A STUDY OF ACUTE ST ELEVATION MYOCARDIAL INFARCTION (STEMI) IN ELDERLY PATIENTS IN A TERTIARY CARE INSTITUTE IN SOUTH INDIA

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ABSTRACT

BACKGROUND

Coronary Artery Disease (CAD) is the leading cause of morbidity and mortality among elderly. The clinical features of Acute ST Elevation Myocardial Infarction (STEMI) in elderly are different from those in young patients in many aspects. The elderly STEMI patients are often less aggressively treated than younger ones due to advanced age, co-morbidities and delayed admission to the hospital. The epidemiological data regarding STEMI in elderly in India are mainly from urban centres.

Hence, we conducted a study on the clinical presentation, risk factors and complications of elderly STEMI (> 60 years) patients admitted in the ICCU of Department of Cardiology, Thanjavur Medical College, Tamilnadu which caters to the needs of largely rural population.

MATERIALS AND METHODS

Our retrospective descriptive study was conducted on patients > 60 years of age, who were admitted with the features of acute STEMI from 1st January 2018 to 30th September 2018. The demographic features, cardiovascular risk factors, clinical presentations, serial ECG changes and 2D-Echo features were analysed and correlated.

RESULTS

Out of 87 patients studied, 58 (66.67%) were Male and 29 (33.33%) were Female with Male-to-Female ratio of 2:1. However, above 80 years of age, there were more Females (20.69%) than Males (1.72%). Majority of the patients belonged to 60-70 years' age group (66.67%). Type II Diabetes Mellitus (28.74%) and Systemic Hypertension (25.29%) were the common risk factors. Though 50.57% of patients presented with chest pain, atypical symptoms were present in significant number of patients. Majority were in Killip's class II (47.13%) on admission. IWMI occurred slightly more (49.42%) than AWMI (48.28%). RVMI occurred in 37.21% of patients with acute IWMI. LVEF < 40% was more common in AWMI (64.28%) group and in non-thrombolysed (50%) patients. Mitral regurgitation was present in 57 (65.52%) cases, while cardiogenic shock was present in 14.95% of cases. 5 patients (5.74%) died during their hospital stay.

CONCLUSION

STEMI in the elderly presented commonly between 60-70 years of age. Female patients with STEMI increased with increasing age (>70 yrs.). Diabetes Mellitus and Systemic Hypertension were the common risk factors. More patients presented with atypical symptoms and in Killip's class II. IWMI was more common than AWMI. 37.21% of patients with IWMI had RVMI. LV systolic dysfunction with LVEF < 40% was more common in AWMI and in non-thrombolysed patients. Advanced age, female gender, multiple risk factors, co-morbid conditions, extensive infarction and severe LV systolic dysfunction were the major contributors of in-hospital mortality.

KEY WORDS

STEMI in Elderly, LV Dysfunction, Thrombolysis, Cardiogenic Shock.

BACKGROUND

Coronary artery disease remains the leading cause of morbidity and mortality among elderly patients worldwide.[1] Acute Coronary Syndromes (ACS) include Unstable Angina, Non-ST Elevation Myocardial Infarction (NSTEMI) and ST Elevation Myocardial Infarction (STEMI).[2] The incidence of ACS and the prevalence of ST Elevation Myocardial Infarction progressively increases with age.[3]

STEMI is associated with significantly higher mortality in the elderly when compared with the young. Yet the elderly people are less aggressively treated than the young.[4] Thrombolytic therapy has the greatest effect in the elderly, even though there is increased risk of haemorrhagic stroke.[5]

The clinical features of STEMI in the elderly are different from the young in many aspects.[6,7] Elderly STEMI patients present with more atypical symptoms and co-morbidities than the younger ones.[8,9] In India, the studies regarding the elderly STEMI patients were mostly from urban centres.[10,11] Hence, we studied the clinical, ECG and Echocardiographic profile of elderly STEMI patients (> 60 years of age) admitted in Thanjavur Medical College, Thanjavur which is a tertiary referral centre for nearly 5 adjacent districts in and around Thanjavur with largely Rural and Agricultural population.

The risk stratification of STEMI at the time of admission and at discharge from the hospital by clinical, ECG and Echocardiographic parameters accurately determine the outcome of patients with STEMI and helps in determining the Optimal Therapeutic Interventions and secondary preventive measures.

