Original Research Article

Analysis of D-Dimer Levels among COVID-19 Positive Patients at a Tertiary Care Centre in Jhalawar

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Abstract:

Background: COVID-19, caused by the new beta coronavirus of family 2B, 2019-nCoV/SARS-CoV-2, has caused a global pandemic affecting everyday life and medical procedures. The disease has led to numerous studies and tools to help prevent, diagnose, treat, and improve prognosis. One area of interest is thrombosis associated with this viral pneumonia. Higher D-dimer levels have been linked to worsening symptoms and consequences, with individuals with readings >1000 ng/ml having a 20 times higher mortality risk than those with lower D-dimer values. D-dimer levels can effectively predict in-hospital mortality in COVID-19 patients, suggesting that D-dimer testing could be a useful early marker for improving patient care. This study aimed to assess D-dimer levels in diagnosed COVID-19 patients and assess the correlation between D-dimer levels and disease severity among COVID-19 patients.

Material & Methods: A retrospective study was conducted at Jhalawar Medical College's Microbiology and Biochemistry lab to analyse D-Dimer tests in COVID-19 patients. Data from 100 cases was audited, with normal D-Dimer values <500 ng/ml. Ethical approval was obtained from S.R.G. Hospital and Medical College, Jhalawar Ethical Committee and Data was entered and analysed through SPSS 23.0 (trial-Version) Software and Chi-square, Unpaired T test and Person correlation coefficient test were applied for statistical significance. P value <0.05 was considered as significant.

Results: A study analysed 130 adult COVID-19 patients. D-dimer values are classified into normal, elevated, and high levels. The mean age was 48 ± 10.3 years, with diabetes being the most common comorbidity. Symptoms included fever, cough, headaches, dyspnoea, and fatigue. The average hospital stay was 6.3 ± 2.5 days, with 17 overall mortality. No significant association was found between age and outcome, and there was no significant difference in D-dimer values according to gender. The study found a significant impact of days stay in the hospital on outcome, with mortality occurring after 6.39 ± 2.5 days and survival occurring after 3.12 ± 1.3 days.

Conclusion: Coagulopathy is a significant complication in COVID-19 patients, and D-dimer is a reliable coagulation parameter for predicting mortality. Mortality is linked to hospital days spent and co-morbidity conditions, not age or gender. Elevated D-dimer levels increase mortality risk compared to normal D-dimer levels without morbidity.

Keywords: D-dimer, Coagulopathy, COVID-19.

Introduction

The sickness known as COVID-19 is brought on by the new beta coronavirus of family 2B, 2019-nCoV/SARS-CoV-2 [1]. The disease might be as simple as a minor infection or as serious as human respiratory tract infections, as those that causes Middle East respiratory syndrome (MERS) and severe acute respiratory syndrome (SARS). The symptoms that might manifest include fever, coughing, dyspnea, diarrhoea with water, myalgia, severe lymphopenia, delayed coagulation profiles, heart disease, and unexpected death [2, 3].

The severe acute respiratory syndrome coronavirus 2 (SARS CoV-2), also known as the coronavirus disease 2019 (COVID-19), has generated a global pandemic that has affected everyday life and medical procedures all over the world. Numerous studies and tools have been used to help COVID-19 individuals be prevented, diagnosed, treated, and have a better prognosis. As the epidemic spreads, nations and medical facilities are continuously observing this distinct group in relation to test results and data.

A specific area of interest for investigation is the thrombosis associated with this unusual viral pneumonia. [4]Disseminated intravascular coagulopathy and other thrombotic consequences are prevalent in COVID-19, presumably as a result of super infection and organ failure, or maybe as a result of viremia or cytokine storm-induced activation of the coagulation cascade [5]. Two covalently coupled fibrin D domains make up D-dimer, a fibrinogen breakdown product that reflects the strong coagulation and increase of secondary fibrinolytic activity in vivo [6, 7].

