	1 (3.5%)	26 (33.3%)	24 (38.7%)	12.344	0.002*
	Absent	28(96.5%)	52 (66.7%)	38 (61.3%)		

* Statistically Significance

Table 2 expresses the males were 19 (65.5%) in the age group of 25-45 years, 46 (59.0%, and 32 (51.6%) in the age groups of 46-64, and ≥65 years respectively, and females were 10 (34.5%) in the age group of 25-45 years, 32 (41.0%), and 30 (48.4%) in the age groups of 46-64, and ≥65 years respectively.

Based on the age groups, STEMI was found in 21 (72.4%) ages 25-45 years of MI patients, 31 (39.7%) in the age groups of 46-64 years, and 16 (25.8%) in ≥65 years of age with statistical significance of <0. 001 (Chi square-13.89). The NSTEMI was found in 8 (27.6%) in ages 25-45 years of MI patients, 47 (60.3%) in the age groups of 46-64 years, and 46 (74.2%) in ≥65 years of age with statistical significance of <0. 05 (Chi-square-6.34) (Table 2).

Table 2 presents the major symptoms observed among the MI patients, and based on age groups, angina was present in 21 (72.4%) MI patients with the age group of 25-45, in 46 (59.0%) patients angina was present in the age group of 46-64 years, and in 41 (66.1%) MI patients' angina was present in the age group of ≥65 years of age. Dyspnea was present in 5 (17. 2%) patients in the 25-45 years of age, in 23 (29.5%) patients in the age group of 46-64 years, and in 37 (59.7%), MI patients in the age group of ≥65 years of age with statistical significance of <0. 001 (Chi square-19.962).

Fatigue was present in 3 (10. 3%) patients the 25-45 years of age, in 8 (10. 3%) patients in the age group of 46-64 years, and in 9 (14. 5%), MI patients in the age group of ≥65 years of age. Diaphoresis was present in 15 (51.7%) patients in the 25-45 years of age, in 19 (24.4%) patients in the age group of 46-64 years, and in 14

(22.6%), MI patients in the age group of ≥65 years of age with statistical significance of 0. 009 (Chi-square-9.417) (Table 2).

Table 2 will explains the finding of our study that the co-morbid condition that was recorded when the patient was admitted due to MI, and based on the age group, we analyzed the association between age groups of MI patients and their co-morbidities. Diabetes Mellitus was present as co-morbidity in 15 (51.7%) MI patients in the age groups of 25-45 years, in 46 (59.0%) patients of 46-64 years, and 35 (56.5%) patients in the age groups of ≥65 years.

We found in our study, that hypertension was present as co-morbidity in 8 (27.6%) MI patients in the age groups of 25-45 years, 52 (66.7%) patients in 46-64 years, and 30 (48.4%) patients in the age groups of ≥65 years with statistical significance of <0. 001 (Chi square-13.902). Prior Coronary Heart Disease (CAD) was present as co-morbidity in 1 (3.5%) of MI patients in the age groups of 25-45 years, in 26 (33.3%) patients in 46-64 years, and in 22 (35.5%) patients in the age groups of ≥65 years with statistical significance of 0. 004 (Chi-square-11.174) (Table 2).

Table 2 outlines the finding of our present paper that smoking is the prime co-morbid condition in MI patients, and smoking is present in 18 (62.1%) of MI patients in the age groups of 25-45 years, in 5 (6.41%) patients in 46-64 years, and in 2 (3.2%) patients in the age groups of ≥65 years with statistical significance of <0. 001 (Chi square-62.352). The presence of anti-platelets is also one of the co-morbid conditions present in 1 (3.5%) of MI patients in the age groups of 25-45 years, in 26 (33.3%) patients in 46-64 years, and 24 (38.7%) patients in the age groups of ≥65 years with statistical significance of 0. 002 (Chi-square-12.344).

