

Original research article

Retrospective analysis of Acute Coronary Syndrome profile before and after Covid-19 Pandemic Began-Single centre observational study in a tertiary care centre in Mumbai metropolitan region

¹Dr. Akshat Jain, ²Dr. Rohit Deshpande, ³Dr. Kalyan Munde

¹Assistant Professor, Department of Cardiology, Grant Government Medical College & Sir J.J. Group of Hospitals, Mumbai, India

²Associate Professor, Department of Medicine, Grant Government Medical College & Sir J.J. Group of Hospitals, Mumbai, India

³Professor & HOD, Department of Cardiology, Grant Government Medical College & Sir J.J. Group of Hospitals, Mumbai, India

Corresponding Author:

Dr. Akshat Jain

Abstract

Background and Objective: To find if there has been any significant difference between patient profile with acute coronary syndrome with regard to diagnosis, symptoms, hospital course, outcome and prognosis between two specified time periods pre and post Covid-19 pandemic

Method: Information was tabulated, compared, and inferred using proper statistical analysis in a single centre, observational, retrospective investigation using information received from medical records of patients before and after the COVID 19 pandemic as pre COVID 19 and COVID 19 groups, respectively.

Result: ACS admissions decreased by 57.3% in the Covid-19 group compared to the pre-covid-19 group. The covid-19 group's mean symptom duration at presentation was 7 hours longer on average. Value is consistently less than 0.01. Pre-COVID-19 group and COVID-19 group in-hospital mortality rates were 7.3% and 17.1%, respectively (p value 0.0014).

Conclusion: Reduced exposure to air pollution, reduced occupational stress, and reduced mental effort as a result of lockdown and working from home status could all be factors in the decline in ACS instances. It draws our attention to the underlying cause(s) of underreporting or late reporting and aids in its correction, giving the benefit of early treatment to the greatest number of people and preventing both mortality and morbidity.

Keywords: Acute coronary syndrome, covid-19, Killips stage, ejection fraction, BP

Introduction

The initial documentation of the novel coronavirus disease 2019 (COVID-19), a viral infection that can result in the development of acute respiratory distress syndrome, was recorded in December 2019 in the city of Wuhan, located in the People's Republic of China. On March 11, 2020, the World Health Organization designated this global health emergency as a pandemic because to its extensive and rapid dissemination worldwide. As of December 2020, the global tally of COVID-19 cases surpassed 80 million, with an estimated two million fatalities directly attributed to the virus [1-3].

During the influenza season, there is often a rise in the incidence of acute coronary syndrome. This can be attributed to an elevation in inflammatory markers, which subsequently leads to the destabilization of atherosclerotic plaque. This correlation has been substantiated by autopsies conducted on individuals who succumbed to influenza-related complications. According to a study conducted by Pessoa-Amorim et al. in many hospitals globally, a significant majority of participants reported a reduction of over 40% in hospital admissions of patients with acute ST-elevation myocardial infarction following the onset of the coronavirus pandemic [4-6].

Any delay in treatment associated to acute ST-elevation myocardial infarction affects the patients' life and results, particularly in those seriously unwell with cardiogenic shock. Malls and various public venues, including parks, mosques, restaurants and cafes, underwent closure, while educational institutions had a suspension of courses [7]. Additionally, there was a transition towards remote work. Furthermore, multiple instances of comprehensive lockdowns and the implementation of both partial and entire curfews were enforced as measures to mitigate the transmission of the virus. Both international and domestic travel experienced limitations [8, 9].

The implementation of these procedures in Saudi Arabia resulted in a more effective containment and

management of the virus in comparison to other countries experiencing uncontrolled escalation of infection rates. The initial documented instance of COVID-19 infection within the Kingdom of Saudi Arabia was officially recorded on March 22, 2020. These briefings also emphasized the potential factors contributing to certain clusters of cases. Patients from diverse demographic backgrounds were provided guidance through the utilization of a toll-free hotline established by the Ministry of Health [10, 11].

In the context of the healthcare sector, non-urgent surgical procedures were temporarily suspended, booked appointments were delayed, and medical facilities primarily prioritized the treatment of emergency cases and individuals afflicted with complex COVID-19 conditions. Many field hospitals were also established in preparation of patient influx.

Despite the emphasis placed on the prompt delivery of medical intervention, a significant decrease in the incidence of MI cases was seen, particularly during periods of curfew implementation. In this prospective cohort study, we conducted an analysis of patient data pertaining to individuals diagnosed with Acute Coronary Syndrome during the year 2020, which coincided with the COVID-19 pandemic. We subsequently compared the outcomes of these patients with those diagnosed in the preceding year, 2019 [12, 13].

Material and Method

Single centre, observational, retrospective analysis through information obtained from medical record of the patient(s). Patients admitted between 1st of February 2020 to 31st of July 2020 (6 months) were included in the covid group; and those who were admitted from 1st August 2019 to 31st January 2020 were included in pre-covid group. Information was tabulated, compared, and inferred with appropriate statistical analysis.

Inclusion criteria

1. All Acute Coronary Syndrome (ACS) with positive cardiac enzymes (Troponin(s) or Creatine Kinase-Myocardial Band (CK-MB)) OR ST Elevation ACS in the specified time period.

