

# Study of Clinical Profile and Liver Function in COVID-19 Patients at Tertiary Care Center: A Retrospective Study

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**Abstract:** *Background: Although COVID-19 primarily affects the lungs, about 60% of patients also have varying levels of liver injuries or liver dysfunction in various studies. Materials and Methods: This is a retrospective single-center study in patients admitted to the COVID ICU and COVID Ward of Dr. DY Patil Hospital, Nerul, Navi Mumbai. 300 patients with confirmed real-time polymerase chain reaction status for COVID-19 admitted and treated from June 1st, 2021 to August 1st, 2021 were included in this study. Results: Out of 300 patients that were enrolled in the study, 182 (60.67%) patients were males whereas 118 (39.33%) patients were females, and the mean age of patients was 56.09 ± 16.604 years. Out of all the patients, 142 (47.33%) had mild to moderate disease whereas 158 patients (52.66%) had severe disease. The liver function test revealed mean total bilirubin of 0.85±0.68 mg/dl, SGOT mean value was 77.42±99.48 IU/l and for SGPT it was found to be 67.27±85.4 IU/l and ALP was 120.59±65.95 IU/l. The mean albumin level was 3.4±4.6 g/dl. Abnormal liver function tests were observed in 45.33% of cases. Abnormal total bilirubin, SGOT, SGPT, and ALP were seen in 10.6%, 45.33%, 68.38%, and 3.33% cases, respectively. It was found that there was a positive correlation between LFT (Total Bilirubin, AST, ALT, Albumin) and severity. Conclusion: The majority of the patients with COVID-19 infection presenting to our hospital were severe. Breathlessness, fever, and cough were the most common symptoms. Abnormal LFTs are high in COVID-19 patients and abnormality correlates with the severity of the disease.*

**Keywords:** COVID-19, Liver Dysfunction

## 1. Introduction

COVID 19 has been a significant threat all around the world. Within 3 months of outbreak, it has spread to more than 120 countries. 1 On February 2020, COVID-19 was declared a public health emergency by World Health Organization. 2 By Oct 2020, the Corona virus has spread in 216 countries, more than 35 million people were infected and more than 1 million have died due to it. Even in India, there have been 6 million confirmed cases with 1, 03, 569 deaths from January to October. 3

Most patients with COVID-19 predominantly have a respiratory tract infection associated with fever, cough, and shortness of breath. However, in a small percentage of cases, it has led to acute respiratory distress syndrome (ARDS), severe sepsis, and multiorgan failure, including acute kidney injury and cardiac injury. 4 Although COVID-19 primarily affects the lungs, about 60% of patients also have varying levels of liver injuries or liver dysfunction in various studies. 5-6,7

Several hypotheses are formulated to explain the liver dysfunction in COVID 19 patients which include collateral damage from cytokine storm, drug-induced liver injury, virus-induced hepatitis, and hypoxia-induced damage. 8 It is very important to identify liver dysfunction in patients affected with COVID 19. The liver enzyme at initial presentation or during illness is an important marker of disease severity. Serum albumin, a negative acute phase reactant also indicates the severity of the disease.

There are very limited studies done in India about liver dysfunction in COVID patients. Therefore, this study was conducted to know the clinical profile and biochemical abnormalities of liver dysfunction in COVID-19 patients.

## 2. Materials and Methods

This is a retrospective single-center study in patients admitted to the COVID ICU and COVID Ward of Dr. DY Patil Hospital, Nerul, Navi Mumbai. 300 patients with confirmed real-time polymerase chain reaction status for COVID-19 admitted and treated from June 1st, 2021 to August 1st, 2021 were included in this study. The study was approved by the Institutional Ethics Committee, Dr. DY Patil Hospital, Nerul, Navi Mumbai, India. Informed consent was taken from every patient included in the study. Patients were divided into asymptomatic (group I) and clinical severity groups of mild (group II), moderate (group III), severe (group IV) groups based on the National Clinical Management Protocol COVID 19, Revised version 3, dated June 13, 2020, by Ministry of Health and Family Welfare, Government of India. 8