We additionally analyzed the association between the age groups and biological and clinical markers in MI patients and presented them in Table 3.

Table 3: Based on Age Groups the Biological and Clinical Markers of MI patients

Profile of the Study Patients		Age Group			Chi square	P value
		25-45 (n=29)	46-64 (n=78)	≥65 (n=62)		
Troponin I	Present	19 (65.5%)	33 (42.3%)	45 (72.6%)	13.890	<0.001*
	Absent	10 (34.5%)	45 (57.7%)	17 (27.4%)		
Creatine Kinase Isoenzyme MB (CKI-MB)	Present	15 (51.7%)	27 (34.6%)	22 (35.5%)	2.867	0.238
	Absent	14 (48.3%)	51 (65.4%)	40 (64.5%)		
B- type Natriuretic Peptide (B-NP)	Present	5 (17.2%)	12 (15.4%)	15 (24.2%)	1.812	0.404
	Absent	24 (82.8%)	66 (84.6%)	47 (75.8%)		
Non-Invasive Ventilation	Present	1 (3.5%)	5 (6.4%)	4 (6.5%)	0.383	0.826
	Absent	28 (96.5%)	73(93.6%)	58 (93.5%)		
Coronary Artery Vessel Disease (CAVG)	SVD	17(58.5%)	35(44.9%)	10 (22.2%)	2.63	0.16
	DVD	9 (31.2%)	18 (23.1%)	5 (11.1%)	1.3	0.506
	TVD	3 (10.3%)	25 (32.0%)	30 (66.7%)	1.36	0.5
KILLIP Classification	1	15 (71.4%)	20 (64.5%)	7 (43.8%)	3.84	0.001*
	2	3 (14.3%)	6 (19.4%)	4 (12.5%)		
	3	2 (9.5%)	3 (9.7%)	2 (25.0%)		
	4	1 (4.8%)	2 (6.4%)	3 (18.7%)		

Recovery/Mortality Rate	Recovered	27 (93.1%)	74 (94.9%)	53 (85.5%)	11.970	0.0037*
	Deceased	2 (6.9%)	4 (5.1%)	9 (14.5%)		
Recovery Days	7-28 days	22 (84.6%)	71 (97.3%)	51 (92.7%)	9.323	0.0052*
	≥29 days	4(15.4%)	2 (2.7%)	4 (7.3%)		

* Statistically Significance

Table 3 shows our finding of this present study that Troponin I was present in 19 (65.5%) patients in the age group of 25-45 years, in 33 (42.3%) patients in the age group of 46-64 years, and in 45 (72.6%) patients, in the age group of ≥65 years with statistical significance of <0. 001 (Chi square-13.890). Creatine Kinase Isoenzyme MB (CKI-MB) was present in 15 (51.7%) patients in the age group of 25-45 years, in 27 (34.6%) patients in the age group of 46-64 years, and in 22 (35.5%) patients, in the age group of ≥65 years.

We found in our study, that the B- type Natriuretic Peptide (B-NP) present in 5 (17.2 %) patients in the age group of 25-45 years, in 12 (15.4%) patients in the age group of 46-64 years, and in 15 (24.2%) patients, in the age group of ≥65 years. In our study patient, few of them were in ventilation, among them 1 (3. 5%) patient in the age group of 25-45 years, in 5 (6. 4%) patients in the age group of 46-64 years, and in 4 (6. 5%) patients, in the age group of ≥65 years (Table 3).

We also recorded and analyzed Coronary Artery Vessel Disease (CAVG) based on age groups, and Small Vessel Disease (SVD) was found in 17(58. 5%) patients in the age group of 25-45 years, in 35(44.9%) patients in the age group of 46-64 years, and in 10 (22.2%) patients, in the age group of ≥65 years, whereas Double vessel disease (DVD) in 9 (31.2%) patients in the age group of 25-45 years, in 18 (23.1%) patients in the age group of 46-64 years, and in 5 (11.1%) patients, in the age group of ≥65 years. We also analyzed Triple Vessel Disease (TVD) that was present in) in 3 (10. 3%) patients in the age group of 25-45 years, in 25 (32.0%) patients in the age group of 46-64 years, and in 30 (66.7%) patients, in the age group of ≥65 years (Table 3).

