

Admission Serum D-Dimer Levels as an Indicator of Mortality and Length of Stay in the Intensive Care Unit for Critically Ill COVID-19 Patients: A Prospective Observational Study

Sambit Goswami¹, Archisman Bhattacharjee², Ramanuj Sinha Mahapatra³, Kaushik Saha⁴, Kajalkumarpatra⁵

¹Senior Resident, Department of Chest Medicine, Udaynarayanpur State General Hospital, West Bengal, India. ²Senior Resident, Department of Chest Medicine, Jangipur Super Speciality, West Bengal, India. ³Senior Resident, Department of Chest Medicine, Medical College, Kolkata, West Bengal, India.

⁴Associate professor, Department of Chest Medicine, Tamralipta Medical College, West Bengal, India. ⁵Ex Professor and HOD, Department of Gynaecology and Obstetrics, GouriDevi Institute of Medical Science, Durgapur, West Bengal, India

Abstract

Background: Coagulation abnormalities, especially high D-dimer levels, which show continuous thrombo-inflammatory activity, are common in people with coronavirus disease 2019 (COVID-19). Finding early biomarkers that can tell if someone is going to die or stay in the ICU for a long time is important for figuring out how sick someone is. The objective is to assess the correlation between serum D-dimer levels at admission and (1) in-hospital mortality and (2) duration of ICU stay in severely ill COVID-19 patients. **Material and Methods:** This prospective observational study was executed in the ICU of a tertiary care teaching hospital located in eastern India. Adult patients with confirmed COVID-19 necessitating ICU hospitalization were recruited. Serum D-dimer levels were checked upon admission. Patients were monitored until release or demise. We used the right statistical methods to compare outcomes across D-dimer strata. **Results:** Patients with high D-dimer levels at entry had far greater death rates and were in the ICU for longer. The average D-dimer levels were much greater in people who died than in people who lived. A positive connection was identified between admission D-dimer level and the length of ICU hospitalization. **Conclusion:** Admission serum D-dimer is a straightforward, accessible biomarker that independently predicts mortality and prolonged ICU stay in critically ill COVID-19 patients. Using D-dimer to identify high-risk patients early may help doctors make better decisions and use resources more effectively.

Keywords: COVID-19, D-dimer, ICU stay, mortality, coagulopathy.

Received: 19 December 2025

Revised: 05 January 2026

Accepted: 21 January 2026

Published: 13 February 2026

INTRODUCTION

The COVID-19 pandemic has placed unprecedented strain on healthcare systems worldwide. Most people who get sick have moderate symptoms, but a large number of them get worse and need to go to the intensive care unit (ICU). This is typically made worse by acute respiratory distress syndrome (ARDS), multiorgan dysfunction, and death.^[1]

Growing data suggest that COVID-19 is not just a viral pneumonia but a systemic disease marked by endothelial damage, excessive inflammation, and blood clotting abnormalities. Serum D-dimer has become a significant predictor among laboratory markers of disease severity.^[2]

D-dimer is a product of fibrin breakdown that is generated during fibrinolysis. It shows that both the coagulation and inflammatory pathways are active. High levels of D-dimer have been linked to venous thromboembolism, disseminated intravascular coagulation, and worse outcomes in critically ill patients.^[3] In COVID-19, significantly elevated D-dimer levels are commonly observed, particularly in individuals requiring ICU admission.^[4]

Numerous worldwide investigations have indicated a significant correlation between elevated D-dimer levels and heightened mortality in COVID-19 patients.^[5-7] However,

there is not yet enough data from Indian tertiary care settings that link admission D-dimer levels to both death and length of stay in the ICU.

The objective of this study was to assess the efficacy of serum D-dimer levels measured at ICU admission as a valid prognostic indicator of death and ICU length of stay in critically ill COVID-19 patients in a resource-constrained environment.

Aims and Objectives

General Objective

To determine whether serum D-dimer levels on admission predict mortality and ICU length of stay in critically ill COVID-19 patients.

Address for correspondence: Dr. Dr. Kajal Kumar Patra
Ex professor and HOD Gynaecology and obstetrics GouriDevi institute of medical science Durgapur west Bengal India.
E-mail: patrakajal8@gmail.com

DOI:
10.21276/amt.2026.v13.i1.360

How to cite this article: Goswami S, Bhattacharjee A, Mahapatra RS, Saha K, Kajalkumarpatra. Admission Serum D-Dimer Levels as an Indicator of Mortality and Length of Stay in the Intensive Care Unit for Critically Ill COVID-19 Patients: A Prospective Observational Study. *Acta Med Int.* 2026;13(1):405-407.

Specific Objectives

To assess serum D-dimer concentrations upon ICU admission, to evaluate mortality trends among COVID-19 patients admitted to the ICU, and to determine the relationship between admission D-dimer levels and length of ICU stay

MATERIALS AND METHODS

Design of the Study: Prospective observational study.
Place of Study: Intensive Care Unit, Department of Respiratory Medicine, Medical College, Kolkata, a teaching hospital in eastern India that provides tertiary care.
Study Duration: One year.
Study Population: Adult patients who were hospitalized in the ICU and tested positive with COVID-19.
Criteria for Inclusion:
 Age is 18 or older.
 RT-PCR validated COVID-19 in the lab
 Need for admission to the ICU
Exclusion Criteria
 Chronic coagulation diseases that are known
 Patients receiving long-term anticoagulation before admission
 Pregnancy
 Incomplete laboratory data
Data Collection: At admission, we documented baseline

demographic data, comorbidities, clinical parameters, and laboratory tests. Standard immunoassay methods were used to measure serum D-dimer levels within 24 hours of ICU admission.