MATERIALS AND METHODS

Our retrospective descriptive study was conducted on patients above 60 years of age who were admitted with the features of acute ST Elevation Myocardial Infarction (STEMI) in the ICCU of Department of Cardiology, Thanjavur Medical College, Thanjavur, India from 1st January 2018 to 30th September 2018.

The patients satisfying the following inclusion criteria were included in the study.

Inclusion Criteria
- Age- 60 years (or) above (ICMR Guidelines).
- Typical ECG pattern.
  a. ST segment elevation of > 0.1 mv in at least two consecutive limb leads (or) > 0.2 mv in at least two consecutive chest leads.
  b. Definite 'T' wave inversion and pathological evolution of Q waves (> 0.04 sec).
  c. New onset of LBBB.
     - Elevated cardiac enzyme levels (Troponin T).

The clinical data studied include Demographic features like diabetes mellitus, systemic hypertension, dyslipidaemia, tobacco smoking/chewing and alcohol consumption.

The presenting symptoms studied include chest pain, shortness of breath, sweating, palpitation, dizziness, syncope, nausea/vomiting and abdominal pain. The time of presentation of patient to the I.C.C.U from the onset of symptoms (window period) and the Killip Clinical Class of the patient were analysed.

The serial electrocardiograms (E.C.G) recorded by the computerized 12 channel E.C.G machine (BIONET) were analysed for ST segment elevation (or) depression, pathological Q waves, tachy/bradyarrhythmias and conduction disturbances. The regions of infarction were categorized into Anterior, Inferior (or) Combined using standard AHA E.C.G criteria.

Echocardiography was performed on all patients with STEMI by consultant cardiologists using Philips HD11XE and Aloka Prosound SSD 4000 Echocardiography systems within 24 hours of admission of the patient to I.C.C.U and at the time of discharge. The data studied include Regional Wall Motion Abnormality suggestive of ischemia (RWMA), LV and RV chamber dimensions, LV ejection fraction, mitral regurgitation, LV clot, pulmonary hypertension, tricuspid regurgitation, RV function, pericardial effusion, identification of ventricular septal rupture and ventricular aneurysm.

RESULTS

A total of 87 elderly patients (> 60 years of age) admitted with the features of Acute Elevation Myocardial Infarction (STEMI) in the ICCU of Department of Cardiology at Thanjavur Medical College, Thanjavur from 1st January 2018 to 30th September 2018 were studied retrospectively regardless of the therapeutic intervention they received.

Out of the 87 patients, 58 (66.67%) were male and 29 (33.33%) patients were female with the male-to-female ratio of 2:1. The common age group of presentation in the elderly was between 60-70 years (66.67%) of age. In the > 80 years' age group, there were more female (29.69%) than male (1.72%) in our study, (Figure 1).

Type II Diabetes mellitus was the most common risk factor (28.74%) followed by systemic hypertension (25.29%) among overall elderly patients with STEMI (Figure 2). Diabetes mellitus is slightly more common in elderly female (31.03%) than elderly male (27.59%) patients with STEMI.

Chest pain was the most common presenting symptom of STEMI (50.57%) followed by atypical symptoms like difficulty in breathing (37.93%), sweating, nausea (26.44%), vomiting (25.29%) and dizziness (16.09%) in elderly patients. Around 49.43% of patients presented to the ICCU within 12 hours of onset of chest pain, while 33.33% between 12-24 hrs. and 17.24% > 24 hours after the onset of symptoms. Killip's class II was the most common (47.13%) clinical class followed by Killip's class I (25.29%), class IV (14.97%) and class III (12.64%) in our study. Co-morbid conditions like renal insufficiency was present in 10 (11.50%) cases, while old CVA was present in 3 (3.45%) cases.

The ECG localisation of infarction showed inferior wall MI (49.42%) occurred slightly more than anterior wall MI (48.28%) in the elderly STEMI patients. 2 patients (2.30%) had both anterior and inferior wall MI. Among the 43 patients (49.42%) with IWMI, inferoposterior wall MI is more common (32.86%). RVMI occurred in 37.21% of elderly STEMI patients with acute IWMI in our study, (Figure 3). Out of the 42 elderly patients (48.28%) with Acute AWMI, 19 (45.24%) had anteroseptal MI and 18 (42.86%) had extensive anterior wall MI. 3 cases (7.14%) had anterolateral MI, while 2 cases (4.76%) had high lateral MI (Figure 4).

