

D-Dimer level as a Predictor of Covid-19 Severity

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ABSTRACT

Background: Coagulopathy has been reported with COVID-19 Illness with D-Dimer elevations in roughly half the patients.

Objectives: To evaluate the outcomes of patients having COVID-19 for their disease severity with D-Dimers as a marker for the prediction of the disease.

Study Design: Cross sectional / Observational study.

Place and Duration of Study: The study was performed in the Department of Medicine at Khyber Medical College/Teaching Hospital Peshawar from January 2021 to March 2021.

Methodology: A total of 110 patients were included in the study. Patients were divided into two groups; DM group included the D-Dimer levels of the patients with the Mild to Moderate Illness. DS group included the D-Dimer levels of the patients with the severe illness. All information was recorded using proforma and analysed on SPSS for MacBook, 26.0.

Results: Linear regression analysis showed that D-Dimer level was a significant predictor of disease severity (Adjusted R Square = .888). D-Dimer was 110 ± 31 (ng/ml) for DM group and 457 ± 149 (ng/ml) for DS group.

Conclusion: D-Dimer levels done early on predict high risk of pulmonary complications and thromboembolic episodes which could be prevented by therapy initiation and intervention.

Keywords: D-Dimers; Prognostic Marker; comorbid; Risk Factor

INTRODUCTION

Coagulopathy has been reported with COVID-19 Illness with D-Dimer elevations in roughly half the patients.¹⁻³ Previously published literature suggests a link between raised levels of D-Dimer and severe cases of Pneumonia and COPD. It could be used as a prognostic marker for such lung related illnesses and infections.^{4, 5} Studies have also shown that elevated levels of D-Dimer could be a mortality related risk factor in COVID-19 hospitalised patients.³

The utility and ability of D-Dimer levels as a marker to predict disease severity has been reported but not fully understood. Thus, we report here on a descriptive analysis of patients admitted for COVID-19, evaluating Leucocytes Counts, C-Reactive Protein, D-Dimer, and Ferritin values amongst other baseline investigations.

The aim of our study is to evaluate the outcomes of patients having COVID-19 for their disease severity with D-Dimer as a marker for the prediction.

METHODOLOGY

The cross-sectional study was performed in the Department of Medicine at Khyber Medical College/Teaching Hospital Peshawar from January 2021 to March 2021 to evaluate the outcomes of patients having COVID-19 for their disease severity with D-Dimer as a marker for the prediction. A total of 110 patients were included in the study by confirming results on RT-PCR. Patients were divided into two groups: DM Group for Mild to Moderate Disease and DS for Severe Disease. DM group includes the D-Dimer levels of the patients with the Mild to Moderate Illness. Mild to Moderate Illness is fever, cough, sore throat, malaise, headache, muscle pain, nausea, vomiting, diarrhoea, loss of taste and smell, some shortness of breath/dyspnoea on

exertion and $SpO_2 \geq 94\%$ on room air. DS group includes the D-Dimer levels of the patients with the severe illness. Severe Illness is $SpO_2 < 94\%$ on room air, respiratory rate > 30 breaths/min, $PaO_2/FiO_2 < 300$ mm Hg, or lung infiltrates $> 50\%$. Blood was taken and analyzed at the Hospital Laboratory via Cobas 6000 E 501 analyzer. The following parameters were checked: Serum Ferritin, C-Reactive Protein, D-Dimer, and White Blood Cells. All confounding variables were controlled by exclusion criteria. Bias was controlled by following strict inclusion criteria for patient selection. All information was recorded using proforma and analyzed on SPSS for MacBook, 26.0

RESULTS

Patients in the DS group were older and showed relatively high frequencies of comorbidities including diabetes mellitus, hypertension, and coronary artery disease. A linear regression analysis of D-Dimer against disease severity found out that D-Dimer was significant for disease severity (Adjusted R Square= 0.888). D-Dimer was 110 ± 31 (ng/ml) for DM group and 457 ± 149 (ng/ml) for DS group.