We calculated the KILLIP classification patients in our study, and found KILLIP Classification 1 was present in 15 (71.4%) patients in the age group of 25-45 years, in 20 (64.5%) patients in the age group of 46-64 years, and in 7 (43.8%) patients, in the age group of ≥65 years, KILLIP Classification 2 was present in 3 (14. 3%) patients in the age group of 25-45 years, in 6 (19. 4%) patients in the age group of 46-64 years, and in 4 (12. 5%) patients, in the age group of ≥65 years, KILLIP Classification 3 was present in 2 (9.5%) patients in the age group of 25-45 years, in 3 (9.7%) patients in the age group of 46-64 years, and in 2 (25.0%) patients, in the age group of ≥65 years, and KILLIP Classification 4 was present in 1 (4.8%) patients in the age group of 25-45 years, in 2 (6.4%) patients in the age group of 46-64 years, and in 3 (18.7%) patients, in the age group of ≥65 years, with statistical significance of <0. 001 (Chi-square-3.84) (Table 3).

During our study, we recorded the recovery rate and mortality rate also, and our study reported the recovered patients were 27 (93.1%), 74 (94.9%), and 53 (85.5%) in the age group of 46-64 years, and ≥65 years respectively, with statistical significance of 0.0037 (Chi-square-11.970). The recovery days were also calculated and analyzed based on age groups and found MI patients recovered in the 7-28 days were 22 (84.6%), 71 (97.3%), in the age group of 25-45 years, 51 (92.7%) in the age group of 46-64 years, and ≥65 years respectively, few

patients took ≥29 days, among them 4(15.4%) in the age group of 25-45 years, 2 (2.7%) in the age group of 46-64 years, and 4 (7.3%) in the age group of ≥65 years with statistical significance of 0.0052 (Chi-square-9.323) (Table 3).

We did an extended analysis of the cardinal clinical vital markers that affect MI patients and tested Kruskal Wallis to see the statistical significance also. Based on age groups, Wall Motion Score Index (WMSI) was observed in 1.8 % Interquartile range (IQR) from 1.6% to 1.9% in the age group of 25-45 years in 29 MI patients, in 1.5 % IQR from 1.3% to 1.9%) in the age group of 46-64 years in 78 patients, and in 1.75 % IQR from 1.3% to 2% in the age group of ≥65 years in 62 patients with statistical significance of 0.027 (Kruskal Wallis test) (Table 4).

In Table 4, we reported that the Left Ventricular Ejection Fraction (LVEF) at admission and was 46% with IQR from 40% to 50%) in the age group of 25-45 years 29 MI patients, 50% with IQR from 47.5% to 57.3% in the age group of 46-64 years in 78 patients, and 45% with IQR from 40% to 55% in the age group of ≥65 years in 62 patients with statistical significance of 0.003 (Kruskal Wallis test).

We also studied the cardinal vital factor Systolic Blood Pressure (SBP) and found 120 mmHg in both age groups of 25-45 years and ≥65 years respectively, but IQR was different, 120 to 130 mmHg in the 25-45 years age group, and 110 to 130 mmHg in the ≥65 years of age group. In the 46-64 years of age group, the SBP was 110 mmHg with IQR from 110 to 130 mmHg. The Oxygen Saturation (SpO2) was also calculated in our study population and found 97% in both age groups of 25-45 years and ≥65 years, but IQR was different, (94% to 98%) in the 25-45 years age group, and 96% to 98% in the ≥65 years of age group. In the 46-64 years of age group, the SpO2 was 96% with IQR from 94% to 98.3 % (Table 4).

