

Correlation of D - Dimer Level with Demographic Detail of Covid 19 Patients at Tertiary Care Center - A Retrospective Study

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Abstract

Introduction: Since December 2019, Patients suffering from coronavirus disease-19 (COVID-19) is on the rise. According to previous research, D-dimer levels are higher in severe instances of community-acquired pneumonia (CAP) and chronic obstructive pulmonary disease (COPD). They may be utilized as a predictive biomarker. **Objective:** To evaluate the level of d-dimer among covid disease patients and correlate with age and gender. **Methods:** Four hundred and seventeen covid-19 positive patients were studied at GMERS Medical College, Vadnagar, from October-2020 to December-2020. A citrate sample was collected of all patients who tested positive for the covid-19 disease. Citrated plasma was separated from each sample after proper centrifugation. Hemolysed samples and samples with insufficient quantity were rejected. In such cases, a new sample of the same patient was collected. D dimer test was then carried out from separated citrate plasma. Cut off value for d-dimer is 0.5 [Positive: >0.5 Fibrinogen equivalent units (FEU)/ml]. **Result:** From 417 cases: 280 males and 137 Females affected with peak occurrence in their sixth and seventh decade. A similar distribution pattern was found with a High D-dimer level also. The majority of the patients with elevated d-dimer levels had moderate to severe symptoms and required hospitalization. **Conclusion:** A significant correlation is found between elderly age with elevated d-dimer level, and it was found to be more common in female patients. So, d-dimer is one of the most important tests to be carried out in a hospitalized novel corona disease patient for preventing thrombotic events with timely interventions guided by d-dimer level.

Keywords: Covid-19 disease, D-dimer, elder patient, community-acquired pneumonia

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Introduction

Coronavirus disease (COVID-19) is caused by Coronavirus-2, which causes severe acute respiratory illness (SARS-CoV-2) [1]. COVID-19 is primarily presented as a respiratory tract infection. Still, new evidence suggests that it should be considered a systemic disease involving numerous cardiovascular, respiratory, gastrointestinal, neurological, hematopoietic, and immunological systems [2]. Infection with SARS-CoV-2 causes a severe inflammatory response, which sets off the coagulation cascade [3]. In COVID-19 patients, coagulation cascade activation is linked to a hypercoagulable condition and poor clinical outcomes, including mortality.

The occurrence of defective coagulation in COVID-19 patients highlights the critical importance of hemostasis-focused laboratory monitoring and treatment. D-dimer is now thought to be the best available laboratory diagnostic marker for COVID-19-associated hemostatic abnormalities (CAHA) [4]. D-dimer is a fibrin generation and degradation biomarker that may be detected in whole blood or plasma [5]. High amounts of circulating D-dimer are observed in conditions linked with hypercoagulation and enhanced fibrinolytic activity, whereas low levels are found in healthy people. D-dimer levels have also been found to be elevated in COVID-19 patients. High mortality is related to elevated D-dimer levels at the time of admission and rapidly increasing D-dimer levels (3 to 4-fold) over time, possibly reflecting coagulation activation from infection/sepsis, cytokine storm, and approaching organ failure [3]. Although data on the relationship between D-dimer levels and mortality in COVID-19 patients have been published, and serial D-dimer testing has been advised for COVID-19 patients, the ideal D-dimer cut-off has yet to be determined [6, 7]. In this study, we have retrospectively analyzed D-dimer level data from patients admitted to tertiary care center - GMERS medical college and general hospital, Vadnagar.

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Materials and Methods

Information on 417 patients with confirmed COVID-19 reports was retrospectively collected and analyzed between October to December 2020. The samples for laboratory tests were collected on admission and during the hospital stay. Peripheral venous blood was collected for a routine blood test. Laboratory testing for D Dimer on Citrate sample was performed in hematology and clinical pathology laboratory of GMERS medical college and General hospital, Vadnagar. These values had been measured using the MISPA-i3 analyzer machine. Inclusion criteria were defined as patients infected with COVID-19 and had been confirmed by RT-PCR. MISPA-i3 is an automated Cartridge based specific protein analyzer work on Dual Channel System-Nephelometry and Turbidimetry. For D dimer measurement range of machine is 0.05-15mg/L with biological reference range is 0-0.5mg/L [Fibrinogen equivalent units (FEU)

