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Impact of Covid-19 outbreak on clinical presentation of patients admitted for acute heart failure in India



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Acute Heart Failure (AHF) is a life-threatening, rapid onset or worsening of sign and/or symptoms of heart failure (HF) which often requires urgent hospitalization for rapid evaluation and treatment. It may present as de novo or, more frequently, as a result of acute decompensation of chronic heart failure (ADHF). Apart from the economic burden on patient and health care system, each AHF related hospitalization is associated with significant increases in 12-month rehospitalization and mortality rate (44% and 17% in ESC-HF pilot study; 30.2 and 30.8% in Trivandrum Heart Failure Registry) Maggioni et al. (2013), Hari Krishnan et al. (2017) [1,2].

As of July 15th, India has about 936,181 cases and nearly 24,309 death attributed to novel coronavirus disease 2019 (Covid-19) infection [1]. Unprecedented apprehension due to the rapid spread of COVID-19 pandemic has resulted in hospital avoiding behavior among patients suffering other diseases, including HF. Also, spread of COVID-19 pandemic attracted the major allocation of healthcare infrastructure and human resources, including emergency services, for the care of COVID-19 infected patients, and little is known about the effect of this stressed-out healthcare system on short and long term outcome in patients suffering from HF. Although, the implementation of lockdown by the Government (from March 25, 2020) initially slowed the community spread of COVID-19, but inadvertently, suspension of public transport further affected the delivery of medical care for HF patients, as most of the patients in India still use public transport for their emergency department (ED) visits.

In this study, we performed a retrospective analysis of all consecutive patients who were admitted for AHF (de novo and ADHF; left ventricular ejection fraction <40%) in two Medical college hospitals providing healthcare services in Jodhpur, western India. Both are regional tertiary care centres of local hub and spoke networks for the management of various cardiovascular emergencies. Our EDs have a separate registration desks for patients coming with non-Covid-19 emergencies and COVID-19 symptoms, with clear signs at the entrance directing patients to the designated registration desk. Also, ED was expanded to avoid overcrowding and separate waiting area was created for those who have COVID-19 signs and symptoms.

We analysed demographic, clinical, echocardiographic and outcome parameters in patients admitted for AHF during the study period of 16 weeks (March 25 to July 14, 2020; starting from the day when lockdown was imposed by Government of India) and compared this data with a control period of 16 weeks (Dec 05, 2019 to March 24, 2020; when there was no lockdown and number of COVID-19 attributed death ≤10). In addition, hospitalization rates during the study period were also compared with data from the same period in 2018–19. Patients diagnosed with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) were not included in study.

Our analysis of patients admitted during the study (lockdown) period revealed 69% reduction in AHF hospitalizations as compared to the control period (241 vs 782) and 60% reduction compared to same calendar period from the previous year (144 vs 602; Fig. 1). It was contrary to an expected increase due to the availability issue of guideline-directed medical therapy in follow-up patients and an anticipated surge in AHF due to late presentation of patients with acute myocardial infarction associated mechanical complications. Among the patients from the lockdown period, 96.7% presented with NYHA IV symptoms, this was significantly higher than the rate during the control period (out of 782; 76.6% presented with NYHA IV symptoms during the control period; p value <0.001; Table 1). The mean age (\pm SD) of patients in study and control period was 63.5(\pm 11.2) and 61.1(\pm 11.9) respectively, with no significant difference. Compared with control group, study group patients were more commonly male (82.6 vs 71.6%; p value <0.02), more likely to have atrial fibrillation (23.7 vs 18.2%; p value <0.02), lower eGFR (64.6 vs 77.7%; p value <0.05), lower mean ejection fraction (24.2 ± 5.6 vs $30.4 \pm 4.9\%$; p value <0.001) and higher NT pro BNP levels (mean value 7349.2 vs 5680.4 pg/ml; p value <0.001). Median length of stay during study and control period was 5 and 4 days respectively. We also observed significantly increased in-hospital mortality during the lockdown period as compared to the control period (8.3% vs 5.4%; p value <0.001).

The number of patients presenting to ED with AHF in western India has reduced significantly, and yet, late presentations with advanced symptoms and low EF seem to have increased. Similar pattern of decreased admission for cardiovascular emergency was reported from California, where weekly rates of hospitalization for acute myocardial infarction decreased by up to 48% during the Covid-19 period (Solomon et al., n.d. [3]). The current case fatality rate for COVID-19 in India is approximately 2.6% [4], which is far less than that of AHF and we presume