The 2D Echocardiographic evaluation done within 24 hours of acute STEMI showed regional wall motion abnormality suggestive of anterior wall ischaemia in the form of hypokinesia (80.95%) and akinesia (11.90%) in patients with acute AWMI. Similarly, in patients with acute IWMI, 81.40% had hypokinesia and 6.98% had akinesia as RWMA.

The 2D Echocardiographic study of LV systolic function by the measurement of LVEF showed 64.28% of patients with acute AWMI had moderate-to-severe LV systolic function with EF < 40%. The LVEF was normal in 2.38% of cases. The assessment of LV systolic function in elderly patients with IWMI showed only 11.63% patients had moderate-to-severe LV systolic function with LVEF < 40%. While 62.79% had mild LV systolic function with LVEF between 40-55%. The LVEF was normal in 25.58% of cases (Figure 5). The mitral regurgitation was present in 57 (65.52%) of elderly STEMI patients. Out of these 57 patients, 31 (35.63%) cases had IWMI and 26 cases (29.89%) had AWMI.

Out of the 87 patients with STEMI 53 (60.92%) cases were thrombolysed, while 34 (39.08%) cases were not thrombolysed. Advanced age and late presentation to the hospital were the main reasons for not receiving Thrombolysis in these patients. Nearly, 50% of patients who were not thrombolysed had moderate-to-severe LV systolic dysfunction

with LVEF < 40%, while only 32.08% of patients who received thrombolysis had EF < 40% (Figure.6).

Out of the 87 patients, 5 (5.74%) patients died during their hospital stay. All of them were above 65 years of age. Among them 4 were female and 1 was a male patient. 3 cases were thrombolysed, while 2 cases did not receive Thrombolysis. 4 patients had inferoposterior and RVMI, while one had extensive AWMI. Cardiogenic shock was the cause of death in 3 cases, while Ventricular fibrillation and cardiac asystole contributed to the death in each of the remaining 2 cases.
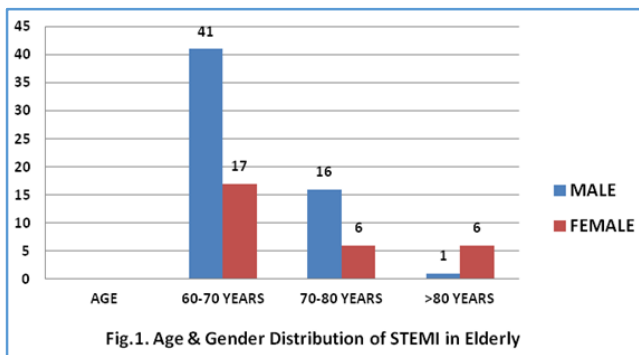
STEMI in Elderly-Figures

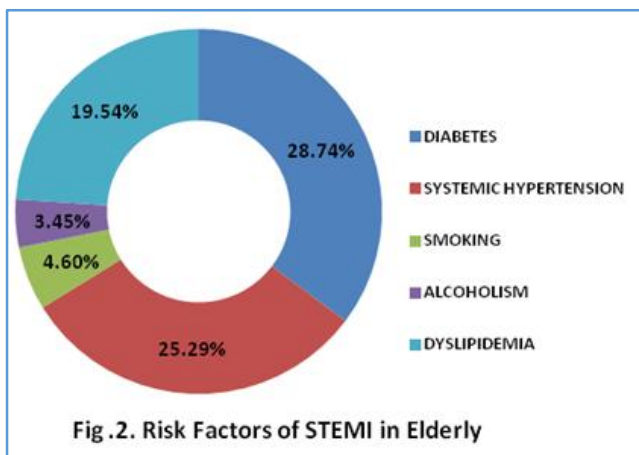Fig.1. Age & Gender Distribution of STEMI in Elderly
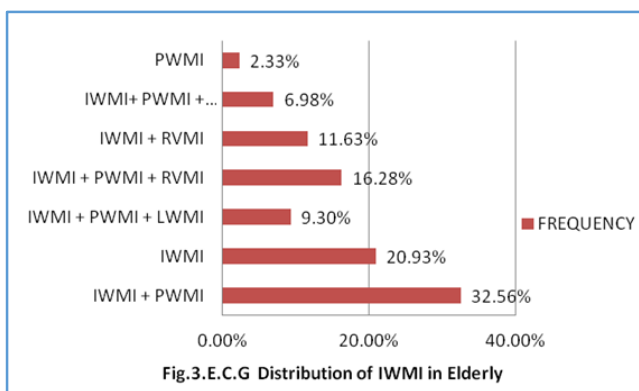