In Table 4, we expressed the data related to the vital marker Respiratory Rate (RR), among our 169 MI patients studied, 28 patients who are in the age group of 25-45 years were found with 20 breaths per minute with IQR from 19.5 to 25 breaths/minutes, whereas in 78 and 62 MI patients in whom the age groups were 46-64 years, and ≥65 years respectively, the RR was found 22 breaths per minutes, and IQR was also the same being the range from 20 to 25 breaths/minutes. Creatinine is one of the vital markers which was 0.8mg/dL (range from 0.7 to 1.2 mg/dL) in the age group of 25-45 years, 0.9 mg/dL (range from 0.6 to 1.2 mg/dL) in the 46-64 years of age group, and in the ≥65 years of age group Creatinine was 1 mg/dL (range from 0.8 to 1.3 mg/dL).

In our study, we studied the door to needle (Thrombolysis) also and we found that in the age group of 25-45 years, it was 0 minutes (0 to 0 minutes), in the age group of 46-64 years, door to needle (Thrombolysis) was 5 minutes (range from 5 to 5. 25 minutes), and whereas in the age group of ≥65 years, door to needle (Thrombolysis) was 8 minutes (6 to 8 minutes) with statistical significance of 0.001 (Kruskal Wallis test). When we studied door to balloon- Primary percutaneous Coronary Intervention (PCI), we found that the time taken was 3 minutes (range from 3 to 3 minutes) in the age group of 25-45 years, 2.5 minutes (range from 2 to 4 minutes) in the age group of 46-64 years, and 5 minutes (3 to 6 minutes) in the age group of ≥65 years. In table 4 we described the percentage of left ventricular ejection fraction at discharge, and it was found to be 45% (range from 40% to 48.5%) in the age group of 25-45 years, 50% (range from 40% to 55%) in the age group of 46-64 years, and 45.5% (range from 39. 8% to 54%) in the age

group of ≥65 years with statistical significance of 0.009 (Kruskal Wallis test) (Table 4).

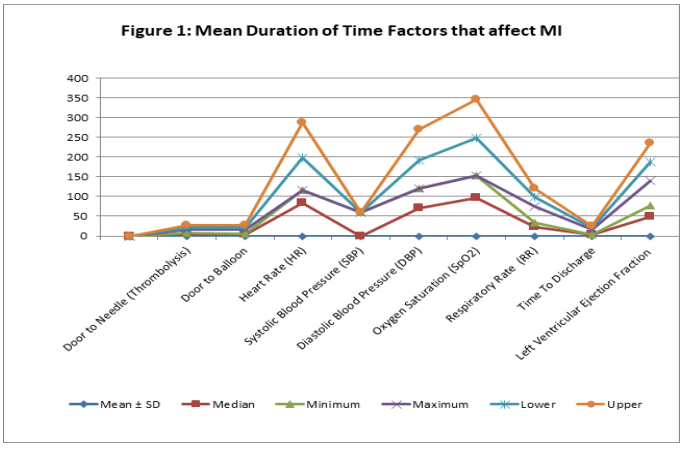
Table 4: Based on Age Groups the Cardinal Clinical Vital Markers of MI patients

