



# Association between Deranged Liver Function Tests and Radiological Severity Indicators in COVID-19 Patients

Ajay P. Tripathi<sup>1\*</sup> , Kratika Singh<sup>2</sup>, Prabhakar Gupta<sup>3</sup>, Ajay Adhikari<sup>1</sup>, Ajay Verma<sup>1</sup>, Tejaswini Dwivedi<sup>4</sup> 

In this retrospective observational study, data of 30 COVID-19-positive confirmed cases was extracted from medical archives of RD Gardi Medical College Hospital, and this data was analyzed. Liver function tests like SGOT, SGPT and total bilirubin were compared to radiological indicators of increased lung involvement in these 30 patients. It was found that there is a significant association between increased involvement of lung tissue damage and derangement of liver function tests of these patients at the time of admission. Lung tissue involvement was calculated as per radiologically established scores for assessing the severity of COVID-19.

## Access this article online

### Website:

www.cijmr.com

### DOI:

10.58999/cijmr.v2i02.112

### Keywords:

COVID-19, Liver Function Test, HRCT Chest.

## Introduction

COVID-19 and post-COVID-19 sequelae has been a persistent challenge throughout India till recent past. COVID-19 has been infamous for involving not just lungs but multiple organs of the body, including kidney, liver, brain and heart. It is well known that the involvement of multiple organs is associated with increased severity and greater mortality of patient. There have been reasonable evidences to demonstrate the ability of SARS-CoV-2 to cause gastrointestinal and liver injuries.<sup>1</sup> Various researchers have also attributed gastrointestinal symptoms and transaminitis as a common feature in COVID-19 infection.<sup>2</sup> Some previous studies reported a significant association between deranged liver functions tests and severity of COVID-19 cases.<sup>3</sup> Mild self-resolving elevation of liver function tests has also been reported to be in more than 50% of cases infected by SARS-CoV-2 in some studies.<sup>4</sup> We therefore tried to ascertain any association between deranged liver function tests and Radiological severity indicators of COVID-19. A data of

30 COVID-19 positive cases was collected from archives of R.D. Gardi Medical College Hospital and analysed retrospectively in this observational study.

## Aims and Objective

To ascertain any correlation and associations between radiological severity indicators such as CT Severity score, CORAD Score, Percentage lung field involvement and Liver function tests in COVID-19 patients

## Material and Methods

### Study Design

This is a retrospective observational study with data retrieved from case files of 30 patients admitted in R.D. Gardi Medical College Hospital in the duration of May 2020 to July 2021.

### Variables Analysed

Data as retrieved from case files pertaining to 1<sup>st</sup> presentation to the hospital was used for this study. Multiple variables such as CORAD Scores, CT Severity Scores, lung percentage involvement as reported in HRCT Chest report, SGOT, SGPT, serum total bilirubin and ALP were analyzed. Mean SGOT, SGPT, total bilirubin, ALP levels were ascertained along with the Pearson correlation coefficient calculated for ascertaining strength of associations (Tables 1 and 2).

<sup>1</sup>Department of Medicine, R.D. Gardi Medical College Hospital & Research centre, Ujjain, Madhya Pradesh, India

<sup>2</sup>Department of Radiodiagnosis, R.D. Gardi Medical College Hospital & Research Centre, Ujjain, Madhya Pradesh, India

<sup>3</sup>Department of Radiotherapy, M.G.M Medical College Indore Madhya Pradesh, India

<sup>4</sup>Department of Pathology, R.D. Gardi Medical College Hospital & Research Centre, Ujjain, Madhya Pradesh, India

**Correspondence to:** Ajay P. Tripathi, Department of Medicine, R.D. Gardi Medical College Hospital & Research centre, Ujjain, Madhya Pradesh, India. E-mail: drajaytripathi@gmail.com

**Submitted:** 15/05/2023

**Revision:** 28/05/2023

**Accepted:** 15/06/2023

**Published:** 31/08/2023

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**How to cite this article:** Tripathi AP, Singh K, Gupta P, Adhikari A, Verma A, Dwivedi T. Association between Deranged Liver Function Tests and Radiological Severity Indicators in COVID-19 Patients. Central India Journal of Medical Research. 2023;2(2):24-26.

### Statistics

We used SPSS 23 package for analysis. The mainstay test used for ascertaining association was Pearson coefficient with 2 tailed sig value of <0.05 taken as significant.

### Result

A significant association was found between the percentage involvement of lungs and SGOT, SGPT, total bilirubin levels but the same association was not followed by CORAD score and CT Severity score systems (Tables 2 and 3).