Fig .2. Risk Factors of STEMI in Elderly

Fig.3.E.C.G Distribution of IWMI in Elderly

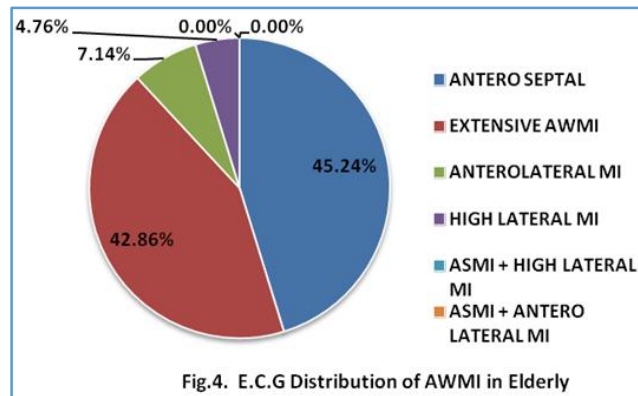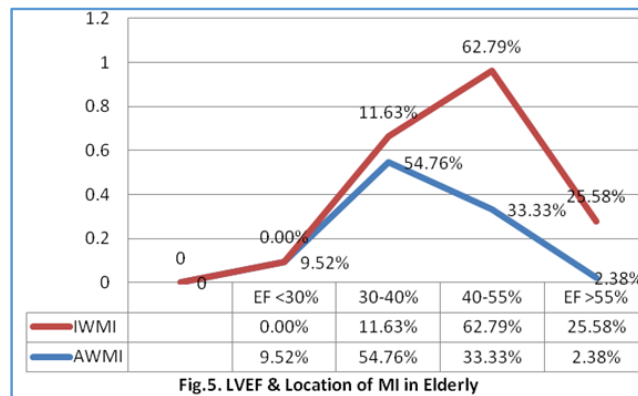
Fig.4. E.C.G Distribution of AWMI in Elderly

	EF <30%	30-40%	40-55%	EF >55%
IWMI	0.00%	11.63%	62.79%	25.58%
AWMI	9.52%	54.76%	33.33%	2.38%

Fig.5. LVEF & Location of MI in Elderly

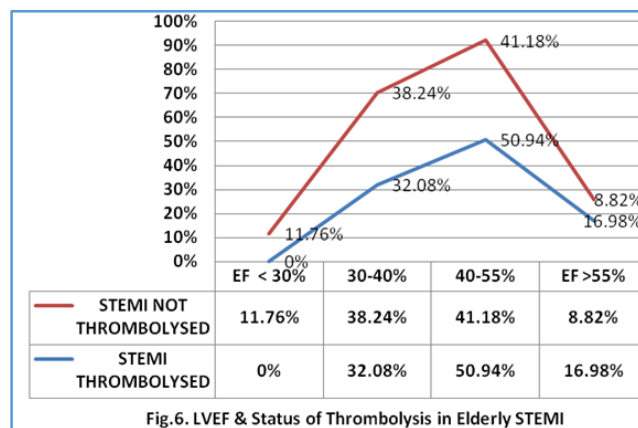|	EF < 30%	30-40%	40-55%	EF >55%
STEMI NOT THROMBOLYSED	11.76%	38.24%	41.18%	8.82%
STEMI THROMBOLYSED	0%	32.08%	50.94%	16.98%

Fig.6. LVEF & Status of Thrombolysis in Elderly STEMI

DISCUSSION

The Coronary Artery Disease is the leading cause of death among elderly patients. The Elderly patients with Acute ST Elevation Myocardial Infarction (STEMI) often present with more atypical symptoms.[12] Though, STEMI in elderly is associated with significantly higher mortality. They are treated less aggressively than the young.[13]