Clinical Variations	Age Groups Median (IQR)			Kruskal Wallis test (P value)
	25- 45 (n=29) % (Interquartile range)	46- 64 (n=78) % (Interquartile range)	≥65 (n=62) % (Interquartile range)	
Wall Motion Score Index (WMSI)	1.8% (1.6% to 1.9%)	1.5 % (1.3% to 1.9%)	1.75 (-1.3% to 2%)	0.027*
Left Ventricular Ejection Fraction (LVEF) at admission	46% (40% to 50%)	50% (47.5% to 57.3%)	45% (40% to 55%)	0.003*
Systolic Blood Pressure (SBP)	120 mmHg (120 to 130 mmHg)	110 mmHg (110 to 130 mmHg)	120 mmHg (110 to 130 mmHg)	0.257
Oxygen Saturation (SpO2)	97% (94% to 98%)	96% (94% to 98.3%)	97% (96% to 98%)	0.408
Respiratory Rate (RR)	20 breaths per minute. (19.5 to 25 breaths/min)	22 breaths per minute. (20 to 25 breaths/min)	22 breaths/min (20 to 25 breaths/min)	0.907
Creatinine	0.8mg/dL (0.7 to 1.2 mg/dL)	0.9 mg/Dl (0.6 to 1.2 mg/dL)	1 mg/dL (0.8 to 1.3 mg/dL)	0.275
Door to Needle (Thrombolysis)	0 minutes (0 to 0 minutes)	5 minutes (5 to 5. 25 minutes)	8 minutes (6 to 8 minutes)	0.001*
Door to Balloon- Primary percutaneous coronary intervention (PCI)	3 minutes (3 to 3 minutes)	2.5 minutes (2 to 4 minutes)	5 minutes (3 to 6 minutes)	0.24
Left Ventricular Ejection Fraction (LVEF) at discharge	45% (40% to 48.5%)	50% (40% to 55%)	45.5% (39. 8% to 54%)	0.009*

* Statistically Significance

We studied the mean duration of each procedure that can affect the MI patients in the time factor during their hospital stay and we plotted it in Figure 1.

Figure 1: Mean Duration of Time Factors that affect MI



In Figure 1, we explained that the time duration for door-to-needle (Thrombolysis) and door-to-balloon (Primary PCI)), did not show as factors affecting the MI with the mean±SD value of 5.84± 1.45 minutes, 3.48 ± 1.3 minutes respectively. The systolic blood pressure (SBP), respiratory rate (RR), and time to discharge, also did not show much difference in the time duration that affects the MI.

As per Figure 1, we found that the time duration of vital factors that affect the Myocardial Infarction was heart rate (85.62 ± 15.38 beats/minute), diastolic blood pressure (74.62 ± 12.2 mmHg), oxygen saturation (SpO2) (95.83% ± 4.06%), and left ventricular ejection fraction (47.55% ± 8. 08%).

Discussion

Myocardial Infarction (MI) is one of the prime causes of major morbidity and mortality in the elderly, in this era of 2022, MI is highly found in young age groups also. Research published by Gao, H et al showed that a higher percentage of risks of all cardiovascular death were found in elderly patients in the age groups >50 than < 50 years, our study also shows that a higher number of patients were in the age group > 46 years of age groups who were admitted due to MI, but our study is different in reporting the MI in young age groups (25 years to 45 years) also[25].

The MI published data by Gulati, R et al show that 3 in 4 MI patients are young and are suffering from cardiac ischemia symptoms; our study is compatible with this study with 29 young study MI patients admitted among 169 study population[26].

Myocardial Infarction (MI) was found high in males than in females in our study and a study by Cui, Y., et al also published that in their study, males were suffering from MI symptoms than females, in our study also, higher males were admitted than females due to MI[27].

MI is a life-threatening disease that has several vital factors affecting, and leading to morbidity and mortality. Co-morbidities of MI patients become the vital factor that affects their life, we have reported several co-morbidities in our study, likewise Kleinbongard, P et al report that co-morbidities play as confounders in giving cardio-protection to the MI patients[28].

One of the published data by Schalij, M. J et al shows that in NSTEMI patients medical adherence was lesser in females, young, and elderly patients, but in our study we had 59.8% of MI patients showed NSTEMI, who received the best and unique protocol of medical adherence hence, leading to low mortality rate[29].

Zalewski et al reported that patients with non-obstructive coronary arteries require long-term anti-coagulating agents, in our study also, we treated 42.6% of MI-admitted patients with heparin, hence reducing the mortality due to MI[30].