Numerous investigations have linked higher D-dimer levels (prevalence as high as 46.4%) to worsening COVID-19 symptoms and consequences. [8-10] Individuals with D-dimer readings >1000 ng/ml have a mortality risk that is 20 times higher than those with lower D-dimer values. [9] When D-dimer was higher than 2.0 µg/mL (a four-fold increase) upon admission, it was found to be an effective predictor of in-hospital mortality in COVID-19 patients. This suggests that D-dimer may be a useful early marker to enhance COVID-19 patient care. [11]

As a result, D-dimer may be used to screen COVID-19 patients for VTE. Patients benefit more from therapeutic anticoagulant dosage adjustments than from prophylactic dose adjustments based on D-dimer increase.12 Therefore, it is important to check D-dimer levels as soon as COVID patients are admitted. Our research sought to ascertain if D-dimer is indicative of severe illness and mortality resulting from SARS-CoV-2 infection. This finding adds credence to the idea that D-dimer testing might be a useful instrument for the early triaging of COVID-19 patients who arrive at the hospital.

In Current Study the primary objective was to assess D-Dimer levels in diagnosed COVID-19 patients and secondary objectives was to assess the correlation between the D-Dimer levels and disease severity among COVID-19 patients.

Material and Methods

Data on the patients with confirmed COVID-19, admitted to our tertiary care hospital, between January 05, 2022, and April 20, 2023, was retrospectively collected through lab investigation. A retrospective study was carried out in Microbiology and Biochemistry lab, Jhalawar Medical College, Jhalawar for D-Dimer tests in Corona-positive patients. Data from 100 COVID-19-positive cases was audited regarding the D-dimer levels in this study. We had considered D- Dimer value <500 ng/ml as normal (According to S.R.G. Hospital, Clinical Biochemistry Laboratory). Ethical approval was obtained from S.R.G. Hospital and Medical College, Jhalawar Ethical Committee. We had used frequency and percentage for observation results. Data was entered and analyzed through SPSS 23.0 (trail Version) Software and Chi square, Unpaired T test and Person correlation coefficient was used during data analysis and p value <0.05 was considered as significant .

Results

130 adult patients were hospitalized in SRG Hospital, Jhalawar with COVID-19 between January 05, 2022, and April 20, 2023. After excluding 30 patients without available key information in their medical records, we included 100 patients in the final analysis. We include the age, gender, comorbidity, No. of days to stay in hospital, D-dimer value and outcome of the patients. In study had classified the D- dimer values in three groups that was < 500 ng/mL as normal, 500- 1000 ng/mL as elevated and > 1000 ng/mL as High. The mean age of the 100 patients was 48 ± 10.3 years, ranging from 18 years to 84 years, and most patients were male. Comorbidities were present in nearly 40% of patients, with diabetes being the most common comorbidity, followed by hypertension and coronary heart disease. The most common symptoms on admission were fever, cough, and headaches, followed by dyspnea and fatigue. Out of these 100 patients the rise D- dimer level was found in 62 (62%). The average hospital stay of patients was 6.3 ± 2.5 days. The overall mortality was 17 during the study periods. There was no significant association between age and outcome (p>0.05). The mean age for survival was 46.36 ± 9.6 years and for not survival it was 49.15 ± 11.3 years. In study no significant correlation was found between age and D-dimer level (p>0.05). Study shows no significant difference in D-dimer value according to gender, the average D-dimer value for male was 789.26 ± 123.5 ng/mL and for female it was 768.24 ± 118.15 ng/mL. The mortality was also not associated with the gender of the patient (p>0.05). In study we see significant impact of days stay in hospital on outcome (p<0.05), in case of mortality the mean no. of hospital stay days was 6.39 ± 2.5 days while for survival it was 3.12 ± 1.3 days. There was no association was found between comorbidity and D-dimer level (p>0.05).

Table 1: Distribution of Mortality according to D- dimer Level

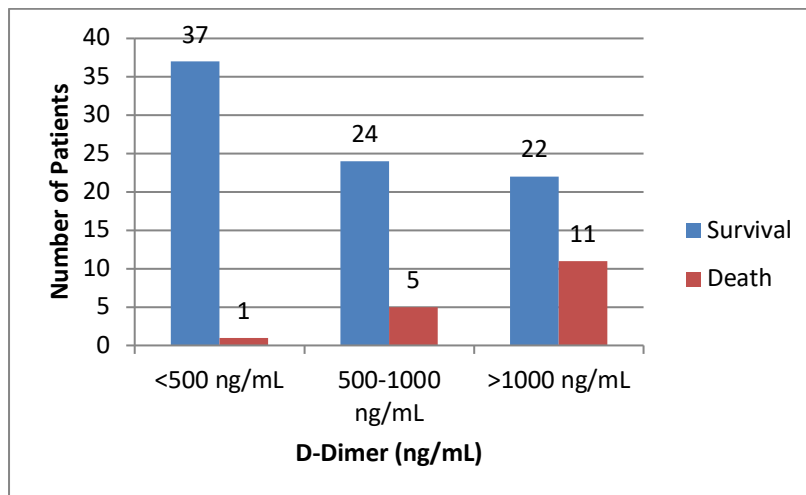| D – Dimer Level	Outcome			Chi sq	P value
	Survival	Death	Total		
<500 ng/mL	37(97.4%)	1(2.6%)	38(100%)		
500-1000 ng/mL	24(82.8%)	5(17.2%)	29(100%)	11.801	0.003*
> 1000 ng/mL	22(66.7%)	11(33.3%)	33(100%)		

