

D-Dimer Elevation in COVID-19 Patients: A Predictor of Mortality

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Abstract: COVID-19 is a systemic infection that significantly impacts the hematopoietic system and haemostasis. Blood hypercoagulability is common among hospitalized COVID-19 patients. Although elevated D-Dimer levels are frequently observed, their progressive rise over an illness is particularly linked to the condition worsening. The D-dimer level is a promising biomarker for predicting death in COVID-19 patients.

Keywords: SARS-CoV-2, Coronavirus disease 2019; D-Dimer; biomarker; Mortality

1. Introduction

An ongoing worldwide health emergency is Coronavirus disease 2019, which is brought on by the severe acute respiratory syndrome coronavirus 2 (SARS-COV2).¹ The SARS-COV 2 infections clinical spectrum includes asymptomatic infection, serious illness, and death. In COVID-19, coagulopathy is frequently reported and is more common in critically ill patients; in fact, SARS-COV 2 may predispose patients to thrombotic disease, both in the venous and arterial circulation, due to excessive inflammation, platelet activation, endothelial dysfunction, and stasis.² The most common result in patients with COVID-19 is an increased D-dimer concentration, however, coagulation problems are increasingly recorded in hospitalized patients with COVID-19, including increased D dimer, high fibrinogen, and rising prothrombin time.³ D-dimer is a fibrinolysis biomarker.⁴ It is the primary breakdown fragment of fibrin. D-dimer can only be generated when there is the formation and degradation of cross-linked fibrin, offering a global marker of activation of the coagulation and fibrinolysis, and thus reflective of enhanced thrombotic activity.⁶ Fibrin degradation products induce acute pulmonary dysfunction and have a direct procoagulant effect.⁷ Elevated D-dimer values correlate with a poor prognosis, with the development of acute respiratory distress syndrome and the risk for admission to the intensive care unit.⁸

The aim of the study was to evaluate whether elevated D-dimer levels could predict the mortality of COVID-19 patients.

2. Materials and Methods

A retrospective study was performed on adult patients with laboratory-confirmed COVID-19. A total of 30 individuals who had a high D-dimer level on admission were enrolled. Within 24 hours of admission, blood samples were taken for routine laboratory tests. For the D-dimer test Blood should be collected in a blue-top tube containing 3.2% buffered sodium citrate. D-dimer was measured using an ABBOT

ARCHITECT 4100 ANALYSER Work on the principle of photometric, potentiometric, Turbidimetric, and Chemiflex.

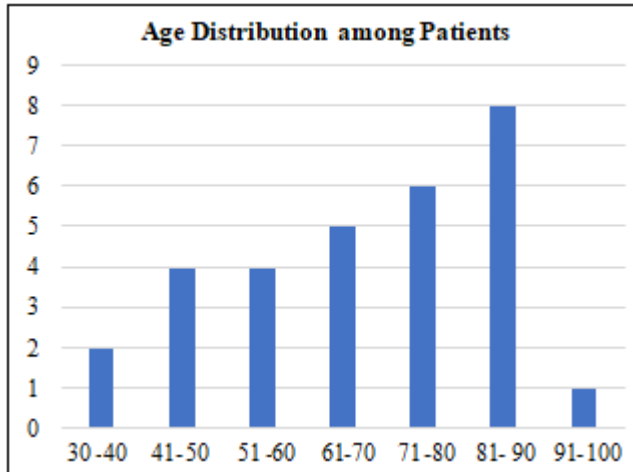
The Quantia D-Dimer (dDim) reagent is a suspension of uniformly sized polystyrene latex particles covered with a monoclonal antibody that is highly selective for the D-Dimer domain present in fibrin soluble derivatives. The coated latex particles agglutinate when plasma containing D-Dimer is combined with the reagent and buffer provided in the kit. The degree of agglutination is directly proportional to the quantity of D-dimer in the sample and is determined by measuring the reduction in transmitted light that results from the aggregates (turbidimetric immunoassay). D-Dimer results are measured in ng/ml. D-dimer normal levels are variable with the analytical procedure. Cut off value of D-dimer is 500ng/ml. The value above 500ng/ml is abnormal.

3. Observation and Result

The data from 30 COVID-19 patients were retrospectively collected from a hospital. Among the 30 hospitalized patients, 53% were female remaining 47% were male. Mortality was higher among patients with elevated D-dimer >1600ng/ml. Out of these 30 patients, 17 patients were dead due to high D-dimer levels of more than 1600 ng/ml during the hospitalization period.

Table 1

Age of the patient	Frequency
30-40	2
41-50	4
51-60	4
61-70	5
71-80	6
81-90	8
91-100	1



Graph 1

Table 2

D-DIMER (ng/ml)	No. of patients
500-1000	8
1000-1500	5
1500-2000	17

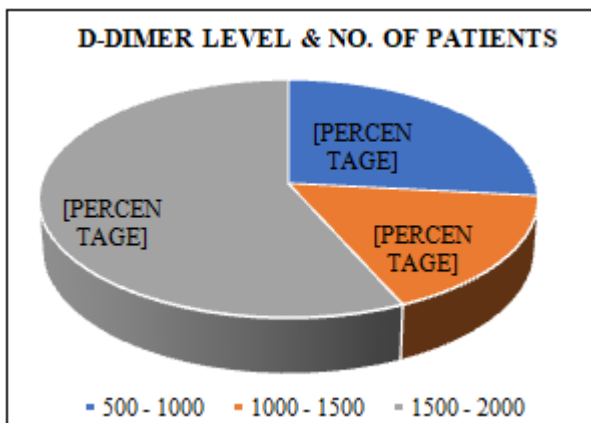


Diagram 1

4. Discussion

D-dimer elevation has been reported to be one of the most common laboratory findings noted in COVID-19 patients requiring hospitalization.

D dimer was high in 56% of patients upon hospital presentation in this research of 30 patients with confirmed COVID-19. Patients who had increased D-dimer levels at the time of admission had poor outcomes. Individuals with lower D-dimer at presentation had a higher chance of being discharged without progressing to the critical disease. Hospitalized patients with COVID-19 are frequently identified with coagulation problems.

In this study, it was discovered that in patients with COVID-19, a higher D-dimer value at hospital admission was substantially associated with in-hospital mortality. D-dimer is a byproduct of fibrin breakdown that is primarily used to identify and treat thrombotic disorders. In COVID-19 patients, increased D-dimer and thrombotic problems have been extensively observed. According to Guan et al., D-dimer levels greater than 0.5 µg/ml were discovered in 260 out of 560 individuals (46%). The association between initial

D-dimer readings and the severity of the disease and outcome has been investigated in a number of studies. Guan and colleagues examined 1099 patients from more than 550 hospitals in China who had laboratory-confirmed COVID-19 and discovered that the non-survivors had a considerably higher D-dimer. Similar to this, Ning et al also discovered abnormal coagulation outcomes, including noticeably raised D-dimer in COVID-19-related deaths.⁹ In a retrospective analysis involving 191 patients with COVID-19 Fei et al discovered that D-dimer of more than 1 µg/mL at admission was associated with in-hospital deaths.

5. Conclusion

D-dimer value on admission is an important biomarker for predicting the disease severity and mortality in COVID-19 patients. The current study adds to the evidence that the COVID-19 infection and negative outcomes are directly related to the D-dimer and the coagulopathic condition of COVID-19.

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