Units]. The information included demographic details; laboratory findings were collected. Patients' details were kept confidential. Patients with a positive result of SARS-CoV-2 by real-time RT-PCR as per World Health Organization guidelines were considered as confirmed COVID-19 cases. D-dimer values that the laboratory had reported are used for analysis. In case of the repeated testing highest value of D Dimer has been included in data for all the patients included in the study. All the data analysis was performed using IBM SPSS ver. 20 software. Frequency distribution was performed to obtain the tables. All the data are expressed as numbers and percentages.

Results

Out of a total of 417 cases, the majority were males [280 (67.1%)] compared to females [137(32.9%)].

Table 1: Age-wise distribution of COVID-19 positive patients

Age(years)	No of Cases	Percentage
0-10	1	0.24
11-20	13	3.12
21-30	20	4.80
31-40	61	14.63
41-50	67	16.07
51-60	88	21.10
61-70	106	25.42
>70	61	14.63
Total	417	100.00

Table 2: Age wise distribution between gender

Age (years)	Male [n (%)]	Female [n (%)]
0-10	1 (0.36)	0 (0)
11-20	7 (2.50)	6 (4.38)
21-30	14 (5)	6 (4.38)
31-40	46 (16.43)	15 (10.95)
41-50	49 (17.50)	18 (13.14)
51-60	54 (19.29)	34 (24.82)
61-70	64 (22.86)	42 (30.66)
>70	45 (16.07)	16 (11.68)
Total	280 (100.00)	137 (100.00)

The majority of the COVID-19 patients had an age between 61-70 years (25.42%). The table-wise distribution between gender is given in table 2. Out of a total of 417 cases, 176 (42.20%) patients had (>0.5 FEU) high D dimer. Of these 176 cases with high D-dimer, the majority were male [114 (64.8%)] followed by the female [62 (35.2 %)]. Out of the total 280 male cases, 114 (40.74%) had a high d dimer level, while out of 137 females, 62 (45.25%) had a high d dimer level. It has been observed that the total number of female cases is lower than the male case the however higher proportion of female patients had high D dimer levels than male patients who had high d dimer levels.

The majority of the COVID-19 patients having high D-dimer levels had an age between 61-70 years (30.68%) followed by >70 (26.70%) and 51-60 years (21.02%). This highlights that high D-dimer was more prevalent in old age group patients.

Table 3: Age-wise distribution among the patients with high D-dimer level

Age (years)	Male [n (%)]	Female [n (%)]
0-10	0 (0)	0 (0)
11-20	0 (0)	0 (0)
21-30	2 (1.75)	3 (4.84)
31-40	11 (9.65)	4 (6.45)
41-50	14 (12.28)	4 (6.45)
51-60	23 (20.18)	14 (22.58)
61-70	30 (26.32)	24 (38.71)
>70	34 (29.82)	13 (20.97)
Total	114 (100.00)	62 (100.00)

In cases with high d dimer (>0.5 FEU) level age, wise distribution concerning gender showed the highest number of cases with high d dimer (>0.5 FEU) in male patients in above 70 years age group while in females it is observed in 61-70 years age group.

