



## STUDY OF D-DIMER LEVEL AS AN ASSOCIATED FACTOR WITH SEVERITY OF THE DISEASE IN COVID-19 PATIENTS

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### ABSTRACT

**INTRODUCTION:** Since December 2019, the rapid outbreak of corona virus disease 2019 (COVID-19), which arose from severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, has become a public health emergency of international concern. COVID-19 has contributed to an enormous adverse impact globally. Infection by COVID-19 ranges from asymptomatic to severe life threatening course or death. It is better to early know the severity of the disease to prevent morbidity and mortality from COVID-19. For this purpose D-dimer level is essential to know the severity of the disease. **AIMS AND OBJECTIVES:** To study the D-dimer level in severe COVID-19 patients. **MATERIALS AND METHODS: INCLUSION CRITERIA :** Patients who are positive for COVID-19 by RTPCR test. **EXCLUSION CRITERIA:** Asymptomatic COVID-19 patients. **RESULTS:** In our study among 50 patients 6% patients had normal D-dimer level, 12% had mild elevation, 42% had moderate elevation and 38% had severe elevation of D-dimer. **CONCLUSION:** In majority of severe COVID-19 patients D-dimer levels were significantly elevated. This indicates high inflammatory activity and thrombus formation in the lungs. To reduce mortality and morbidity from COVID-19, inflammatory activity on thrombus formation have to be controlled, for these achievements anti-inflammatory drugs and anti-coagulants have to be given.

**KEYWORDS :** D-dimer; pulmonary embolism; COVID-19; SARS-CoV-2; RTPCR test

### INTRODUCTION:

Since December 2019, a novel member of human coronavirus which newly identified in Wuhan, China, is officially named as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) by International Committee On Taxonomy Of Viruses.1,2,3 The reported overall case fatality rate for COVID-19 was 2.3%, but cases in those aged 70-79 years had 8% case fatality rate and in those aged over 80 years had 14% mortality.4 It is crucial to discriminate among COVID-19 patients who have high risk of severe infection and guide the use of different therapies at an early stage. Abnormal coagulation function, including elevated D-dimer, has been demonstrated to be more common in diseased patients with COVID-19 and increasing hospital death was associated with D-dimer >1g/ml.<sup>5</sup>

It has been reported that about 50% of the patients had increased D-dimer levels and abnormal D-dimer levels are associated with poor prognosis.6,7 In some stable patients with sudden death, acute infarction due to embolism may be considered as cause of death. The incidence of pulmonary embolism was 11.4% in COVID-19 patients.8 D-dimer is the biomarker which identifies early thrombus formation. D-dimer is a fibrin degradation product, a small protein fragment present in the blood, after a blood clot is degraded by fibrinolysis. It is so named because it contains two D fragments of the fibrin protein joined by a cross link. Elevated D-dimer levels indicate fibrinolysis of intravascular thrombosis – causes of which include pulmonary embolism, deep venous thrombosis. A normal D-dimer range is <0.5g/ml. Positive test results were defined as a D-dimer level of >0.5g/ml. D-dimer levels were higher in COVID-19 patients and were related with markers of inflammation.

### AIMS AND OBJECTIVES:

- To study the D-dimer levels in severe COVID-19 patients.
- To study association of high D-dimer levels with severity of the disease in COVID-19 patients

### MATERIALS AND METHODS:

In this study total 50 patients, who are admitted in SVRRGG hospital, Tirupati were taken.

All these patients were tested positive for SARS-CoV-2 by RTPCR test. All these patients were severely ill and admitted in COVID-19 intensive care unit.

### INCLUSION CRITERIA:

- All patients who were positive for COVID-19 RTPCR test
- Severely symptomatic patients
- Patients age more than 18 years

### EXCLUSION CRITERIA:

- Asymptomatic COVID-19 patients
- Mildly symptomatic COVID-19 patients
- Patients aged <18 years
- Patients who had history of clotting disorders prior to COVID-19 infection.

### RESULTS:

**Table: D-dimer levels in severe COVID-19 patients**

S.No.	D-dimer levels	No. of patients	Percentage
1	Normal (<0.5g/ml)	3	6%
2	Mild elevation(0.5-1g/ml)	7	14%
3	Moderate elevation (1-3g/ml)	21	42%
4	Severe elevation (>3g/ml)	19	38%

In our study 50 patients were included. All these patients were admitted in SVRRGG hospital, Tirupati. All these were tested for COVID-19 by RTPCR test. All these patients were severely affected by COVID-19. Indicators of severity of the disease – all these patients had oxygen saturation <90% and required oxygen supplementation. All these patients were admitted in COVID-19 intensive care unit.

In this study normal D-dimer level was taken as 0.5g/ml. Severity of D-dimer levels is classified into 3 categories- mild elevation (0.5-1g/ml), moderate elevation (1-3g/ml) and severe elevation (>3g/ml). In our study among 50 patients, 3 patients(6%) had normal D-dimer (<0.5g/ml) level and 7 patients (14%) had mild elevation of D-dimer. 21 patients (42%) had moderate elevation of D-dimer. Severe elevated D-dimer level was found in 19 patients (38%).

**DISCUSSION:**

COVID-19 patients presentation varies from asymptomatic to severely symptomatic. To identify the severity of the disease is essential to prevent morbidity and mortality. Estimation of D-dimer level is one of the best indicator to know the severity of the disease in COVID-19 patients. Biomarkers, which can identify thrombus formation at early stages, might be used to evaluate the thrombus formation and response to treatment. D-dimers are fibrin degradation products which have been shown to be useful in a clinical decision rule for ruling out pulmonary embolism.<sup>9</sup>

In this study 50 severely symptomatic COVID-19 patients were included. All were tested positive for COVID-19 by RTPCR test. Among these 11 were female patients and 39 were male patients. Age of patients varies from 40-70 years. For all patients routine and special investigations like chest X-ray PA view, CT scan chest, complete blood count, blood sugar, renal function tests, liver function tests, etc were done. For all these patients inflammatory markers like D-dimer, Interleukin-2, LDH (Lactate Dehydrogenase) and serum ferritin levels were done. In our study among 50 severely ill COVID-19 patients, 3 patients (6%) had normal D-dimer levels and 7 patients (14%) had mild elevation of D-dimer. But D-dimer was elevated moderately in 21 patients (42%). D-dimer levels were very high in 19 patients (38%). Our study is indicating that D-dimer levels were significantly elevated in most of the severely ill COVID-19 patients.

Our study results are comparable with the following other studies. Yin S, Huang et.al<sup>10</sup> and Zhang L, Yan X et.al<sup>11</sup> studies reported that D-dimer is significantly increased in patients with COVID-19 and is reflected to prognosis. Hai-Han Yu et.al study reported patients with severe disease were more likely to exhibit dysregulated coagulation function, and a significantly higher D-dimer level.

**CONCLUSION:**

In majority of severe COVID-19 patients D-dimer levels were significantly elevated. This is due to high inflammatory activity and thrombus formation in the lungs. Patients who have high D-dimer levels indicate severe pathogenesis in their lungs. To reduce the severity of the disease, in COVID-19 patients, inflammation and thrombus formation have to be controlled. These goals are achieved by treating with anti-inflammatory and anti-coagulation drugs. For all COVID-19 patients, D-dimer levels should be done, patients who had elevated D-dimer levels may be treated with anti-inflammatory and anti-coagulation drugs to prevent morbidity and mortality.

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