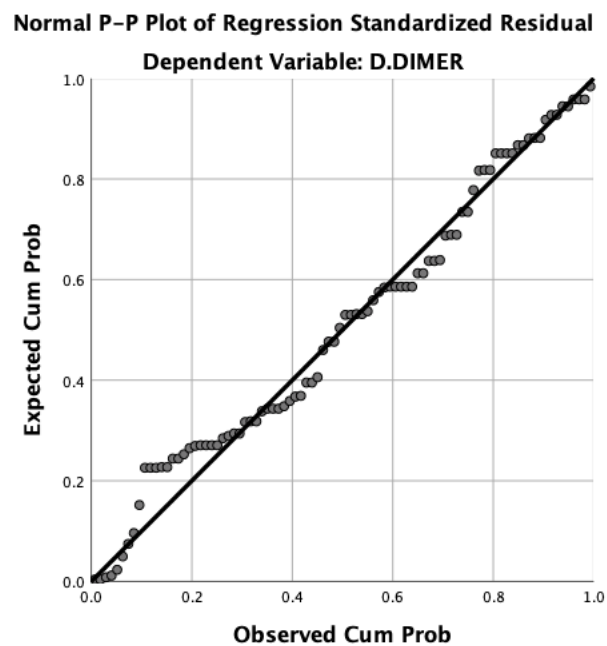


Fig. 1 Linear Regression Analysis showing the correlation of D-Dimer against the severity of disease

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.943 ^a	.889	.888	72.47284

a. Predictors: (Constant), Severity

b. Dependent Variable: D.DIMER

Fig. 2 showing the R values of the Linear Regression Analysis

DM Group (N=65)		DS Group (N=45)	
Parameter	Mean +/- SD	Parameter	Mean +/- SD
WBC (/cmm)	5950±44	WBC (/cmm)	9720±99
Ferritin (ng/ml)	109.50±22.19	Ferritin (ng/ml)	761 ±121.08
D-Dimers (ng/ml)	104±29	D-Dimers (ng/ml)	463±138
C-Reactive Protein (mg/dl)	4.29±1.11	C-Reactive Protein (mg/dl)	79.68±09.95

Fig. 3 Table showing biochemical parameters of the COVID-19 patients. (N=90)

DISCUSSION

When plasmin breaks down fibrin, one of the products produced is D-dimer. To exclude any diagnosis of thrombosis, this is routinely used as an important tool. Any medical condition that leads to the increased production or the breakdown of fibrin causes D-Dimer levels to rise in the plasma. 6

Many studies have pointed towards the association of D-dimer with severity of pneumonia. Articles have described elevated D-dimer levels in COVID-19 patients, but it is not studied as a marker of severity. ^{7, 8}

Our study found out that patients in the DS group were older and showed relatively high frequencies of comorbidities including diabetes mellitus, hypertension, and coronary artery disease. A linear regression analysis of D-Dimer against disease severity showed that D-Dimer was significant for disease severity (Adjusted R Square= 0.888). D-Dimer was 110±31 (ng/ml) for DM group and 457±149 (ng/ml) for DS group. D-Dimer level was significantly higher in the severe group. In the biochemical parameters of the patient there was a significantly high count of white blood cells above the normal ranges.

More and more studies are warranting the use of D-dimer levels in COVID-19 patients to detect its diagnostic and/or prognostic ability in predicting the severity and mortality. The results still seem to be not very clear on the subject given the sample sizes and non-randomized nature of the data being studied mostly retrospective.⁹

Studies found out that old or increasing age is the most important risk factor for COVID-19 mortality. The researchers have a hard time adjusting the study samples for comorbid as the study subjects were not examined by the physicians prior to the disease.^{10, 11} Our study has certain limitations. This was a single centered descriptive study with only a small sample size of 90 patients of mostly Pashtun ethnicity. The results can therefore not be generalized.

CONCLUSION

D-Dimer levels might be useful in the early diagnosis of severe disease and the first treatment. Studies have shown that levels of D-Dimer have been associated with mortality and morbidity. These need to be checked early on and taken as a marker of disease progression and recovery. As a result, high risk of pulmonary complications and thromboembolic episodes could be prevented by therapy initiation and intervention.

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