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ORIGINAL RESEARCH

CLINICAL PROFILE AND OUTCOME OF PATIENTS WITH ACUTE MYOCARDIAL INFARCTION IN COVID19 PANDEMIC - AN OBSERVATIONAL STUDY FROM TERTIARY CARE HOSPITAL

Dr. S. Murugarajan

Assistant Professor, Department of Cardiology, Government Royapettah Hospital, Kilpauk Medical College, Chennai, Tamil Nadu, India

Correspondence:
Dr. S. Murugarajan
Assistant Professor, Department of Cardiology, Government Royapettah Hospital, Kilpauk Medical College, Chennai, Tamil Nadu, India
Email: murugarajan121@gmail.com

Abstract

Background: Twenty million patients have been impacted by the COVID-19 pandemic worldwide, with two million instances coming from India. To slow the pandemic, the lockdown was implemented. But it unintentionally affected urgent cardiovascular care, particularly for acute myocardial infarction (AMI). Observational studies have revealed a decline in AMI hospital admissions throughout the pandemic period in a number of wealthy nations. We aimed to evaluate the impact of COVID-19 on the AMI admissions patterns in our tertiary care centre.

Methods: All AMI cases admitted to the hospital during the research period of 15 May 2021 to 15 July 2021 were included in this observational, cross-sectional analysis. To compare them, we used a historical control of all AMI cases admitted during the same period in the year 2019.

Results: The results showed that 84.9% subjects were males and 15.09% subjects in the current study were females. The mean age of the subjects was found to be 52.64 ± 10.07 years. In table 2 distribution of subjects according to various variables was done. It showed that maximum subjects had a diagnosis of AWMI (39.6%), followed by IWMI (16.98%). Comorbidities like diabetes mellitus, hypertension, CAD and CVA were seen in 30.19%, 24.53%, 7.55%, 5.66% subjects respectively. It was also seen that most of the subjects indulged in some habits. It was found that 43.4% of subjects had a habit of both smoking and alcohol consumption.

Conclusions: Overall it was found that 28% of patients had covid RT-PCR positive and CT chest positive. Out of these covid positive patients, 20% died due to severe Lung Involvement (ARDS) or rarely due to severe LV dysfunction secondary to fulminant myocarditis. Remaining 80% covid positive patients (both RT –PCR positive and CT chest positive) were

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completely recovered. This study offers empirical support for the effect of COVID-19 on AMI treatment in India. Based on the results of this study, we may be able to recommend suitable modifications to the current MI guidelines and inform the public about the need for urgent care for AMI during the COVID-19 pandemic.

Keywords: Acute Myocardial Infarction, COVID-19, Unstable angina

Introduction

India was the nation most severely impacted by the second wave of the COVID 19 epidemic and ranked first globally with more than 4 lakh cases reported daily[1]. As a result, the entire country was having trouble controlling the pandemic. The whole healthcare system, as well as the entire country, was devoted to fighting the pandemic and getting ready with beds, oxygen, and manpower. Only the necessary services were allowed to function during the pandemic. Care for acute coronary syndrome during the pandemic was indirectly impacted for a number of reasons. The prothrombotic condition and the risk of myocardial infarction are both exacerbated by COVID19 infection.

Observational studies from different parts of the world have demonstrated that during pandemics, there is an increase in the time it takes for a patient to seek medical attention for chest pain, a decrease in admissions for acute coronary syndrome, a decrease in cardiac interventions, and a decrease in both primary and elective PCI[2-4]. Even inside our own nation, there may be a connection between the apparent decline in AMI admissions and hospitals' reduced use of transport services during times of lockdown, patient anxiety, and other relevant factors. Despite the fact that COVID 19 has a higher thrombotic state and is stressing the public more, the relative decline in AMI hospital admissions must be sought after. According to data from Italy, there are more cardiac arrests that occur outside of hospitals and are most likely caused by AMI[3].

Due to the country's poor economic standing and the lack of primary PCI in the majority of Government hospitals during this epidemic, the scenario for managing STEMI in India is further complex. Now, as advised by recent recommendations, the standard of care for STEMI patients is initial fibrinolytic therapy followed by elective PCI after learning the patient's COVID status in the majority of hospitals in India during the peak of COVID pandemic.

Rationale for the study

Particularly during this second wave of the pandemic, little was known about the COVID pattern among the AMI patients admitted. We anticipate that research among AMI patients will shed some information on how covid affects acute coronary syndrome. This will facilitate the pandemic's control of AMI even more.

Aim and objectives of the study

- To find the covid pattern among the AMI patients.
- To find the outcome of AMI patients with COVID 19 infection.

