



The incidence of myocarditis in patients with COVID-19 and in-hospital mortality.

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ABSTRACT... Objective: To determine the Incidence of myocarditis in patients with COVID-19 and in-hospital mortality. **Study Design:** Observational Cohort study. **Setting:** Aziz Bhatti Shaheed Teaching Hospital, Nawaz Sharif Medical College, Gujrat. **Period:** 15 to 30 March 2020. **Material & Methods:** Patients with positive PCR results for COVID-19 were included in this study after informed consent; patients with prior history of any cardiovascular, pulmonary or other co-morbidity were excluded while patients having history of hypertension, diabetes or smoking were included in the study. All the patients remain admitted for 14 days. Patients were evaluated clinically, by ECG, troponins and echocardiographically for diagnosis of myocarditis. Patients were managed conservatively. Incidence of myocarditis and in-hospital mortality was noted. Successful treatment towards hospital discharge was relief of clinical symptoms, a-febrile, clear chest X-Ray and at least two consecutive negative PCR for covid-19. P-value <0.05 was considered as significant. Data was analyzed with SPSS -23. **Results:** Out of fifty five, 5(9%) patients were diabetics and 4 were hypertensive. Five (9%) developed mild pneumonia which recovered conservatively and three (5.4%) patients developed myocarditis. One (1.8%) patient expired having myocarditis. Duration of follow up was only during hospital stay. So our in-hospital mortality was 1.8%, p value was calculated as significant < 0.05. **Conclusion:** Myocarditis is a known but less common complication of COVID-19. Cardiac injury is more in those with previously having cardiovascular or other co-morbidities. In healthy and immunocompetent population its incidence is quite low.

Key words: COVID-19, In-Hospital Mortality, Myocarditis.

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INTRODUCTION

Corona virus infection has become a recognized infectious disease spreading throughout the world. Number of patients with COVID-19 are increasing day by day in whole globe. Previous studies showed that COVID-19 results in rapid deterioration in patients suffering from chronic illness.¹⁻⁴ According to Huang et al⁵, 12% of patients with COVID-19 were having acute myocardial injury. In another study, out of 138 patients admitted with COVID-19, 16% had arrhythmias and 7.2% were having acute myocardial injury.⁶ It was also noted that cardiovascular patients hospitalized with COVID-19 are at greater risk of myocardial injury and poor in-hospital outcome.⁷ Myocarditis (inflammation of the heart muscle) can be identified clinically or histopathologically.

In many studies it was observed that COVID 19 can cause myocarditis⁸ that's why several cases of myocarditis noted after COVID-19.^{9,10} Myocarditis is an acute severe heart failure which can result in hypotension and cardiogenic shock having high mortality upto 50-70%.⁸ Myocarditis can be diagnosed clinically and by imaging aid. Echocardiography is an important tool to assess left ventricular function and to diagnose myocarditis.¹¹ MRI is very useful for the diagnosis of myocarditis.¹² All these studies were conducted outside Pakistan so in our study we tried to assess the incidence of myocarditis and in-hospital mortality in previously healthy population of Pakistan, without any co-morbidities especially cardiovascular diseases.

MATERIAL & METHODS

This was a cross sectional cohort study, 55 patients between 15-70 years of both genders having positive PCR results for COVID-19 were included in this study after informed consent. Whereas patients with prior history of any cardiovascular, pulmonary or other co-morbidity were excluded, patients having hypertension, diabetes or smoking were included in study group. All patients remained admitted and followed up for 14 days. Patients were evaluated clinically, by ECG, troponins and echocardiographically for diagnosis of myocarditis. Incidence of myocarditis and in-hospital mortality was noted. Successful treatment towards hospital discharge was relief of clinical symptoms, a-febrile, clear chest X-Ray and at least two consecutive negative PCR for covid-19. For quantitative variables like age, mean and standard deviations were calculated. For qualitative variables like gender, smoking, hypertension and diabetes Mellitus frequency and percentages were calculated. Stratification was used to control the effect modifiers. After stratification Chi square test was applied to see the effects of the outcome. Data was analyzed with SPSS -23 and p value <0.05 was considered as significant.

RESULTS

A total number of 55 patients were enrolled in the study out of which 45(82%) were male while 10(18%) were female. Mean age of patient was 35+10. Out of fifty five, 5(9%) patients were diabetics and 4 were hypertensive. Five (9%) developed mild pneumonia which recovered conservatively and three (5.4%) patients developed myocarditis. One (1.8%) patient expired having myocarditis. Duration of follow up was only during hospital stay. So our in-hospital mortality was 1.8%. P-value was calculated as significant < 0.05.

DISCUSSION

Exact incidence of myocarditis is difficult to ascertain in patients of COVID-19. Because this disease is affecting the population of different areas in different ways, in developed countries like America and Europe overall mortality due to COVID-19 is quite high than Asian countries.

Our study was conducted on previously healthy patients; therefore myocarditis was diagnosed in 3 (5.4%) cases of COVID-19 out of which one patient was expired so in-hospital mortality was 1.8% which is quite low than calculated in a study by Fabre A et al where myocarditis was responsible for sudden cardiac death in 8.6% of cases and is present in 9% of routine post partum examination.¹³ The difference may be due to sample size, duration of study, sample technique and baseline characteristics of patients. Incidence of cardiac injury with covid-19 is noted more in previously known cardiac patients.

	N (%)
Age	
Gender	
Male	45 (82%)
Female	10(18%)
Hypertension	
Present	4 (7.2%)
Absent	51 (92.8%)
Diabetes	
Present	5(9%)
Absent	50 (91%)
Smoking	
Present	10 (18%)
Absent	45 (82%)
Obesity	
Present	20 (36%)
Absent.	35(64%)

Table-I. Clinical characteristics of patients in the study.

Total Patients	55	Mortality
With Myocarditis	3 (5.4%)	1(1.8%)
Without Myocarditis	52(94.6%)	0

Table-II. In-hospital mortality with myocarditis. P-Value < 0.05

In a European study of epidemiology and treatment of cardiac inflammatory diseases 72% patient had dyspnea, 32% had chest pain and 18% had arrhythmia.¹⁴ Acute myocarditis resembles myocardial infarction with acute chest pain, arrhythmias, and sudden death.¹⁵ COVID-19 patients may develop severe cardiac

complications such as myocarditis and heart failure leading to shock.^{6,8} Results of our study were consistent with a study conducted by Peiris JS and colleagues in which incidence of myocarditis in patients with COVID-19 was 0.2-2%.¹⁶ Further studies and research work is required to see the effect of this deadly virus on myocardium.

CONCLUSION






Myocarditis is a known but rare complication of COVID-19. Cardiac injury is more common in patients having cardiovascular diseases and comorbidities. In healthy and immunocompetent population its incidence is quite low.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Muhammad Zahid Ali	Concept, Data collection, Statistical analysis,. Design of study.	
2	Irfan Younus	Critical revision of study, Data Collection.	
3	Sohail Yousuf	Drafting, Data collection.	
4	Muhammad Javed	Critical revision, Data collection.	
5	Khalil Iqbal	Critical revision, Data collection.	
6	Faiza Altaf	Data collection.	