Majority of elderly STEMI patients belonged to 60-70 years of age group in the present study. This is in concordance to other studies, wherein the number of elderly presenting with STEMI decreases as age increases. This is attributed to the co-morbid condition like renal insufficiency, cognitive problems, depression and atypical vague symptoms of MI in elderly forbidding them proper access to health care.[1]

In the present study, 66.67% of elderly patients were male and 33.33% were female with the male-to-female ratio of 2:1. However, above the age of 80 years there were more female (20.69%) than male (1.72) in the present study. This indicates an increase in prevalence of disease in elderly females compared to young females who are hormonally protected against CAD. Alexander K et al reported that with progressively older age, patients with ACS are more likely to be female from 30% below age 65 to 62% over the age of 85 years.[14] This gender and CV risk reverses past age 65. In a statistical study by AHA, the prevalence of cardiovascular diseases increased in female as the age increases (male-to-female ratio of 1.3:1 in 35-44 years of age group compared to 0.89:1 in 75+ age group).[15] The loss of protective effect of oestrogen in postmenopausal woman may contribute to the increased incidence of STEMI in them with advanced age.

Though chest pain was the common presenting symptom of STEMI (50.57%) in Elderly patients, atypical symptoms like difficulty in breathing (37.93%), nausea, vomiting and dizziness were also significantly present in elderly STEMI patients. In Worcester Heart Attack Study chest pain was reported in less than half of the patients over age 75 years (45.5%), while dyspnoea (or) cough (22%) and other symptoms like dizziness, headache, syncope, sweating, palpitation, nausea and weakness (32%) were more common.[16]

In the present study, Type II Diabetes mellitus was the most common risk factor followed by Systemic Hypertension in elderly STEMI patients. The incidence of Type 2DM is slightly more in elderly female than in male.

The smoking and alcoholism contributed to the risk factors of STEMI in only a few elderly STEMI patients in the present study. Various studies have reported that hypertension, diabetes mellitus and dyslipidaemia were just as prevalent in both young and elderly STEMI patients while smoking, obesity and family history of CAD are more prevalent in the young STEMI patients.[13] The emphasis for the elderly population should be better control of diabetes, systemic hypertension and dyslipidaemia, while in young population in addition to quitting smoking habits control of obesity should be included. Only 49.43% of patients presented to the ICCU within 12 hours of onset of symptoms in the present study. Atypical clinical presentation might have caused pre-hospital delay in the admission of elderly STEMI patients. In the Global Registry of Acute Coronary Events (GRACE) registry, the median time from symptoms onset to presentation was 2.3 hours in those under 45 years, but 3 hours over age 85.[1] In the Co-operative Cardiovascular Project, one significant determinant of late arrival (> 6 hours of symptom onset) was advanced age.

The Inferior wall MI occurred slightly more (49.42%) than Anterior wall MI (48.28%) in our study. Various studies reported that in patients < 60 years of age, AWMI is more common than IWMI. Teruo Shiraki et al reported AWMI was present in 52% of patients in the above 70 years' age group.[17] Among the patients with AWMI 48.28% had anteroseptal MI, while 45.24% had extensive anterior wall MI in our study. Various studies have reported that patients with AWMI have worse prognosis with increased incidence of complications than IWMI and the occurrence of acute RVMI with IWMI have worse prognosis than Acute Inferior Wall MI alone.[18] Right Ventricular Infarction (RVMI) occurred in 37.21% of elderly STEMI patients with Acute IWMI in the present study.

Most of the in-hospital mortality in STEMI depends on the severity of LV systolic dysfunction. The risk of sudden cardiac death after MI is increased by the development of post infarct heart failure.[19] The 2D Echocardiography done within 24 hours of admission can predict the patients with high risk, diagnose mechanical complications of STEMI and quantity of the LV dysfunction.[20] Thus, it aids in the treatment and assessing the prognosis of patients with acute STEMI. Various studies have shown that Echo findings in STEMI correlates well with the clinical events and ECG in AMI.[21,22]

In our study out of 43 patients with IWMI, Regional Wall Motion Abnormality (RWMA) suggestive of ischaemia was observed in the form of Hypokinesia (81.40%) and Akinesia (6.98%) in the corresponding segments of LV by 2D Echo. Similarly, among 42 patients with AWMI 80.95% had hypokinesia and 11.90% had akinesia as RWMA.