Exclusion criteria

1. Patients who are resident from outside of Mumbai Metropolitan Region (MMR).
2. As this group do not have free access to our centre post intrastate travel restrictions during Covid Pandemic.

Result

Table 1: Demographic Data

	Pre Covid-19 Group	Covid-19 Group
Total ACS Admission	328	140
Total Male	244 (74.4%)	100 (71.4%)
Total Female	84 (25.6%)	40 (28.6%)
Mean Age (Years)	55.6	57.6

Table 2: Diagnosis

	Pre Covid 19 Group	Covid-19 Group
AWMI	172 (52.4%)	76(54.3%)
IWMI	84 (25.6%)	56 (40%)
NSTEMI	72 (22%)	8 (5.7%)
Mean EF	40	36.1
Ejection Fraction <= 40	192 (58.5%)	100 (71.4%)
H/o HTN	160 (48.8%)	56 (40%)
H/o DM	80(24.4%)	44 (31.4%)
Old IHD	36 (11%)	20 (14.3%)

Table 3: Course and Outcome

	Pre Covid-19 Group	Covid-19 Group
New Cases	240 (73.2%)	124 (88.6%)
Referred Cases	88 (26.8%)	16 (11.4%)
Mean Duration of Symptoms in New Cases	4.5 hours	11.5 hours
Chest Pain	316 (96.3%)	136 (97.1%)
Breathlessness	220 (67.1%)	112 (80%)
Mean BP (mmHg)	89.8	89.7
Killips Stage I/II	244 (74.4%)	80 (57.1%)
Killips Stage III/IV	84 (25.6%)	60 (42.8%)
Cardiogenic Shock	20 (6.1%)	20 (14.3%)

Ventilatory Requirement	48 (14.6%)	40 (28.6%)
Mortality	24 (7.3%)	24 (17.1%)

Discussion

There was 57.3% reduction in ACS admission in Covid-19 group as compared to pre-covid-19 group. There was no significant difference in sex distribution or the mean age of presentation. Mean duration of symptoms at presentation was significantly higher in covid-19 group by an average of 7 hours^[14-7]. The proportion of patients presenting with severe symptoms and clinical findings- Killip's stage III/IV failure, cardiogenic shock, Ejection fraction less than 40% and those requiring ventilator support were significantly higher in covid-19 group. With p Value consistently <0.01. Not only did the study showed that the severity of disease and presentation in covid-19 group was higher, there was also significant difference in mortality rates in between these groups. The all cause in-hospital mortality in pre covid-19 group and covid-19 group was 7.3% and 17.1% respectively (p Value 0.0014)^[18-20]. There are other similar studies conducted in different parts of world which have shown common findings. Factors that appears to play role: Personal Factors (Fear of moving out of home, fear of visiting hospitals, opting for self-medication or telephonic consultations), Community Factors (Shut down of local primary care physicians, interrupted transport services), Vocational Factors (Work from home, loss of jobs), Environmental Factors (Decreased pollution, decreased infections (hand washing, home stay)), Hospital Factors (most of the hospital staff involved in covid care, pharmacoinvasive approach being the plan of choice, many peripheral hospitals and nursing homes converted to covid care)^[21-23].

Conclusion

Similar findings in different parts of the world suggest that this decrease in ACS cases is not due to local factors of illiteracy or poor healthcare infrastructure in developing countries. As the pandemic continues it is crucial to follow this early signal and investigate its causes. Decrease in ACS cases might be attributed to decrease in exposure to air pollution, decreased vocational stress and mental exertion secondary to lockdown and working from home status. Late presentation might be attributed to community and behavioural factors like fear of coming out of home, non-availability of local doctors, interrupted transport services. It gives insight to the community and environmental factors that can help in reducing the incidence of ACS and hence forth help in planning steps for community prevention in long term. It directs our attention the root cause(s) of under reporting/ late reporting and help us rectify the same so as to provide the advantage of early treatment to maximum population and prevent both mortality and morbidity.

Funding support: Nil.

Conflict of interest: None.