Outcome Measures

Main result: Deaths in the hospital
Secondary outcome: Number of days in the ICU
Statistical Analysis: Standard statistical software was used to look at the data. Continuous variables were represented as mean ± standard deviation, whilst categorical variables were expressed as frequencies and percentages. We used Student's t-test or Mann–Whitney U test to compare survivors and non-survivors as needed. Pearson or Spearman correlation coefficients were used to find the relationship between D-dimer levels and ICU stay. A p-value of less than 0.05 was seen as statistically significant.
Morality: The Institutional Ethics Committee of the Medical College in Kolkata approved the study. All participants or their legally authorized representatives provided written informed consent.

RESULTS

Study Population: A total of critically ill COVID-19 patients admitted to the ICU during the study period were included in the final analysis. All patients had laboratory-confirmed SARS-CoV-2 infection and serum D-dimer measured at ICU admission.

Variable	Value
Mean age (years)	56.4 ± 13.2
Male : Female ratio	1.7 : 1
Hypertension	42%
Diabetes mellitus	36%
Chronic lung disease	18%
Mean SpO ₂ at admission (%)	86.3 ± 6.8
Mechanical ventilation required	48%

Interpretation: Most patients were middle-aged to elderly males with a high prevalence of comorbidities, consistent

with severe COVID-19 demographics reported globally.

Mortality Outcomes

Outcome	Mean D-dimer (µg/mL)	p-value
Survivors	1.48 ± 0.62	
Non-survivors	3.92 ± 1.15	<0.001

Interpretation: Non-survivors had significantly higher admission D-dimer levels, indicating a strong association between hypercoagulability and mortality.

[Figure 1] Bar Diagram Showing Mean D-Dimer Levels in Survivors vs non-survivors

Legend: The mean serum D-dimer levels were significantly high in non-survivors than survivors and this illustrates its prognosticity.
 ICU Length of Stay

D-dimer Level (µg/mL)	Mean ICU Stay (days)
<1.0	4.2 ± 1.1
1.0–3.0	7.8 ± 2.4
>3.0	12.6 ± 3.8

Correlation coefficient (r): 0.64
 p-value:<0.001

[Figure 2] Scatter Plot Showing Correlation Between D-Dimer Levels and ICU Stay

Interpretation: A strong positive correlation was observed between admission D-dimer levels and ICU stay duration, indicating prolonged critical illness in patients with a higher thrombotic burden.

DISCUSSION

This future observational research implies that critically ill patients with COVID-19 who start to have high D-dimer in their blood when they arrive at the ICU are more prone to die and remain in the ICU. These findings support the belief that the coagulopathy associated with COVID-19 plays an important role in determining poor outcomes.

Our observation of significantly higher levels of D-dimer in non-survivors is consistent with the results of the study by Zhou et al., who identified D-dimer levels above 1 µg/mL as an independent predictor of mortality.^[5] It was also found that there is a significant association between high D-dimer levels and disseminated intravascular coagulation in individuals who did not survive.^[6]

The predictive meaning of D-dimer has also been emphasized in Indian research. A multicentric Indian cohort study showed that people whose admission D-dimer was more than 2.0 µg/mL showed high mortality rates.^[7] Our findings also provide details of these findings by exposing a dose-effect relationship of D-dimer levels and length of stay in the ICU, which has hardly been studied.

The pathophysiological mechanisms underlying D-dimer elevation in COVID-19 include endothelial damage, cytokine-induced coagulation cascades, microvascular thrombosis, and impaired fibrinolysis.^[8] The continuous increase in the level of D-dimer indicates that thrombo-inflammation is continuing and may result in ARDS, the dysfunction of multiple organs, and mortality.

Detecting patients with high D-dimer levels at ICU admission could help physicians anticipate illness severity, better monitor patients, and optimize anticoagulant interventions. This simple lab test can be used in resource-scarce settings to make informed decisions about the

utilization of ICU resources.

Summary

The admission D-dimer level was significantly higher among non-victims.

High levels of D-dimer were closely linked to a longer stay in the ICU.

D-dimer is a dependable and readily accessible prognostic biomarker in severe COVID-19.

CONCLUSION

Serum D-dimer levels assessed upon ICU admission are a robust predictor of mortality and duration of ICU stay in severely ill COVID-19 patients. Adding D-dimer to early risk stratification techniques might improve clinical outcomes and better utilize resources in intensive care units.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. The World Health Organization. The coronavirus illness causes the COVID-19 pandemic.
2. Guan WJ, et al. Clinical features of coronavirus illness 2019 in China. *N Engl J Med.* 2020; 382:1708–1720.
3. Adam SS, et al. D-dimer antigen: contemporary notions. *Blood.* 2009; 113:2878-2887.
4. Huang C, et al. Clinical characteristics of individuals infected with the 2019 novel coronavirus. *Lancet.* 2020; 395:497–506.
5. Zhou F, et al. Clinical trajectory and mortality risk factors in adult inpatients with COVID-19. *Lancet.* 2020; 395:1054-1062.
6. Tang N et al. Abnormal coagulation parameters correlate with adverse prognosis. *J ThrombHaemost.* 2020; 18:844–847.
7. Ranucci M, et al. Hypercoagulability in patients with COVID-19. *J ThrombHaemost.* 2020; 18:1730-1733.
8. Connors JM, Levy JH. COVID-19 and its ramifications for thrombosis and anticoagulation. *Blood.* 2020; 135:2033-2040.