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CLINICAL PROFILE OF STEMI PATIENTS AND IT'S CORRELATION WITH ECHOCARDIOGRAM AND ANGIOGRAPHIC FINDING

General Medicine

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ABSTRACT

Worldwide, coronary artery disease (CAD) is a leading factor in mortality and morbidity. India is experiencing issues with both communicable and non-communicable diseases as a result of epidemiologic, demographic, and health changes. Cardiovascular disease is the major cause of death in the 25-69 age range, accounting for 25% of all male fatalities. Coronary heart disease is the most important form of heart disease and single most cause of death. Acute myocardial infarction (AMI) continues to be a major public health problem in the industrialized world and is becoming an increasingly important problem in the developing world. It is a fatal event in approximately one third of patients with acute MI. An acute ST-elevation myocardial infarction (STEMI) is an event in which transmural myocardial ischemia results in myocardial injury or necrosis. For a long time the 12-lead electrocardiogram (ECG) was considered an essential part of the diagnosis and initial evaluation of patients with chest pain. Patients with ST elevation or new left bundle branch block are usually referred for immediate reperfusion therapy, whereas those without ST deviation or those with predominately ST depression are usually treated conservatively initially.

KEYWORDS

Coronary heart disease, Acute myocardial infarction, Stemi, Echocardiogram.

INTRODUCTION

Coronary heart disease is the most important form of heart disease and single most cause of death. Acute myocardial infarction (AMI) continues to be a major public health problem in the industrialized world and is becoming an increasingly important problem in the developing world. It is a fatal event in approximately one third of patients with acute MI. In 2019, IHD affected around 126 million individuals globally (1,655 per 100,000), which is estimated to be 1.72% of the world's population.[1] MI is defined pathologically as myocardial cell death due to prolonged ischemia. The clinical definition of MI denotes the presence of acute myocardial injury detected by abnormal cardiac biomarkers in the setting of evidence of acute myocardial ischemia. The term acute myocardial infarction should be used when there is acute myocardial injury with clinical evidence of acute myocardial ischemia and with detection of a rise and/or fall of cTn values with at least one value above the 99th percentile URL and at least one of the following symptoms of myocardial ischemia; new ischaemic ECG changes; development of pathological Q waves, imaging evidence of new loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischaemic etiology and identification of a coronary thrombus by angiography or autopsy.[2]

An acute ST-elevation myocardial infarction (STEMI) is an event in which transmural myocardial ischemia results in myocardial injury or necrosis.[3] For a long time the 12-lead electrocardiogram (ECG) was considered an essential part of the diagnosis and initial evaluation of patients with chest pain. Patients with ST elevation or new left bundle branch block are usually referred for immediate reperfusion therapy, whereas those without ST deviation or those with predominately ST depression are usually treated conservatively initially.[4,5] Patients are diagnosed as having anterior, inferior-posterior, or lateral myocardial infarction based on the patterns of ST deviation and assessment of risk is usually based on simple crude measurements of the absolute magnitude of ST segment deviation or the width of the QRS complexes.[6] The ECG may help in assessing the size of the myocardial ischaemic area at risk, may help in differentiation between subendocardial and transmural ischaemia, and may assist in identifying the presence of previous infarction (abnormal Q waves in leads not involved in the present infarction, For example, abnormal Q waves in the precordial leads in patient with inferior ST elevation).[7] Furthermore, some ECG patterns may indicate presence of diffuse coronary artery disease and remote ischaemia.[8,9] Left anterior descending (LAD) coronary artery obstruction usually causes ST elevation in the precordial leads V1-V4.[10] In relatively rare instances, ST elevation in leads V1-V4 signifies proximal right coronary artery occlusion with concomitant right ventricular infarction.[11-13] Thrombolytic therapy for patients with AMI improves the coronary artery patency, limits AMI size, improves left ventricular function and survival, as demonstrated in large placebo-controlled clinical trials. With the advent of interventions aimed at limiting AMI size, it becomes important to assess the amount of ischemic myocardium in the early phase of AMI, and to develop non-invasive methods for evaluation of these therapies.[14] Hence, the present study was done to evaluate clinical profile of STEMI patients and its correlation with echocardiogram and angiographic findings.

MATERIAL AND METHODS

The present observational study was conducted at Department of Medicine in a Tertiary care hospital during the study period of October 2020 to September 2022.

Inclusion Criteria:

- Newly diagnosed patients.
- Chest pain (for >30 min or angina equivalent) accompanied by ST segment elevation.
- Patient suitable for angiography ie no known allergy to iodinated contrast.
- Patient without implanted pacemakers or valve prosthesis.