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Material and methods

This observational, cross-sectional study was conducted at a single site among all AMI patients admitted to the ICCU of Government Royapettah Hospital between May 15 2021 and July 15 2021.

Inclusion criteria

- All patients Age >18 years, admitted to hospital with diagnosis of AcuteMyocardial Infarction. AMI INCLUDES BOTH STEMI AND NSTEMI as defined by ACC/AHA Guidelines.
- STEMI: New ST –segment elevation at the j point in 2 contiguous leads with the cut off point as greater than 0.1 mV in all leads other than v2-v3
- In leads v2-V3, the cut-off point is greater than 0.2 mV in men older than 40 years and greater than 0.25 mV in men younger than 40 years old or greater than 0.15 mV in women.
- Modified scarbossa criteria are used for diagnosing STEMI in pre-existing LBBB.
- NSTEMI: defined as new onset chest pain consistent with ACS and troponin elevation but ECG changes not consistent with STEMI. Other criteria used are, there should be typical ischemic symptoms, typical ECG changes, new regional wall motion abnormalities as used in fourth universal definition of MI.

Exclusion criteria

STEMI outside of the 14-day window, NSTEMI without Troponin elevation, and study participants who did not provide informed consent are not included in the study.

SPSS 22 was used to do the statistical analysis. Significant data was defined as a p value <0.05. Mean and standard deviation were used to express quantitative variables. Frequencies and percentages were used to express qualitative characteristics. These categorical variables were compared between the groups using the chi-square or Fisher's exact test.

Results

The results showed that 84.9% subjects were males and 15.09% subjects in the current study were females (graph 1). The mean age of the subjects was found to be 52.64 ± 10.07 years (table 1). In table 2 distribution of subjects according to various variables was done. It was seen that out of all the patients, 141(88.68%) had AMI and 18(11.32%) had unstable angina (UA). It showed that maximum subjects had a diagnosis of AWMI (39.6%), followed by IWMI (16.98%). Comorbidities like diabetes mellitus, hypertension, CAD and CVA were seen in 30.19%, 24.53%, 7.55%, 5.66% subjects respectively (table 2). It was also seen that most of the subjects indulged in some habits. It was found that 43.4% of subjects had a habit of both smoking and alcohol consumption.

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Table 1: Distribution of subjects according to age and gender

Variables (n=159)	N	%
Gender		
Males	135	84.9
Females	24	15.09
Age (Mean ± SD) in years	52.64 ± 10.07	

Graph 1: Gender distribution of subjects

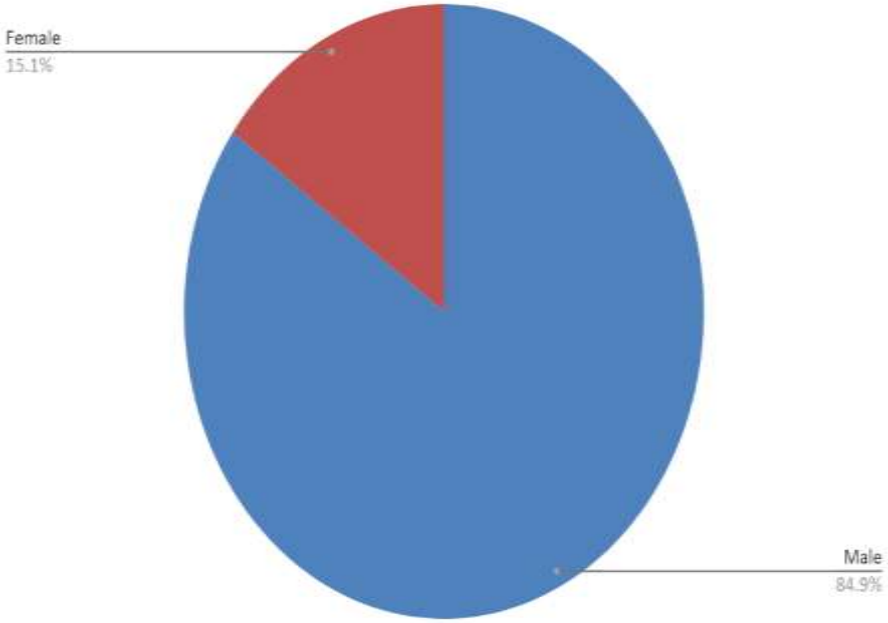

Table 2: Distribution of subjects according to other variables

Variables (n=159)	N	%
Diagnosis		
ALMI	12	7.5
AWMI	63	39.6
IPWMI	12	7.5
IPWMI/RV	3	1.89
NSTEMI	15	9.43
PWMI	3	1.89
UA	18	11.32
IVMI/RV	6	3.77
IWMI	27	16.98
Comorbidities present		
DM	48	30.19

