

A Retrospective Hospital Based Assessment of D Dimer – Prognostic Indicator for Disease Severity in Patients Hospitalized with COVID 19

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Conflict of interest: Nil

Abstract

Aim: To evaluate the usefulness of D-Dimer levels in blood to correlate with disease severity in COVID 19 patients.

Material & Methods: The present retrospective study includes 50 patients hospitalized for COVID-19 during a period of 6 months in Government Medical College, Bettiah, Bihar, India. D-dimer evaluation was performed using an immunoturbidimetric assay on Erba Mannheim ECL 105 machine.

Results: The study was conducted on 50 COVID 19 positive patients admitted to the hospital. Of the total patients, 34 were male and 16 were female. In mild cases D Dimer varies from 52 ng/ml to 192 ng/ml with mean 98.3 and median 99. In moderate cases D Dimer varies from 262 ng/ml to 998 ng/ml with mean 664.8 and median 812.

Conclusion: D dimer helps in identifying severe disease and can be used as an essential biomarker in developing the management protocol for COVID 19 patients.

Keywords: D-Dimer, COVID 19, Biomarker

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Introduction

Coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2, was first recorded in Wuhan, the capital of Hubei province of China in December 2019 [1]. While COVID-19 is primarily a respiratory illness, it can affect multiple organ systems including gastrointestinal, hepatic, cardiac, neurological, and renal systems [1–3].

Thrombotic complications and coagulopathies including Disseminated

intravascular coagulopathy are common in COVID-19, likely reflecting activation of the coagulation cascade due to viremia or cytokine storm, or possibly due to superinfection and organ dysfunction [4].

D-dimer is a fibrin degradation product, widely used as a biomarker for thrombotic disorders. A D-dimer value less than 0.5 µg/mL is usually considered normal, and values increase with increasing age and in pregnancy. The level of D-dimer rises with increased severity of community-acquired

pneumonia [5]. Following the outbreak of the COVID-19 pandemic, Ddimer has been identified as a potential indicator for its prognosis in COVID-19 patients.

Admission day D-dimer has shown promise for predicting the disease severity in multiple studies [6–9].

D-dimer is a fibrin degradation product, a small protein fragment that is released into the blood when a blood clot is degraded by fibrinolysis [10]. A diagnosis of thrombosis can be made by determining the D-dimer concentration: the D-dimer level is increased when the coagulation system is activated by thrombosis or disseminated intravascular coagulation. A high level of D-dimer may also be a sign of deep venous thrombosis, pulmonary embolism, or disseminated intravascular coagulation [11]. Zhou et al. reported that a high level of D-dimer may help in the early clinical diagnosis of COVID-19. The present study was undertaken to evaluate the usefulness of D-Dimer levels in blood to correlate with disease severity in COVID-19 patients.

Material & Methods:

The present retrospective study includes 50 patients hospitalized for COVID-19

during a period of 6 months in Government Medical College, Bettiah, Bihar, India.

The laboratory confirmation for COVID-19 was carried out by RT – PCR or Rapid Antigen test as per ICMR criteria. The epidemiological data, comorbidities and clinical condition of the patients were obtained from the medical records department. Blood sample was collected during the hospital stay for testing D-dimer.

D-dimer evaluation was performed using an immunoturbidimetric assay on Erba Mannheim ECL 105 machine. Sample was collected in citrate vial. D-dimer levels were evaluated along the clinical course of the disease and values were compared for those having severe versus non-severe disease.

Results:

The study was conducted on 50 COVID-19 positive patients admitted to the hospital. Of the total patients, 34 were male and 16 were female. There was no significant difference in the severity of the disease between the two. [Table 1].

Table 1: Gender distribution of COVID 19 patients

Gender	Total	Mild	Moderate	Severe
Male	34	14	18	2
Female	16	11	4	1

In mild cases D Dimer varies from 52 ng/ml to 192 ng/ml with mean 98.3 and median 99. In moderate cases D Dimer varies from 262 ng/ml to 998 ng/ml with mean 664.8 and median 812. In severe cases D Dimer varies from 1529 ng/ml to 2628 ng/ml with mean 1781.2 and median 1381 [Table 2].

Table 2: D Dimer levels in patients as per severity of COVID 19

D Dimer level (ng/ml)	Mild	Moderate	Severe
Minimum	52	262	1529
Maximum	192	998	2628
Mean value	98.3	664.8	1781.2
Median value	98	814	1381

As per linear regression model the coefficients of severity of illness of COVID 19 with d dimer levels in blood for moderate and severe category are statistically significant at 99.9% wit p value less than 0.001. [Table 3].

Table 3: Statistical significance of D dimer levels as per severity of COVID 19

Clinical Types	Estimate	Std. Error	t value	Pr(> t)
Mild	98.3	39.28	2.528	0.0271
Moderate	528.7	61.62	8.629	2e-12
Severe	1487.5	122.81	12.441	<2e-16

Discussion:

Several studies have shown that D-dimer levels are associated with severity of community-acquired pneumonia and clinical outcome [13]. However, Ddimer has not been used as a biomarker for viral pneumonia [14-15]. Though D-dimer elevation has been observed in articles describing the clinical features of COVID-19, whether the level of D-dimer is a marker of severity has not been examined.

A study in most SARS patients has reported an association between thrombocytopenia and elevated D-dimer [16]. Similarly, elevated D-dimer levels were also reported in patients with Ebola [17]. Huang et al., (2020) [18] reported that D-dimer values were nearly fivefold higher in those with severe disease caused by COVID-19 pneumonia. Recent literature data also showed that D-dimer values are frequently elevated in patients with COVID-19 [19].

The pathological features of COVID-19 include diffuse alveolar damage with cellular fibromyxoid exudates, desquamation of pneumocytes and hyaline membrane formation, pulmonary edema with hyaline membrane formation, and interstitial mononuclear inflammatory infiltrates, dominated by lymphocytes, which greatly resemble those seen in SARS and MERS coronavirus infection [20, 21]. Presumably, the observed D-dimer elevation signify a hyper fibrinolysis state and increased inflammatory burden induced in SARS-COV- 2 infection. However, in a recent observational study including 2773 hospitalized COVID-19

patients, Paranjpe et al. found that treatment dose anticoagulant was associated with a reduced risk of mortality, especially among patients who required mechanical ventilation [22].

The demographic profile in our study supports the data reported by numerous authors stating that advancing age is a predisposing factor for COVID-19 and leads to severe disease and even death. For instance, Zhou et al. opined that age more than 50 years was strongly associated with the disease while age around 65 years increases chances of mortality. [6] The basis for this might be impaired cellular immunity superimposed with longer duration of inflammation in adults. [23]

Conclusion:

D dimer helps in identifying severe disease and can be used as an essential biomarker in developing the management protocol for COVID 19 patients.

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