Exclusion Criteria:

- Not willing to participate in study.
- Presence of right or left bundle branch block.
- Known case of valvular heart disease.
- Patient with implanted pacemakers or valve prosthesis

Date Collection:

After approval from Ethical committee and obtaining informed consent from the patients, data was collected through interview and review of medical records. Patient with AMI during study period were selected on random basis for study. Nature and purpose of study was described to subjects and informed consent was obtained from those willing to participate in study. Pre-Structured proforma was used to record personal details. Detailed history noted regarding demographic data, risk factors, symptoms at presentation, vitals were noted. Patient's vitals such as pulse rate in radial artery, blood pressure in supine position with use of mercury sphygmo manometer, respiratory rate and temperature was recorded every day during admission period physical examination also includes measurement of height in centimeter, weight in kilograms and BMI according to it. BMI (Body Mass Index) = weight in kilogram/ height in meter^2. Findings in ECG, echocardiogram and Angiography noted. Routine and relevant blood examination included in case proforma sheets. The clinical data studied include demographic features like diabetes mellitus, systemic hypertension, Dyslipidemia, Tobacco Smoking (or) 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 KILLIPS CLINICAL CLASS of the patient were analyzed. The serial Electrocardiograms recorded by the computerized 12 channel E.C.G machine (BIONET) were analyzed for ST segment elevation (or) depression, pathological Q waves, Tachy (or) Bradyarrhythmia 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 24hours of admission of the patient to C.C.U. and at the time of discharge. The data studied include regional wall motion abnormality suggestive 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.

Statistical Analysis:

The statistical analyses performed using the Statistical Package for Social Science (SPSS) version 26 for Windows. Chi square test was used for correlation between variables. Frequency and proportions were reported for categorical variables. The p-value < 0.05 was considered for statistically significance.

RESULTS:

was observed that majority of patients were having hypertension (29%), diabetes Mellitus (21%) and Smoking was present in 32% patients with BMI >22.9 kg/m2 among 12% patients, family history of coronary artery disease was present in 10% patients. Majority of patients presented with chest pain (81%) followed by breathlessness (51%), sweating (43%), vomiting (33%) and epigastric pain (10%). majority of patients with ECHO showed Antero septal RWMA (100%) as compared to ECG findings (91.17%) with statistically significant difference. (P<0.05). Similarly, localization by CAG was accurate compared to ECG findings for other vessels with statistically significant difference. (P<0.05)

Table 1: Demographic Profile

Demographic profiles	No of Patients	Percentage
Age group (years)		
<40	03	03.00
41-50	21	21.00
51-60	38	38.00
61-70	26	26.00
>70	12	12.00
Gender		
Male	68	68.00
Female	32	32.00

Table 2: Risk Factors And Symptoms

Risk factors	No of patients (n=100)	Percentage
Hypertension	29	29.00
Diabetes Mellitus	21	21.00
Previous MI H/O without revascularization	11	11.00
Previous MI H/O with revascularization	07	07.00
Smoking	32	32.00
Serum Hypercholesterolemia (>200mg/dl)	19	19.00
BMI (>22.9 kg/m^2)	21	21.00
Family history of CAD	10	10.00
Symptoms		
Chest pain	81	81.00
Breathlessness	51	51.00
Sweating	43	43.00
Vomiting	33	33.00
Palpitation	26	26.00
Syncope	23	23.00
Epigastric pain	10	10.00

Table 3: Distribution Of Cases According To ECG Type Of MI, 2D Echo Findings, Vessel Disease.

Type of MI	No of patients	Percentage
Extensive Anterior Wall MI	14	14.00
Anteroseptal wall MI	34	34.00
Antero lateral wall MI	12	12.00
Inferior Wall MI	26	26.00
Inferolateral Wall MI	09	09.00
Inferoposterior Wall MI	05	05.00
Echo Findings		
Ejection fraction >35%	58	58.00
Ejection Fraction <35%	42	42.00
Acute MR	06	06.00
Free Ventricular wall rupture	01	01.00
Anterior Wall RWMA	19	19.00
Antero septal RWMA	31	31.00
Antero lateral RWMA	10	10.00
Inferior wall RWMA	28	28.00
Inferolateral wall RWMA	07	07.00
Inferoposterior Wall RWMA	05	05.00
CAG Findings		
SVD	55	55.00
Double-vessel disease	24	24.00
Tripple vessel disease	31	31.00
Vessel involved	Frequency	Percentage
Proximal LAD	14	14.00
MID LAD	34	34.00
LAD Before Diagonal	12	12.00
Proximal RCA	24	24.00
LCx	16	16.00

