

## Pattern of Acute Myocardial Infarction admissions in RIMS hospital during COVID19 era

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### Abstract:

**Background:** COVID-19 pandemic has affected around 30million patients worldwide and 5 million cases from India. The lockdown was employed to delay the pandemic. However, it had an unintentional impact on acute cardiovascular care, especially acute myocardial infarction (AMI). Observational studies have shown a decrease in hospital admissions for AMI in several developed countries during the pandemic period.

**Aim:** To evaluate the impact of COVID-19 on the AMI admissions patterns in RIMS hospital. Major objective of the study is to analyze the changes in the number of hospital admissions for AMI in RIMS hospital. In addition, we intend to evaluate the impact of COVID-19 on the weekly AMI admission rates, and other performance measures like rates of thrombolysis/primary percutaneous interventions (PCI), window period, door to balloon time, and door to needle time. Other objectives include evaluation of changes in the major complications and mortality rates of AMI and its predictors during COVID-19 pandemic.

**Methods:** In this observational study, we included all AMI cases admitted to RIMS hospitals during the study period 15th March to 15th september 2020 and compared them using a historical control of all cases of AMI admitted during the corresponding period in the year 2019.

**Results:** There is definite reduction in the number of hospitalization, number of pharmacological thrombolysis, interventional treatment. There is definite increase in complications (cardiogenic shock) and in hospital mortality compared to corresponding period 2019.

**Conclusions:** This study will provide scientific evidence about the impact of COVID-19 on AMI care in RIMS hospital. Based on this study, we may be able to suggest appropriate changes to the existing MI guidelines and to educate the public regarding emergency care for AMI during COVID-19 pandemic.

**Keywords:** COVID-19, Acute Myocardial Infarction(AMI), thrombolysis, cardiogenic shock

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### I. Introduction:

By the end of August 2020, India has become the 3<sup>rd</sup> worst affected country of COVID-19 in the world. The pandemic and the lockdown imposed by the government to control its transmission has disrupted normal life in most parts of the country. To prevent overload to the health systems, most hospitals are discouraging elective hospital admissions.

Considering the pathogenesis of COVID-19 infection, one would expect an increase in acute myocardial infarction (AMI) admissions during this period. Acute inflammatory response to the viral infection may facilitate plaque rupture and myocardial infarction. Sars Cov 2 infection has been shown to cause increase thrombogenicity which can theoretically lead to more cases of AMI. In addition, most Indians are forced to lead a sedentary lifestyle with government discouraging outdoor activities. This coupled with altered dietary habits during lockdown can increase risk of atherothrombotic events. Emotional stress due to fear of the infection and anxiety about relatives stranded in other parts of the world may also trigger more acute coronary events. Many families in India are facing financial difficulties due to job loss and decreased economic activities due to lockdown. Patients with established heart disease, hypertension and diabetes are defaulting on maintenance drugs due to poor finances, and lack of transport facilities.

However in many parts of the world investigators have observed reduced rates of emergency hospital admissions for acute cardiovascular admissions. In Austria, admissions due to acute coronary syndrome (ACS) reduced by 39% in the last week of March compared to first week<sup>2</sup>. In a study from Italy carried out by Italian society of cardiology in 54 hospitals taking care of AMI patients, it was found that AMI admissions decreased by 48.4% through out one week period during covid era compared to equivalent week in 2019<sup>3</sup>. The reduction was significant for both ST elevation MI (STEMI) and non ST elevation MI (NSTEMI). STEMI case fatality rate during pandemic was substantially increased compared with 2019. A study from US compared weekly

incidence rates of hospitalization for acute MI(STEMI and NSTEMI) in Northern California ,before and after March 4<sup>th</sup>, when the first death from COVID -19 was reported<sup>4</sup>. AMI admissions rate was also compared with data from the same time period 2019. The weekly rates of hospitalization decreased by about 48% during COVID-19 period compared to the period before March 4<sup>th</sup> in the same year. Acute MI admission rates were also significantly lower compared to the same time period in the previous year. Similar findings were reported from other countries as well.

Fall in AMI admissions can be due to a true fall in its incidence. The lockdown has resulted in a more relaxed lifestyle, more time for spending with family, no competition in work place and less interactions with stressful situations of daily living like navigating traffic, daily chores, and meeting deadlines. Many Indian cities are observing decrease in air pollution due to the effects of lockdown. Air pollution has been shown to cause triggering of MI. Another possibility is that people with AMI are not seeking emergency care because of fear of getting infected with COVID-19 from hospitals or because of lack of transport facilities. In India, most large hospitals are overburdened with COVID-19 cases and strict isolation in ICU is challenging. There can be reluctant of patients with AMI to approach hospitals for fear of getting infected. CREATE registry has shown that patients with ACS in many parts of India reach predominantly by public transport or own transport due to non-availability of emergency ambulance services<sup>5</sup>. Lockdown has resulted in cessation of public transport and restrictions on private transport and people are discouraged from travelling. This can also lead to fall in ACS admissions in India.