References

- Kongara R, Sankaran RA, Muralidharan TR, Manokar P, Sadhanandham S, Nagendra Boopathy S, *et al.* Demographic analysis and clinical outcomes of COVID-19 and myocardial infarction from a tertiary care centre in south India. *European Heart Journal.* 2022 Feb;43(1):ehab849-079.
- Kakroo SA, Kishore YR, Jyotsna M, Satish OS. Clinical, angiographic profile and immediate outcome of COVID-19 patients presenting as acute coronary syndrome: An observational study. *Indian Heart Journal.* 2020 Nov;72:S32.
- Anshul G, Sanjeev S. The Covid-19 pandemic and decrease in acute coronary syndrome presentations in Western Rajasthan: A single centre retrospective observational study. *Indian Heart Journal.* 2020 Nov;72:S34.
- Talele SG, Ahire ED, Surana KR, Sonawane VN, Talele GS. Corona Virus Disease (COVID-19): A past and Present Prospective. *Asian Journal of Pharmaceutical Research.* 2022;12(1):45-53.
- Rane BR, Bharat M, Keservani RK. COVID-19 Infection and Recent Investigations and Future Prospects. In *COVID-19 and Immunomodulation with Special Emphasis on Nutraceutical and Herbal Formulation*, Apple Academic Press, 2023 Oct, 223-261.
- Praveen RV. Acute coronary syndrome-A comparative study of admissions & outcomes during COVID-19 pandemic. *Indian Heart Journal.* 2021 Dec;73:S40.
- Ahire ED, Sonawane VN, Surana KR. Role of drug repurposing in current treatment strategies against COVID-19; systemic review. *Pharm Reson*, 2020, 24-9.
- Jarouliya U, Keservani RK. Developing Vaccine Against COVID-19 and Immune Response. In *COVID-19 and Immunomodulation with Special Emphasis on Nutraceutical and Herbal Formulation*. Apple Academic Press, 2023 Oct, 139-160.
- Gunjal SS, Ahire SG, KRS, Vijayraj N, Sonawane, Khushali R, Pagar. Influence of Allopathy, Homeopathy, Ayurveda and Unani Systems of Medicine in the Management of COVID-19. *COVID-19 Pandemic: Questions, Answers and Hypotheses*, 1.

10. Ahire ED, Surana KR, Sonawane VN, Talele SG, Kshirsagar SJ, Laddha UD, *et al.* Role of Synthetic Medicines as Immunomodulators for the Cure of COVID-19. In COVID-19 and Immunomodulation with Special Emphasis on Nutraceutical and Herbal Formulation. Apple Academic Press, 2023 Oct, 181-194.
11. Rane BR, Telange TS, Waghchaure PS, Keservani RK, Jain AS. COVID-19 Pandemic: Role of Ayurveda for Prevention and Treatment. In COVID-19 and Immunomodulation with Special Emphasis on Nutraceutical and Herbal Formulation. Apple Academic Press, 2024, 107-138.
12. Ahire ED, Sonawane VN, Surana KR, Jadhav KR, Sonawane DD, Shah AA. Convalescent plasma therapy: A promising approach in the treatment of Covid-19. *Int J Pharm Sci Res.* 2020;11:4078-86.
13. Razzaque MA, Ahmed M, Kobir MS, Khuda CK, Mahmoud H, Islam MS, *et al.* Pattern of Admission, Management and in hospital Outcome of ACS Patients during COVID-19 pandemic-A study in Tertiary Care hospital. *Bangladesh Heart Journal.* 2022 Jun;37(1):65-71.
14. Jain AA, Dighe SD, Singla R, Bansal NO. Retrospective analysis of Acute Coronary Syndrome profile before and after Covid-19. *Indian Heart Journal.* 2020;72:S33.
15. Kongara R, Sankaran RAMESH, Muralidharan TR, Manokar P, Sadhanandham S, Nagendra Boopathy S, *et al.* Demographic analysis and clinical outcomes of COVID-19 and myocardial infarction from a tertiary care centre in south India. *European Heart Journal.* 2022;43(1):ehab849-079.
16. Kakroo SA, Kishore YR, Jyotsna M, Satish OS. Clinical, angiographic profile and immediate outcome of COVID-19 patients presenting as acute coronary syndrome: An observational study. *Indian Heart Journal.* 2020;72:S32.
17. Dharime A. Trends and outcomes of acute coronary syndrome (ACS) in COVID-19 pandemic: Experience from a tertiary care centre introduction. *Indian Heart Journal.* 2020;72:S32.
18. Makkar K, Malhi TS, Batta A, Panda P, Sharma YP. Observational study of Covid-19 patients presenting with acute coronary syndrome at a tertiary care center in India. *European Heart Journal.* 2021;42(1):ehab724-1274.
19. Praveen RV. Acute coronary syndrome-A comparative study of admissions & outcomes during COVID-19 pandemic. *Indian Heart Journal.* 2021;73:S40.
20. Muralidharan TR, Kumar BV, Krishnamurthy P, Senguttuvan NB, Balasubramaniyan JV, Sadhanandham S, *et al.* COVID-19 and its impact on the management of patients with acute coronary syndrome during the first COVID wave-A questionnaire-based survey among interventional cardiologists from Southern India. *Journal of the Practice of Cardiovascular Sciences.* 2021;7(3):219-224.
21. Razzaque MA, Ahmed M, Kobir MS, Khuda CKE, Mahmoud H, Islam MS, *et al.* Pattern of Admission, Management and in hospital Outcome of ACS Patients during COVID-19 pandemic-A study in Tertiary Care hospital. *Bangladesh Heart Journal.* 2022;37(1):65-71.
22. Khokhar KS, Mehta S, Thakran B. Clinical profile of COVID-19 patients at a tertiary care hospital in North India: A retrospective analysis.
23. Abbas J, Kumar A, Kumar N, Shah SDA, Shah AA, Shah IA. Patterns of Cardiovascular Diseases in Covid-19 Patients Admitted to Tertiary Cardiac Care Centre. *Pakistan Journal of Medical & Health Sciences.* 2022;16(02):1174-1174.