There were more patients (64.28%) with moderate-to-severe LV systolic dysfunction with LVEF < 40% in elderly AWMI group than in IWMI group (11.63%) in the present study. The LVEF was normal in 25.58% of IWMI cases, while only 2.38% of AWMI cases had normal LV systolic function. A left Ventricular Ejection Fraction (LVEF) less than 40% was an independent mortality predictor in Multicenter Post Infarction Research Group in the 1980s.[23] The Canadian Assessment of Myocardial Infarction (CAMI) study also found LVEF < 40% appears to be responsible for an increase in post MI risk.[24]

In the present study 60.92% of cases were thrombolysed, while 39.08% of cases were not thrombolysed. Nearly, 50% of cases who were not thrombolysed had LVEF < 40%, while only 32.08% had LVEF < 40% in the thrombolysed group in the present study. The main reasons for not thrombolysing these patients were advanced age, delayed presentation to the hospital and co-morbid conditions. In the Grace Registry, 30% of STEMI patients presenting within 12 hours of symptoms did not receive thrombolytic therapy. Older age (>75 years), female sex, absence of chest pain and congestive cardiac failure were the factors associated with failure to receive thrombolysis in STEMI patients in this Registry.

Mitral regurgitation was present in 57 (65.52%) of elderly STEMI patients in our study. Various studies have shown that MR develops in 14-26% of patients with STEMI. Cardiogenic shock was present in 14.95% of cases in our study. Ornato JP et al in their study about factors associated with the occurrence of cardiac arrest during hospitalisation for AMI reported that cardiogenic shock occurs in > 10% of patients > 75 years of age mostly due to ventricular (or) papillary muscle rupture (or) severe LV (or) RV dysfunction.

5 patients (5.74%) died during their hospital stay in our study. All of them were > 65 years of age with 4 female and 1 male. 4 had inferoposterior and RVMI, while one had extensive AWMI. Cardiogenic shock was the cause of death in 3 cases, while ventricular fibrillation and cardiac asystole contributed to the death in each of the remaining 2 cases.

In a comparative study between elderly and young MI, mortality was on the higher side in the elderly group. In PURSUIT trial among STEMI patients, in-hospital mortality increased exponentially as a function of age from 1.9% among patients age < 40 years to 31.9% among patients older than 80 years. In GUSTO-1 trial, 30-day mortality following STEMI increased from 3% in patients < 65 years of age to 19.6% in patients 75 to 85 years of age and to 30.3% in patients > 85 years of age. Age, Gender and LV dysfunction are the most

powerful predictors of in-hospital and 30day mortality in various studies.[25,26]

Limitations

Our analytical study reflects a single tertiary care institute retrospective observation. It is not a population-based study. This may result in several bias. The clinical follow-up details of the patients were not available. Though, ECG and Echocardiography are important for diagnosis and management of STEMI, Gold standard coronary angiography was not done in our study.

CONCLUSION

Majority of the elderly STEMI patients belonged to 60-70 years' age group and were male. However, the number of female patients with STEMI increased with increasing age. Above the age of 80 years, there were more Female than Male patients with STEMI. Although, the chest pain was the commonest presenting symptom, atypical presentations were seen in significant number of cases which included dyspnoea, nausea, vomiting and dizziness. Conventional risk factors like Type II Diabetes Mellitus and Systemic Hypertension were commonly present in both genders in the elderly. Most of the patients presented between 6-12 hours after the onset of symptom. 39% of cases did not receive Thrombolysis. Advanced age and delayed presentation to the hospital were the main reasons for not thrombolysing them. Inferior wall MI was slightly more common than AWMI. RVMI occurred in 37.21% of elderly STEMI patients with Acute IWMI. LV systolic dysfunction with increasing severity was observed in AWMI than in IWMI. Patients who did not receive thrombolysis also showed increased severity of LV systolic dysfunction. Ischaemic mitral regurgitation was present in 65.52% of elderly STEMI patients. Advanced age, female gender, multiple risk factors, co-morbid conditions, extensive infarction and severe LV systolic dysfunction were the major contributors of Hospital Mortality in elderly Acute STEMI patients.

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