Patients with confirmed Real-Time Polymerase Chain Reaction for SARS-CoV-2 were included in this study whereas patients with viral hepatitis (defined by positive serum hepatitis B surface antigen and/or hepatitis C antibody), autoimmune hepatitis, primary biliary cirrhosis, primary sclerosing cholangitis, significant alcohol consumption (defined by >30 g/day in men and >20 g/day in women) or any other chronic liver disease was excluded.

A detailed history and examination were carried out for every patient, as per the predesigned proforma. Laboratory investigations such as complete blood counts, fasting blood sugar level, kidney function test, and liver function test were done. Liver function test i.e. alanine aminotransferase (ALT, 9-40 U/l by Ultra spectrophotometry), aspartate aminotransferase (AST, 13-40 U/l by ultraviolet spectrophotometry), alkaline phosphatase (ALP, 38-126 U/l by PNPP AMP buffer method), and total bilirubin (TB, 0.2-1.3 mg/dl by Azobilirubin) were measured. All the collected information was entered and analyzed using SPSS version 22.0 and analyzed. Bilirubin, ALT, AST, ALP and albumin were presented as mean  $\pm$  frequency tables. Liver test abnormalities were defined as the elevation of the liver enzymes more than the upper limit of normal values. Cross tabs were made to know the association between LFTs with disease severity using chi-square and Odds ratio. A  $p$ -value  $<0.05$  was considered significant.

In the present study, patients were managed as per the COVID-19 protocol guideline issued by the ministry of health and family welfare, GOI (MOHFW).

### 3. Results

Out of 300 patients that were enrolled in the study, 182 (60.67%) patients were males whereas 118 (39.33%) patients were females, and the mean age of patients was  $56.09 \pm 16.604$  years. Out of all the patients, 142 (47.33%) had mild to moderate disease whereas 158 patients (52.66%) had severe disease. (Table 1)

The clinical characteristics and liver function tests of the subjects on admission were tabulated (Table-1).

**Table 1:** Clinical profile of COVID 19 patients

Variable	No. of patients (%)
<b>Gender</b>	
Male	182 (60.67)
Female	118 (39.33)
<b>Severity of disease</b>	
Mild	28 (9.3)
Moderate	114 (38)
Severe	158 (52.66)
<b>Symptoms</b>	
Breathlessness	212 (70.67)
Fever	186 (62.00)
Cough	126 (42.00)
Headache	50 (16.67)
Malaise	40 (13.33)
Myalgia	24 (8.00)
Anosmia	18 (6.00)
<b>Comorbidities</b>	
Hypertension	146 (48.67)
Diabetes Mellitus	124 (41.33)
Chronic Kidney Disease	12 (04.00)
Hypothyroidism	08 (2.67)
Stroke	4 (1.33)
No comorbidities	98 (32.67)

The liver function test revealed mean total bilirubin of  $0.85 \pm 0.68$  mg/dl, SGOT mean value was  $77.42 \pm 99.48$  IU/l and for SGPT it was found to be  $67.27 \pm 85.4$  IU/l and ALP was  $120.59 \pm 65.95$  IU/l. The mean albumin level was  $3.4 \pm$

4.6 g/dl. Abnormal liver function tests were observed in 45.33% of cases. Abnormal total bilirubin, SGOT, SGPT, and ALP were seen in 10.6%, 45.33%, 68.38%, and 3.33% cases, respectively.