Table 4: Localization

Vessel involved	Frequency	Percentage
Proximal LAD	14	14.00
MID LAD	34	34.00
LAD Before Diagonal	12	12.00
Proximal RCA	24	24.00
LCx	16	16.00
Localization by CAG		
Proximal LAD	12	12.00
Mid LAD	38	38.00
LAD Before diagonal	10	10.00
Proximal RCA	26	26.00
LCx	14	14.00

Table 5: Correlation between ECG and Echo findings

ECG Findings	ECHO Findings						Total
	Anterior Wall RWMA	Antero septal RWMA	Antero lateral Wall RWMA	Inferior wall RWMA	Infero lateral wall RWMA	Infero posterior Wall RWMA	
Extensive Anterior Wall MI	14	00	00	00	00	00	14
Antero septal wall MI	01	31	00	02	00	00	34
Antero lateral Wall MI	02	00	10	00	00	00	12
Inferior Wall MI	00	00	00	26	00	00	26

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Inferolateral Wall MI	02	00	00	00	07	00	09
Inferoposterior Wall MI	00	00	00	00	00	05	05
Total	19	31	10	28	07	05	100

(P=<0.05*)

Table 6: Correlation Of Localization By ECG And CAG Findings*

ECG localization	CAG localization					Total
	Proximal LAD	Mid LAD	LAD before Diagonals	Proximal RCA	LCx	
Proximal LAD	12	02	00	00	00	14
Mid LAD	00	34	00	00	00	34
LAD before Diagonal	00	02	10	00	00	12
Proximal RCA	00	00	00	24	00	24
LCx	00	00	00	02	14	16
Total	12	38	10	26	14	100

(P=<0.05*)

Table 7: Comparison Of Risk Factors According To Risk Categories

Risk factors	Low risk (12)	Intermediate risk (26)	High risk (67)	P value
Age	50.58± 13.98	54.96± 10.24	61.51± 9.53	Low Vs Int-Significant Int Vs High-Significant
Sex (male)	10	14	40	0.37
HTN	4	6	34	0.08*
DM	0	5	35	0.000***
Alcoholic	5	5	16	0.31
Tobacco	8	18	51	0.03*
Smoking	0	1	5	0.01*

DISCUSSION

The present observational study carried out at Tertiary Institute to study clinical profile of STEMI patients and its correlation with echocardiogram and angiographic findings. All patients with diagnosis of acute myocardial infarction admitted to the CCU enrolled in study during the study period of September 2020 to August 2022.