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Hypertension	39	24.53
CAD	12	7.55
CVA	3	5.66
Habits		
Smokers	15	9.43
Smoker and Alcohol	69	43.40
Alcohol	6	3.77
None	69	43.40

Table 3: Clinical variables

Clinical Variables (N=159)	Mean	SD
EF (%)	45.88	9.04
TC(m/cL)	159.44	37.99
LDL (mg/dL)	90.09	31.66
HDL (mmol/L)	40.90	8.94
VLDL (mg/dL)	28.27	17.41
Triglycerides(mg/dL)	140.75	87.16
Abdominal Circumference	98.35	5.49
BMI (Kg/m^2)	27.13	3.11
RBS (mg/dL)	161.88	80.58

Table 3 & graph 2 demonstrated the distribution of subjects according to clinical findings. It was seen that the Mean EF was 45.88 ± 9.04%, and mean TC was 159.44 ± 37.99 m/cL. The mean LDL, HDL, VLDL and triglycerides was 90.09 ±31.66 mg/dL, 40.90 ± 8.94 mmol/L, 28.27 ± 17.41 mg/dL, and 140.75 ± 87.16 mg/dL respectively. The mean BMI was 27.1± 3.11 kg/m^2. The mean random blood sugar was found to be 161.88 ± 80.58 mg/dL. The status of the subjects according to COVID-19 was seen in table 4. It was found that 92.45% subjects tested negative for COVID-19 and only 7.54% subjects had positive results. It showed that 20.75% subjects had positive CT findings and 79.25% subjects had negative CT findings. COVID symptoms were present in 50.94% of subjects. Almost all the subjects (92.45%) had taken all the doses of COVID-19 Vaccine. It was seen that only 3 (6.38%) AMI patients were COVID positive. Out of all the COVID positive(n=4) only 2(50%) had positive CT findings. Amongst all the COVID negative patients(n=49), 7(14.29%) had positive CT findings.

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Graph 2: Clinical Variables

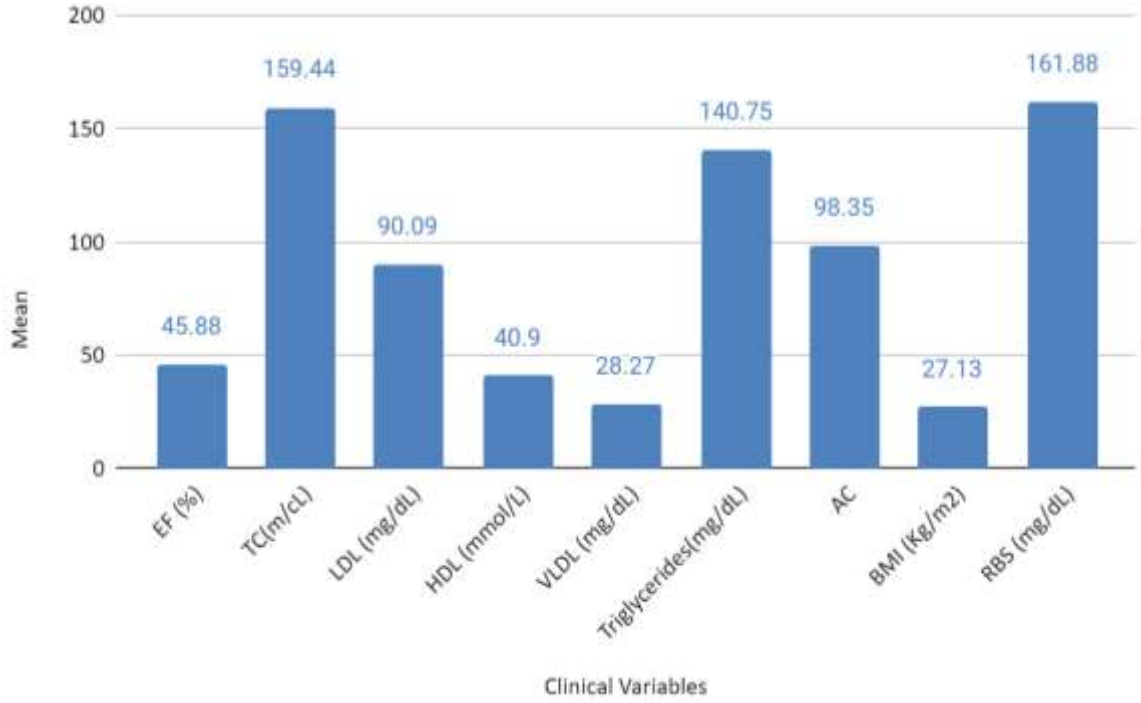

Table 4: Status of subjects according to COVID 19

Variables	N	%
COVID Status		
Positive	12	7.54
Negative	147	92.45
CT Findings		
Positive	33	20.75
Negative	126	79.25
COVID Symptoms		
Present	81	50.94
Absent	78	49.06
COVID Vaccine		
All doses	147	92.45
Single dose	12	7.54