### Discussion

COVID-19 is well known to cause fatal respiratory symptoms and impairment and various life-threatening organ involvements and extrapulmonary manifestations. Hepatocellular injury is one of the important extrapulmonary manifestations of the disease.<sup>5</sup> An uncontrolled immune reaction can very well explain this hepatocellular injury, dysregulated host response to infection, sepsis or drug-induced injury to hepatocytes. Besides this there is also evidence of direct cytopathic effect of the virus to the liver<sup>6</sup> In Hong Kong, in a cohort of 1040 COVID-19 patients, Yip *et al.* found ALT and AST elevation and acute liver injury are independently associated with adverse clinical outcomes, including admission to intensive care unit, use of invasive mechanical ventilation and/or death in

**Table 1:** Variable, number of patients and mean value

Variable	N (Number of Patients)	Mean Value
SGOT	23	92 u/L
SGPT	23	88 u/L
TBIL	30	0.9 mg/dl
ALP	4	110 u/L

**Table 2:** Pearson correlation

CORAD	Pearson Correlation
	Sig. (2-tailed)
	N
CT Severity	Pearson Correlation
	Sig. (2-tailed)
	N
%Involvement	Pearson Correlation
	Sig. (2-tailed)
	N

**Table 3:** SGOT, SGPT, total bilirubin levels

SGOT	SGPT	TBIL	ALP
.160	.133	-.148	-1.000**
.489	.565	.471	.
21	21	26	2
.324	.340	-.079	.558
.114	.096	.623	.249
25	25	41	6
.486*	.450*	-.389*	.811
.019	.031	.034	.189
23	23	30	4

COVID-19 patients.<sup>7</sup> Saini *et al.* retrospectively concluded analysis of liver function tests of 170 patients with confirmed COVID-19, he observed that the number of patients with raised levels of any of the liver enzymes were 89 (58.5%), out of which 43 (48.31%) had liver injury. This manifested as increased severity in terms of ICU requirement ( $p=0.0005$ ).<sup>8</sup> Hormati *et al.* in a case series also reported pure hyperbilirubinemia to be considered as rare gastrointestinal symptom of COVID-19.<sup>9</sup>

All the above-mentioned researches begged the question of whether liver function test can be used to assess the severity of the disease, and whether raised liver enzymes indicated poor prognosis of the patient. A previous study has been successful in considering ALT as a prognostic indicator of ICU admission and mortality in COVID-19 patients.<sup>10</sup> This study showed similar findings in the form of deranged LFT correlation with the percentage involvement of lung tissue as per HRCT chest findings.

### Conclusion

Our study indicates that COVID-19 infection induces hepatic injury which manifests in the form of deranged liver function tests and enzymes. The derangement of liver function tests is directly correlated with radiological severity as observed objectively by percentage of lung involvement in HRCT chest scans. Hence, liver function test monitoring can be a surrogate marker of COVID-19 severity and outcome.

Pearson correlation coefficient calculates significant of association between changes in two continuous variables, in our study changes in LFT were found to correlate to percentage involvement in lung field as reported by HRCT reports (Table 2).

More studies on this topic are needed to enlighten the definite nature and mechanism of these correlations.

## Conflict of Interest

None

## References

1. Greenough TC, Carville A, Coderre J, Somasundaran M, Sullivan JL, Luzuriaga K, Mansfield K. Pneumonitis and multi-organ system disease in common marmosets (*Callithrix jacchus*) infected with the severe acute respiratory syndrome-associated coronavirus. *Am J Pathol.* 2005;167:455–463.
2. Guo Y, Korteweg C, McNutt MA, Gu J. Pathogenetic mechanisms of severe acute respiratory syndrome. *Virus Res.* 2008;133:4–
3. Wei Xu, Chenlu Huang, Ling Fei *et al.* Dynamic Changes in Liver Function Tests and Their Correlation with Illness Severity and Mortality in Patients with COVID-19: A Retrospective Cohort Study. *Clinical Interventions in Aging* 2021;16 675–685
4. Chang HL, Chen KT, Lai SK, Kuo HW, Su IJ, Lin RS, Sung FC. Hematological and biochemical factors predicting SARS fatality in Taiwan. *J Formos Med Assoc.* 2006;105:439–450.
5. Gupta A, Madhavan MV, Sehgal K, *et al.* Extrapulmonary manifestations of COVID-19. *Nat Med.* 2020;26:1017–1032. doi:10.1038/s41591-020-0968-3
6. Jothimani D, Venugopal R, Abedin MF, *et al.* COVID-19 and the liver. *J Hepatol.* 2020;73:1231–1240. doi:10.1016/j.jhep.2020.06.006
7. Yip TC, Lui GC, Wong VW, *et al.* Liver injury is independently associated with adverse clinical outcomes in patients with COVID-19. *Gut.* 2020;70 (4):733–742. doi:10.1136/gutjnl-2020-321726
8. Saini RK, Saini N, Ram S, *et al.* COVID-19 associated variations in liver function parameters: a retrospective study. *Postgrad Med J.* 2020. doi:10.1136/postgradmedj-2020-138930
9. Hormati A, Ghadir MR, Saeidi M, *et al.* Hepatic involvement as hyperbilirubinemia in patients with COVID-19: case series from Iran. *Infect Disord Drug Targets.* 2021;21:. doi:10.2174/1871526521666210218201601
10. Chan HL, Leung WK, To KF, Chan PK, Lee N, Wu A, Tam JS, Sung JJ. Retrospective analysis of liver function derangement in severe acute respiratory syndrome. *Am J Med.* 2004;116:566–567.