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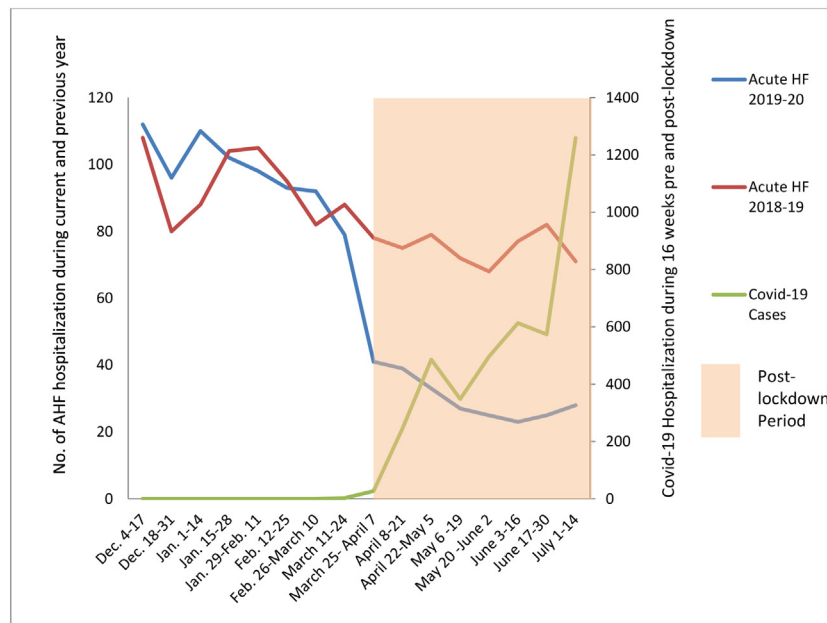


Fig. 1. Hospitalization for AHF before and during the Lockdown for Covid-19 Pandemic in 2019–20 and during the Same Period in 2018–19, Relative to the Incidence of Hospitalization for Covid-19. Data from Two Hospitals in Western India. Lockdown was imposed on March 25, 2020; right half of figure (shaded part) shows the lockdown period. The data shown in blue are weekly admissions for acute heart failure (AHF) during period from December 4, 2019 through July 14, 2020. The data shown in red same are weekly admissions for December 4, 2018 through July 14, 2019. The data shown in green are the number of hospitalization in Jodhpur with a diagnosis of Covid-19.

that many untreated AHF patients must have died at home during COVID-19 pandemic. There have been reports of the inexplicable increase in out of hospital cardiac arrests, revealing that patients were staying too long at home to seek care for a more severe medical condition (Wong et al., 2020 [5]).

Complete suspension of public transit system along with lack of emergency medical services in India, risk of acquiring COVID-19 at ED and misleading information in media and social platforms about flooding of hospital beds due to COVID-19, even when there were reserved wards for other emergencies, led to hospital avoiding behavior among patients suffering from even the most serious medical conditions. Hospitals are now erroneously perceived as reservoirs of SARS-CoV-2. Community educational campaigns are imperative to convey that hospitals are secured, resourceful, and fully prepared for

life-threatening emergencies; which if untreated, has higher morbidity and mortality rate as compared to COVID-19.

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Contributorship

RC, RM and AK conceived of the study. RC, JBS, SD, SS initiated the study design and collected the data. RC, SS, SD and RM analysed the data and drafted the article. All authors approved the final manuscript.

Disclosure

None, no conflict of interest for any author.

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Data sharing

The data that support the findings of this study are available from the corresponding author, [RC], upon reasonable request.

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Table 1

Characteristics of patients admitted with acute heart failure during study period and control period

	Control period	Study period	P Value*
No of admission-no.	782	241	
Age (yr)	61.1 ± 11.9	63.5 ± 11.2	0.08
Male—no. (%)	560(71.6)	199(82.6)	<0.02
De Novo Cases —no. (%)	298(38.1)	114(47.3)	<0.02
NYHA Class IV ^e — no. (%)	59,876.6)	233(96.7)	<0.001
AF- no. (%)	142(18.2)	57(23.7)	<0.02
NT-pro BNP (pg/ml)---mean	5680.4 ± 478	7349.2 ± 524	<0.001
eGFR (mL/min/1.73m ²)---mean	77.7	64.6	<0.05
LVEF--%	30.4 ± 4.9	24.2 ± 5.6	<0.001
In Hospital Mortality-- no. (%)	42(5.4)	20(8.3)	<0.001

Plus-minus values are means ±SD

Control period was defined as period when there was no lockdown and number Covid-19 attributed deaths were ≤ 10cases (December 05, 2019 to March 24, 2020) and Study period was defined as period when total lockdown was imposed by the Government of India (March 25 to July 14, 2020).

The abbreviation NYHA denotes New York Heart Association functional classification, NT-pro BNP N-terminal pro brain natriuretic peptide, eGFR estimated glomerular filtration rate, AF atrial fibrillation, and LVEF left ventricular ejection fraction.

^e The data for New York Heart Association (NYHA) class reflect the status of patients at the time of admission.

* Chi square test was done for categorical variables and ANOVA was done for continuous variables.