First case of COVID-19 in India was reported on 30<sup>th</sup> January 2020 in the state of kerala in a university student from Wuhan who travelled back to state. By mid March, number of confirmed cases exceeded 500 and government of India instituted nationwide lockdown from 24<sup>th</sup> of March 2020. All the transport services were suspended and people were asked to avoid stepping out of their homes. Lockdown was extended further in 4 additional phases with relaxations in certain defined areas. For this purpose, the districts were divided as red zone , orange zone and green zone based on number of confirmed COVID -19 cases. In Manipur also similar restrictions were imposed since March 2020.

Manipur state has population of about 30 lakhs. COVID-19 and the resulting lockdown has certainly impacted acute cardiac care in the state. Hence it is important to study the pattern of admissions for AMI in the state in the COVID era. Regional Institute of Medical Sciences (RIMS) is the main tertiary care and main referral teaching hospital of the state.

#### **Aims and objectives:**

1. To find out change in the number of AMI admissions in RIMS hospitals in Manipur the period from 15<sup>th</sup> March to 15<sup>th</sup> of September 2020 (COVID-19 era) compared to corresponding period in 2019.
2. To find out mortality rate of AMI patients admitted at RIMS hospital during COVID-19 era compared to corresponding period in 2019.
3. To find out type of AMI (STEMI Vs NSTEMI),rate of coronary angiography and PTCA, rate of PCI , thrombolysis or revascularization and time windows for STEMI, and rate of major complications for AMI in RIMS during COVID-19 era compared to corresponding period in 2019.

#### **Design and methods:**

This is a observational study of all the cases of AMI admitted during the study period 15<sup>th</sup> march to 15<sup>th</sup> September in the year 2020 using a historical control of all cases of AMI admitted during the corresponding period in the year 2019.

The site investigator will collect case records of all consecutive patients with acute MI admitted during the study periods in RIMS hospital. Patient data will be analysed in the case record forms (CRFs).

**Statistical analysis:** Relevant statistical analysis will be performed.

**Importance of the study:** This study will tell us how COVID-19 pandemic has impacted AMI care in RIMS hospital. If the number of AMI admissions has come down ,but mortality has gone up and time windows show delay compared to previous year, it means people with AMI are not coming to hospital either due to fear of getting infected with COVID or due to lack of transport facility. Based on the study, we will be able to provide suitable recommendations to the government regarding the need to inform the public by print and visual media that more people die due to AMI than COVID and it is important to seek emergency cardiac care for AMI. If the study shows that cardiologists prefer to lyse patients with STEMI rather than do primary PTCA (possibly due to fear of getting infected) and that increases in –hospital mortality, we will be able to issue appropriate guidelines regarding STEMI management during COVID era.

**II. Results:**

**Table 1: AMI patients hospitalized at RIMS and management**

Hospital admissions	No (n)	sex		Age range (mean age%)	STEMI n(%)	NSTEMI n(%)	CAG n(%)	PTCAn(%)	Thrombolysis n(%)
		Male n(%)	Female n(%)						
During covid19 era (15 <sup>th</sup> march to 15 <sup>th</sup> September,2020)	34	26 (76)	8 (24)	54-84 (70)	14 (41)	20 (59)	0	0	2 (5)
Similar period in 2019	88	49 (55)	39 (45)	37-90 (68)	38 (43)	50 (57)	28 (31)	15 (17)	37 (42)

**Table 2: Outcomes of admitted AMI patient at RIMS**

Hospital admissions	Time windows for thrombolysis (mean in hrs)	Major complications				Mortality n(%)
		AKI n(%)	Cardiogenic shock n(%)	Pericarditis n(%)	VT/VF n(%)	
During covid era (15 <sup>th</sup> march to 15 <sup>th</sup> September)	3-12 (7)	2 (5)	7 (20)	2 (5)	1 (3)	8 (23)
Similar period in 2019	1-8 (4)	4 (4)	11 (12)	5 (6)	5 (6)	10 (11)

**Table1 and 2.**are the summary of our study findings . There is definite reduction in the number of hospitalisation in this six months observation study (from 88 to 34). Also number of pharmacological thrombolysis (42% to 5%), interventional treatment (17%to 0) were reduced. There is definite increase in complications (cardiogenic shock from 12% to 20%) and in hospital mortality has increased in covid-19 era from 11%to 23% compared to corresponding period last year.

**III. Discussion:**

Our small study shows that COVID-19 and resultant lockdown has certainly impacted acute cardiac care in RIMS hospital. This may be related to multiple factors like fear of coming to RIMS hospital, as RIMS also take care of COVID-19 patients, transport difficulties due to lockdown, financial difficulties due to economic lockdown etc.

Dehghani P et al , had reported that overall STEMI volumes have decreased in the COVID-19 era, may be that patients are delaying their presentation to the hospital, potentially leading to need for mechanical circulatory support in the acute setting, mechanical complications of STEMI, sudden death or an increased heart failure population<sup>6</sup>.

**IV. Conclusion:**

COVID-19 has definitely had an adverse impact in hospital attendance and care of acute myocardial infarction patients in RIMS hospital. The relevant authorities should take note of this finding and take appropriate steps on a priority to change and improve acute myocardial infarction patient care.

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