The majority of patients in the current study were found to be between the ages of 51 and 60 (38%) and 61 and 70 (26%), with patients between the ages of 41 and 50 (21%) coming in second. Similar research was conducted by Gopalakrishnan et al. [15] who found that the age range most frequently affected by acute ST-elevation myocardial infarction (STEMI) patients was 40 to 60 years old (51.27%). The majority of patients in the study by NT Subramanyam et al.[16] were found to be between the ages of 51 and 60, making up 38% of all instances of acute MI. This conclusion agreed with the current research. In a study on the connection of 2D-Echocardiography results in young patients with myocardial infarction, Ashish Goel et al.[17] found that the study group's mean age was 36.2 years. The majority of patients in our study (68%) were male, while 32% were female, which is consistent with research by Gopalkrishnan et al. [15], NT Subramanyam et al. [16], and Ashish Goel et al. [17]. According to the distribution of patients' risk factors for AMI, the majority of patients had hypertension (29%), diabetes mellitus (21%) and a history of MI (11%). According to Ashish Goel et alstudy[17], .'s which found that 25% of patients had a history of hypertension and 20% had diabetes, smoking was present in 32% of patients with BMI >22.9 kg/m2 among 12% of patients. In a study, NT Subramanyam et al.[16] found that smoking was present in 22 (44%) of the cases and that diabetes mellitus was present in 17 (34%) of the cases. In a study by R Vedamanickam et al.[18], patients with diabetes and hypertension were found to have the majority of the risk variables that were higher than the rest. The majority of patients (81%) who were distributed according to AMI symptoms reported chest pain, followed by dyspnea (51%), sweating (43%), vomiting (33%) and epigastric pain (10%). Chest pain was the most frequent presenting symptom (72.88%), according to a study by Gopalakrishnan et al. Chest pain, followed by dyspnea and perspiration, was the most prevalent symptom in the study by NT Subramanyam et al. [16]. In the majority of cases, the typical signs of acute MI were present. Huggins GS et al[19] similarly described this. This was comparable to what Muller JE et al's[20] investigation described. The distribution of patients by AMI type was investigated. The majority of patients (34%) had an anterior wall MI, which was followed by inferior walls (26%) and posterior walls (14%) and inferior-posterior walls (5%). According to 2D ECHO results from the current study, it was determined that the majority of patients (42%) had aberrant Ejection Fraction, which was followed by Antero Septal RWMA (31) and Inferior Wall RWMA (28%), with one patient also having a Free Ventricular Wall Rupture. Antero septal RWMA was seen in the majority of patients with ECHO (100%) compared to ECG results (91.17%), with a statistically significant difference. (P<0.05) When compared to ECG findings (85.71%), the majority of patients with CAG demonstrated the placement of the proximal LAD (100%) with a statistically significant difference. (P<0.05) Similar to this, localisation by CAG for additional vessels was accurate when compared to ECG findings with a statistically significant difference. (P<0.05). The majority of patients with ECHO revealed aberrant EF (78.57%) as compared to ECG findings (42.86%), with a statistically significant difference, according to a research by Ruram JA et al. (P<0.05). When compared to ECG findings (79.24%), it was seen that the majority of patients had Proximal LAD location on ECHO (89.36%). This difference was statistically significant. (P<0.05) Similar to this, localisation by CAG for additional vessels was accurate when compared to ECG findings with a statistically significant difference. (P<0.05). ECG and echocardiogram showed good concordance in terms of assessing the infarct site, however echo showed wider extension, according to Penco M. et al. In terms of the infarct site, anterior acute myocardial infarction showed a good correlation, whereas inferior acute myocardial infarction did not. Similar to this, Shah et alstudy[23] .'s found that while segmental wall motion abnormalities on echocardiography are frequently more extensive than on ECG and may occur in areas that are seemingly remote from the putatively infracted zone, the two methods have a good correlation for locating the site of infarction. The majority of patients in the current study (63.81%) had high risk, followed by intermediate risk (24.76%), and low risk (11.43%). It was found that high risk categories were substantially connected with age >60, risk factors for hypertension, Diabetes Mellitus, tobacco use, and smoking. The risk factors of smoking, hypertension, sedentary lifestyle, and male sex have higher incidences of left ventricular dysfunction as well as complications on 2D-Echocardiography, according to Ashish Goel et al's study[17] on the correlation of 2D-Echocardiography findings in young patients with myocardial infarction. The 2D Echo was performed post-MI in this study, and since there is a correlation between risk variables and the 2D Echo outcome post-MI and since it is a non-invasive treatment, it may aid in the patient's risk stratification. Due to changes in food habits, stress levels, and workload, myocardial infarction rates are increasing in young people. Incidence remained higher in men than in women. Smoking and dyslipidemia are highly correlated risk factors in young myocardial infarction patients. Several well-known risk factors for myocardial infarction, such as diabetes, hypertension, and obesity, are strongly correlated with the condition and appear to be becoming more common. The importance of prognostic information for risk stratification, the relevance of 2D-Echocardiography in determining the diagnosis, location, and degree of MI, in identifying mechanical consequences of infarction, and in diagnosing. The accurate non-invasive examination of echocardiography allows for the diagnosis of myocardial dysfunction brought on by ischemia or necrosis. When the ECG is non-diagnostic, evaluation of wall motion while a patient is suffering chest discomfort may be helpful. Even in the absence of chest pain, evaluation of wall motion may be helpful if there is laboratory or ECG evidence of MI. Within seconds of coronary artery blockage, severe ischemia results in regional wall motion abnormalities (RWMAs), which can be seen echocardiographically (12. 5 and 19. 8 seconds in two series of patients assessed after transitory coronary occlusions caused by angioplasty). These alterations take place before ECG alterations or the emergence of symptoms. The RWMAs show localised reductions in myocardial excursion amplitude and rate, as well as localised remodelling and myocardial thickness to a lesser extent.[8]

CONCLUSION

Due to changes in food habits, stress levels, and workload, myocardial infarction rates are increasing in young people. Several well-known risk factors like diabetes, hypertension, and obesity are strongly connected with myocardial infarction and their occurrence appears to be rising. An electrocardiogram is crucial for identifying and categorising myocardial infarction. Myocardial infarction management is based on the degree of coronary artery obstruction, which is determined by coronary angiography. ECG was very helpful in predicting the degree of coronary artery obstruction to a statistically significant level that was comparable to the findings of an angiogram.

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