Chandrasekhar, J et al reported that the females are exceeding door-to-needle time duration than men (67% vs 37%, OR 2.62), but our present study represents in age groups, indicating the young are taking 0 minutes than elderly patients > 46 years of age groups[31].

A study published by Cabral, M et al showed that >88% of their study population received Percutaneous Transluminal Coronary Angioplasty intervention; our study also reported 42% of study patients received Percutaneous Transluminal Coronary Angioplasty intervention[32].

Birnbach. B et al published research shows that we have better knowledge of symptoms of Myocardial Infarction, and as per the study, the knowledge on the symptoms such as shortness of breath, feeling weak, and sweating were 42.1% in the general population and 69.5% in the cardiac population, we in our present study report that we have better knowledge on the age-based symptoms such as angina, Dyspnea, Fatigue, and Diaphoresis in our study population[33].

Research published by Hasebe, T et al showed that cardiovascular risk or vital factors are obesity, dyslipidemia, hypertension, and diabetes mellitus in younger people with MI, in our present study also, we reported 51.7% young MI patients had diabetes, and 27.6% patients had hypertension during their admission for MI[34].

Pandit et al. reported that patients with WMSI ≥2 and the patients with higher Killip's class showed worse outcomes during their hospital stay for cardiac issues, but not reported age-wise distribution, but in our study, we

reported age-wise distribution of the Wall motion score index (WMSI) [35].

Thrombolytic agents used in our study were Streptokinase 7, and Tenecteplace 24, and in a study by Jneid, H et al, 21% of the patients received thrombolytic agents during their hospital stay due to MI[36].

As per the European Society of Cardiology guidelines, the primary percutaneous coronary intervention (PCI) is the best treatment choice when patients are arriving at the hospital with ST-elevation myocardial infarction (STEMI) in protocol-based time frames, and our present study also performed Percutaneous Transluminal Coronary Angioplasty in a higher number of patients, achieving the less mortality rate in MI patients, and our study is particular in reporting the age group-wise distribution of intervention for MI patients[37].

MI patients were found with elevated troponin levels, we found in our study, 72.6% of elderly patients>65 years showed elevation, and in young MI patients <46 years, an elevated troponin level of 65.5% was found. One of the research shows the reasons for elevated levels of troponin levels were injury concerning myocardial ischemia and indeterminate myocardial injury[38].

As per Basman, C et al study Hybrid coronary revascularization are one of the best interventions for triple vessel diseases patients, and Patel, N. C et al reported for double vessel diseases, CABG was the best surgical intervention, we found that in our present study, the multi-dimensional approach of treatment such as treatment with medicines like aspirin, atorvastatin, using anti-coagulating agents such as heparin, surgical interventions such as Percutaneous Transluminal Coronary Angioplasty, Coronary Artery Bypass Graft, and usage of thrombolytic agents like Streptokinase, and Tenecteplase has reduced the mortality rate of our MI patients admitted in our tertiary care center [39-40.]

In conclusion, cardiologists or physicians, or any other health care worker who is finding certain cardiac issues in any patient, the cardiologists or physicians or any other health care worker must keep a track of that particular patient and must advise the caretaker of the patient to reach to health care unit at the earliest when any adverse events occur because patient's delay is one of the vital factors for mortality of MI patients. Our present study concludes that Percutaneous Transluminal Coronary Angioplasty is the best intervention for MI patients with ST-elevation myocardial infarction (STEMI) within time frames. In our present study, the young AMI patients were ¼ and literature shows that young AMI patients have different risk factors, clinical manifestations, and prognosis than older patients, making them an important issue for patients, their caretakers, and their treating physicians, hence we conclude a separate protocol required to treat young AMI patients, and the clinician must closely observe young individual visiting the hospital for any clinical issue for cardiac symptoms, and treat them appropriately, to reduce young mortality due to AMI, and multi-dimensional approach of treatment is required to reduce the mortality rate in patients admitted due to the Myocardial Infarction.

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