Figure: 1 Distribution of Mortality according to D- Dimer Level

Table: 2 Distribution of Outcome according to Morbidity

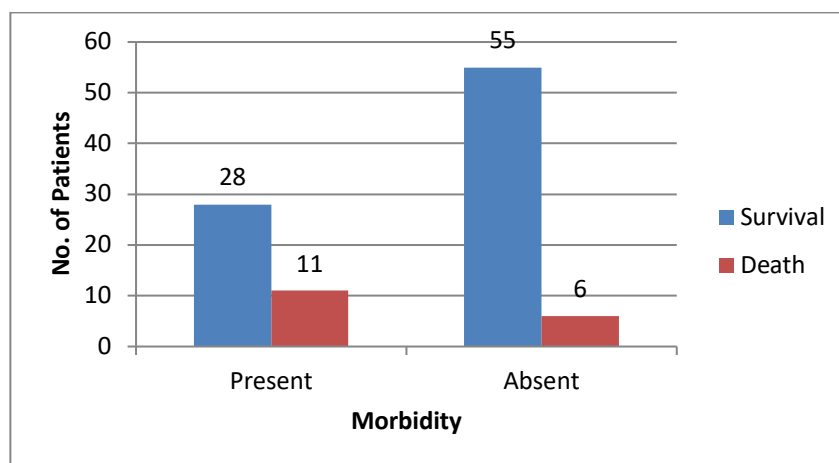| Morbidity	Outcome			Chi sq	P value
	Survival	Death	Total		
Present	28(71.8%)	11(28.2%)	39(100%)		
Absent	55(90.2%)	6(9.8%)	61(100%)	5.689	0.017*

Figure 2: Distribution of Outcome according to Morbidity

Table 1, Figure 1 shows significant association between D-dimer level and outcome of the patients (p<0.05). According to percentage which patients had normal D-dimer level those had more survival. But when D- dimer level goes to high then the percent of mortality also increased.

Table 2, Figure 2 shows the association between morbidity and outcome (p<0.05). According to percentage the mortality was higher where the morbidity was present and where morbidity was absent the chance of survival was higher.

Discussion

In current study we found no effect of age and gender on mortality similar results also find by Peng Zhou et al[1] in study conducted in 2020. In current study D-dimer not influenced by the age and gender of patients which was similar results of Zhou F et al.[9] in there study   "Clinical course and risk factors for mortality of adult in patients with COVID-19 in Wuhan, China". The co-morbidity play important roll on survival of the patients which also shows similar to study conducted by Zhou F et al[9] Co- Morbidity also

effect the D-dimer level of the patients if the co-morbidity was presents then the D-dimer level was also increased. There was correlation of D-dimer level and No. Of days to hospital stay, similar study held by Zhang L et al.[11] was found same association between the hospital stay days and their D-dimer levels. In current study we found the significant association between D- dimer level and the outcome of the patients and the percentage shows that if D-dimer level was increasing or severe then mortality was high, similar results was obtained by Zhou F et al.[9], by Zhang L et al.[11]. There was also find the association between no of day to hospital stay and the outcome of the patients.

Conclusion

Coagulopathy is an important complication in patients with COVID-19 and is closely related to the clinical outcome. D-dimer is a reliable and convenient coagulation parameter to predict mortality. Mortality was also associated with no. of days spend in hospital and the co-morbidity condition of the patients. The mortality was not depends on age and gender of the patients. The mortality of the patients was directly associated with D-dimer level and Co-morbidity, If the patient have morbidity with elevated D-dimer level had more chance of mortality in respect to normal D-dimer level with absent of morbidity.

Limitation: We had conduct study only 100 patients because we had limited time duration. It was a single centre study but results not affected by the limitation.

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