Discussion

Based on our study, we observed that COVID-19 is also an important risk factor to be considered as a potential cause of acute coronary syndrome in addition to conventional ASCVD Risk factors.

According to our knowledge, this is the first study to examine how COVID-19's effects on the prognosis of AMI patients during the outbreak. The key discovery is that patients with

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AMI had an independent risk factor for in-hospital mortality called COVID-19. In populations of patients with STEMI[5-8] and NSTEMI[9,10], numerous multivariable prognostic models have been created, but none during the COVID–19 pandemic.

When we examine the potential causes of this finding, the first difference we see is that individuals with COVID-19 experienced unusual symptoms more frequently, especially those that were suggestive of a respiratory illness, such fever and cough. It's possible that the delayed diagnosis led to later treatment, which ineluctably led to worse outcomes. Female sex is another factor that could cause a delay in the diagnosis of AMI because of its unusual presentation. AMI in women presents atypically (women experience symptoms other than normal chest pain, such as asthenia and dyspnea) and is linked to a worse prognosis, same like in individuals with COVID-19.[11,12] The COVID-19 group had greater levels of the acute-phase reactant C-reactive protein. Future cardiovascular events can be predicted by this protein, which represents systemic and vascular inflammation. Elevated C-reactive protein can assist doctors identify individuals who may be at risk of cardiovascular problems and is a predictor of unfavourable outcomes in AMI patients[10]. Plasma indicators of inflammation may be used to predict coronary events because atherosclerosis is an inflammatory process.

We observed that traditional risk factor like LDL-cholestrol is under control in predominant Acute Myocardial infarction (AMI) patients and most of these patients have more thrombotic lesion due to increased prothrombotic state observed in COVID-19 infection. Prothrombotic state in coronaries is assessed by CRP level whereas d-Dimer is useful in assessing Pulmonary microvasculature prothrombotic state.

Echocardiogram is one of the useful tools to prognosticate Acute MI patients admitted with Covid 19 infection. Echocardiogram is useful in assessing Global LV function and also useful to assess RV function and to diagnose pulmonary embolism. Echocardiogram is useful in differentiating Myocarditis from ischemic heart disease.

We also observed that Troponin and Pro BNP levels are useful in ACS patients admitted during covid pandemic in Intensive cardiac care setting to prognosticate the condition.

The prognosis of AMI in patients with COVID-19 is not well understood. In a recent study, Bangalore et al[13]. found that one-third of the patients had nonobstructive coronary artery disease . The percentage of myocardial infarction with nonobstructive coronary arteries was comparable in our sample of individuals with AMI who had coronary angiography.

The severity of the COVID-19 pneumonia and the direct myocardial injury, with coronary thrombosis more of a bystander than an actor in the disease process. Overall it was found that 28% of patients had covid RT-PCR positive and CT chest positive . Out of these covid positive patients , 20% died due to severe Lung Involvement (ARDS) or rarely due to severe LV dysfunction secondary to fulminant myocarditis . Remaining 80% covid positive patients (both RT –PCR positive and CT chest positive) were completely recovered .

All our patients underwent conventional Pharmaco- Invasive strategy and found that the predominant coronary lesion was High thrombotic load and minimal Atherosclerotic plaque , implicating the role of prothrombotic state of COVID-19 in coronary vasculature .

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Conclusion

This study found that Pharmaco-Invasive strategy is effective in managing Acute Myocardial infarction during COVID-19 pandemic. This study offers empirical support for the effect of COVID-19 on AMI treatment in India. Based on the results of this study, we may be able to recommend suitable modifications to the current MI guidelines and inform the public about the need for urgent care for AMI during the COVID-19 pandemic. We also gave additional Rivoroxaban 10mg once daily for 30 days to prevent Recurrent MI for those who have very high thrombus burden with Ectatic coronaries in coronary angiography with less bleeding risk individuals. Further multicenter studies were needed to generalize this approach.

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