To test the association between LFT and severity, Point-Biserial correlation was used and it was found that there was a correlation between LFT (Total Bilirubin, AST, ALT, Albumin) and severity. (Table 2)

**Table 2:** Relationship of liver function tests with disease severity in COVID-19 patients

Variables		Non severe (n=142)	Severe (n=158)	P value
Total Bilirubin	Normal	132	136	0.05
	Increased	10	22	
AST	Normal	106	58	0.001
	Increased	36	100	
ALT	Normal	74	42	0.001
	Increased	68	116	
ALP	Normal	140	150	0.35
	Increased	2	8	
Albumin	Normal	120	55	0.01
	Decreased	22	103	

### 4. Discussion

In the present study, COVID-19 infection was more in males (60.67%) than in the female population. A similar finding of male predominance was seen in different studies. In a cross-sectional study done in India, 67% were males.<sup>9</sup> Similarly, another study showed that 60.9% were males.<sup>10</sup> However, in a study done in Portugal among COVID-19 patients the number of male and female populations was almost equal at 50.5% and 49.5 respectively.<sup>11</sup>

There were very high, 52.66% of patients with severe COVID infection; this might be because our institute was a tertiary care referral center managing most of the severe cases. In this study, breathlessness (70.67%), fever (62.00%), and cough (42.00%) were the most common symptoms. In a meta-analysis done by Grant et al, fever (78%) and cough (57%) were the most common symptoms.<sup>12</sup>

Derangement in liver enzymes was first documented by Chen *et al.*<sup>13</sup> Among 99 cases with COVID-19 from Wuhan, 43 (43%) patients had differing degrees of liver function abnormality, 18 cases (18%) had increased serum levels of bilirubin, 28 (28%) cases had increased alanine aminotransferase (ALT) and 35 (35%) had increased aspartate aminotransferase (AST). In this study, abnormal LFT was found in 45.33% of cases. AST and ALT were elevated in 25.35% and 47.88 % respectively. A similar result was reported in a study done in India where out of 105 patients associated with COVID-19, 59.04% had abnormal liver function tests at admission. The percentage of patients with elevated AST, ALT, ALP, and total Bilirubin were 45.71%, 25.71%, 20%, and 6.67% respectively.<sup>14</sup> Similarly in a study done by Kumar et al in 2020, a total of 91 patients was studied, out of which 45 (49.45%) patients had abnormal LFT.<sup>15</sup>

Bertolini et al in the Netherlands studied liver function in COVID 19 patients. Mildly abnormal LFTs, especially AST and ALT, are frequently observed in patients with COVID-

19 on admission and are associated with severe disease and increased inflammatory markers. The exact pathogenesis of liver injury in SARS-COV-2 infection remains unclear. The possible mechanism includes direct virus-induced cytopathic effects, exacerbation of the preexisting liver disease, hypoxemia, drug-induced, and overshooting inflammatory responses.<sup>16</sup> This study also showed AST and ALT were significantly increased in severe diseases. Xie *et al* reported 31.6%, 35.4%, and 5.1% of patients with elevated ALT, AST, and total bilirubin, respectively. Similar to our study, they also found that impairment of LFTs worsens with the severity of the disease.<sup>17</sup> Another similar study from Portugal showed changes in liver test values in about 46% of patients with alanine aminotransferase in 28% of patients, aspartate aminotransferase in 35%, and total bilirubin in 18%.<sup>18</sup>

At present, there is no standardized definition or criteria for covid-19-related liver injury. In-depth study and further studies are warranted to define covid-19-induced liver injury to guide proper care and management.

Our study has some limitations. Firstly, it is a single-center, retrospective, small sample size study. Secondly, the levels of biochemical parameters were recorded at the time of admission. Serial measurements can help to draw better conclusions. Thirdly, the association of other comorbidities like diabetes, hypertension, and coronary artery disease on the severity and prognosis of liver injury was not investigated. Moreover, the present study reveals an association of abnormal liver function among COVID-19 patients and not causation.

## 5. Conclusion

The majority of the patients with COVID-19 infection presenting to our hospital were severe. Breathlessness, fever, and cough were the most common symptoms. Abnormal LFTs are high in COVID-19 patients and abnormality correlates with the severity of the disease.

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