

## Editorial

# Prevalence and Outcomes of Cardiovascular Diseases in Patients with COVID-19 Stratified by Myocardial Injury: A Research Letter

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## Editorial

A higher prevalence of cardiovascular diseases among COVID-19 with positive troponin levels was initially observed in China beginning of the pandemic era. We are trying to add to the material available with demographics and prevalence of cardiovascular disease among COVID-19 positives. SARS-CoV-2 is mainly a respiratory disease, but it can involve a heart with direct virulence through ACE-2, exaggerated inflammatory reaction, micro thrombosis, and endothelial injury [1]. We conducted a retrospective analysis to determine cardiovascular disease prevalence among these populations stratified by troponin levels. Cardiovascular diseases led to an increase in the rate of morbidity and mortality among COVID-19 patients. The viral infection in severe cases causes cytokine storm and hypercoagulability that manifests in various acute cardiovascular events like myocardial infarction, heart failure, and myocarditis or thrombotic events like pulmonary embolism and DIC [2]. There is also a high incidence of arrhythmia observed in cases with COVID-19 likely because of viral infection, QT-prolonging drugs like azithromycin, lopinavir, etc. The overall burden of cardiovascular diseases, demographics, and comorbidities in COVID-19 patients has been described in the literature but no causal relationship between them has been explored [3]. Also, there is little evidence regarding the characteristics of patients with

myocardial injury [4]. Hence, further evidence on the subject can aid better evidence-based decisions on the prevention of acute cardiac events.

A retrospective observational study was conducted of patients with a clinical diagnosis of COVID-19 from January 2020 to December 2021 in a large community health service. Patients were included if they had a laboratory or nasal swab confirmed SARS-CoV-2 infection. Myocardial injury was defined as high-sensitive troponin T levels 99<sup>th</sup> percentile above the upper limit of normal for respective biological sex (22ng/ml for female; 14ng/ml for male). The primary outcome was to find out prevalence of cardiovascular disease among COVID-19 patients stratified by troponin level. Descriptive analyses were performed by troponin level divided into positive and negative. We evaluated demographic, baseline characteristics, and medical history of cardiovascular diseases. The categorical variables are reported as total count and percentage with their p-value based on the *chi-square* test.

A total of 13560 (45.3% Male, 21.5% aged >65 years) patients with COVID-19 were included, out of which 411 (3%) had a myocardial injury. Patients with myocardial injury were older (75.9% >65 years) and had higher cardiovascular-related comorbidities when compared with those without. The male and females were equally distributed (49.4% vs 45.2%, 50.6% vs 54.8%; Male and Female respectively). The population in this study was predominantly white (85.2% vs 86.4%) and non-Hispanics (92.2% vs 85.2%). The overall cardiovascular diseases and cardiovascular risk factors were markedly higher in the myocardial injury group. Hypertension and Diabetes were more prevalent among Troponin positive patients compared to those without. Troponin positive group had higher dyslipidemia, Myocardial Infarction (MI), unstable angina, coronary artery disease, cardiomyopathy, heart failure, arrhythmias, stroke, and Peripheral Arterial Disease (PAD). Hospitalization was higher in troponin-positive patients compared to those in troponin negative group (75.9% vs 10%). Length of stay and use of mechanical ventilation was higher in troponin-positive patients. The mortality among troponin-positive strata was 19.7% versus 1.6% in troponin-negative strata.

In our study, we found the prevalence of cardiovascular diseases was much higher among Covid-19 patients with positive troponin levels. The main finding, confirming this study, is that the prevalence of cardiovascular diseases is significantly increased among patients with troponin positive and that this increase can be attributable to traditional risk factors. One previous study found 56.1% of prevalence of myocardial injury among hospitalized COVID-19 patients [5]. Further research may be needed to understand the pathophysiology of Covid-19 affecting cardiovascular diseases.

**Table 1:** Demographic, clinical characteristics, prevalence, and outcomes of cardiovascular diseases of Covid-19 patients stratified by Troponin level.

Characteristics		Overall population with Covid-19	Troponin positive (%)	Troponin negative (%)	P value
	Total	13560	411	13149	
Age	Mean (SD)	49 (18)	74 (13)	48 (18)	<0.01
	Median (IQR)	49 (34,62)	75 (65, 84)	48 (34,61)	<0.01
	18-49	6856	21 (5.1)	6835 (52)	<0.05
	50-64	3792	78 (19)	3714 (28.3)	<0.05
	>65	2912	312 (75.9)	2600 (19.8)	<0.05
Sex	Male	6142	203 (49.4)	5939 (45.2)	<0.01
	Female	7417	208 (50.6)	7209 (54.8)	<0.01
Race	White	11705	350 (85.2)	11355 (86.4)	<0.01
	Black Or AA	988	44 (10.7)	944 (7.2)	<0.09
	Asian	111	2 (0.5)	109 (0.8)	<0.45
	Multiracial	341	8 (1.9)	333 (2.5)	<0.65
Ethnicity	Non-Hispanic	11582	379 (92.2)	11203 (85.2)	<0.05
	Hispanic	2842	28 (6.8)	1814 (13.8)	<0.79
Hypertension		4721	324 (78.8)	4397 (33.4)	<0.05
Diabetes		5261	336 (81.8)	4925 (37.5)	<0.05
Dyslipidemia		4987	290 (70.6)	4697 (35.7)	<0.05
MI		275	46 (11.2)	229 (1.8)	<0.28
Unstable angina		130	21 (5.1)	109 (0.8)	<0.35
Cardiomyopathy		304	63 (15.3)	241 (1.8)	<0.25
CAD		1018	159 (38.7)	859 (6.5)	<0.05
Angioplasty		3063	135 (32.8)	2928 (22.3)	<0.05
CABG		241	42 (10.2)	199 (1.5)	<0.21
HF		768	151 (36.7)	617 (4.7)	<0.05
Stroke		245	39 (9.5)	206 (1.6)	<0.09
PAD		428	63 (15.3)	365 (2.8)	<0.13
Arrhythmias		584	96 (23.4)	488 (3.7)	<0.15
Hospitalization		1632	312 (75.9)	1320 (10)	<0.01
LOS (Median days)		0 (0,0)	4 (1,7)	0 (0,0)	<0.05
Mechanical Ventilation		201	43 (10.5)	158 (1.2)	<0.09
Mortality		297	81 (19.7)	216 (1.6)	<0.07

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## IRB

IRB approval was obtained from the Mercyhealth corporation and the University of Illinois College of Medicine, Rockford.

## Ethical Approval

Though this article does not contain any studies with direct involvement of human participants or animals performed by any of the authors, the ethical standards of the institutional and/or national research committee were following the 1975 Helsinki declaration.

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Authors declare no conflict of interest.

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## Data Availability Statement

The data presented in this study are available on request from the corresponding author.

## Statement of Competing Interests

The authors report no competing interests.

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