Discussion

D dimer elevation has been reported to be one of the commonest laboratory findings noted in COVID-19 patients requiring hospitalization [8]. Studies have shown that rising D-dimer levels during hospitalization are associated with the worst long-term outcomes [9]. International Society of Thrombosis and Hemostasis interim guidance on recognition and management of coagulopathy recommends PT as the next most crucial test after D-dimer to be performed in patients with COVID-19 [10]. In our study, out of 417 cases, 67.1% were males, and 32.9% were female. High D-dimer was reported in 42.20% of the total cases. A similar study by Soni et al. involving 483 patients mostly comprised of adults and elderly persons where the majority of the patients were male (69.9%) compared to the female (30.1%). D-dimer elevation (0.50 mg/ml) was observed in 80.1% (387/483) of the hospitalized patients [7]. In the present study, 40.74% males and 45.25% females had high d dimer levels. In line with current study findings Sharp, et al. retrospectively analyzed D-dimer levels from patients admitted in tertiary COVID care centers and reported that numbers of males and females with elevated D-dimer levels (above 250 ng/ml) were 68.81% and 73.33%, respectively [11]. In our study, we found an association between age and elevated D-dimer level. A recently conducted research by He and colleagues also reported that most patients with abnormal D-dimer values were over 60 years old and had a higher average age ($p < 0.001$) [12]. Because COVID-19 mortality rises with age and elderly patients are more prone to experience bleeding events, bleeding scores should be factored into clinical considerations [13]. Women are at a higher risk of developing coagulation-related complications than men, as seen from results drawn for elevated D-dimer levels. Results obtained by Sharp et al. agree to present study findings they obtained a variation in d-dimer level with age in females by a factor of 0.0869 and in males by a factor of 0.0454 [11]. There is certain limitation involved with the study. The study was conducted in a retrospective manner at a single center. There is a scope for a large, multicentre study to consolidate the study outcome. The repeated measurement of D-dimer could be more helpful to assess the prognosis correctly.

Conclusion

COVID 19 patients can have coagulation related complication as the disease progress. D-dimer is a reliable and one of the most essential coagulation parameters to monitor the patients, which significantly correlates with the age and gender of patients.

Conflict of Interest: Nil **Source of Support:** Nil

References

1. Chaudhry R, Dranitsaris G, Mubashir T, Bartoszko J, Riazi S. A country-level analysis measuring the impact of government actions, country preparedness and socioeconomic factors on COVID-19 mortality and related health outcomes. 2020; 25:100464.
2. Terpos E, Politou M. Hematological findings and complications of COVID-19. *Am J Hematol.* 2020;95(7):834–847.
3. Agnes D, Lee YY, Connors JM, Kreuziger LB, Murphy M, Gernsheimer T. COVID-19, and Coagulopathy: frequently asked questions 2020; 5–6.
4. Joly BS, Siguret V. Understanding pathophysiology of hemostasis disorders in critically ill patients with COVID-19. *Intensive Care Med* 2020;46(8):1603–1606.
5. Weitz JI, Fredenburgh JC, Eikelboom JW. A test in context: D-dimer. *J Am Coll Cardiol.* 2017;70(19):2411–2420.
6. Sakka M, Connors JM, Hékimian G, Martin-Toutain I, Crichton B, Colmegna I. Association between D-Dimer levels and mortality in patients with coronavirus disease 2019 (COVID-19): a systematic review and pooled analysis. *JMV-Journal Med Vasc* 2020;45(5):268–274.
7. Soni M, Gopalakrishnan R, Vaishya R, Prabu P. D-dimer level is a useful predictor for mortality in patients with COVID-19: Analysis of 483 cases. *Diabetes Metab Syndr.* 2020;14(6):2245–2249.
8. Zhang L, Yan X, Fan Q, Liu H, Liu X, Liu Z, et al. D-dimer levels on admission to predict in-hospital mortality in patients with Covid-19. *J Thromb Haemostasis* 2020;18(6):1324–9.
9. Huang C, Wang Y, Li X et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 2020; 395(10223):497–506.
10. Thachil J, Tang N, Gando S, Falanga A, Cattaneo M, Levi M, et al. ISTH interim guidance on recognition and management of coagulopathy in COVID-19. *J Thromb Haemostasis* 2020;18(5):1023e6.
11. Sharp K, Ghodke B. D-dimer levels in COVID-19 patients and its correlation with age and gender: a retrospective analysis. *International Journal of Research and Review.* 2020; 7(7): 339–347.
12. He X, Yao F, Chen J. The poor prognosis and influencing factors of high D-dimer levels for COVID-19 patients. *Sci Rep* 2021; 11: 1830.
13. Yu B, Li X, Chen J, et al. Evaluation of variation in D-dimer levels among COVID-19 and bacterial pneumonia: a retrospective analysis. *J Thromb Thrombolysis.* 2020;50(3):548–557.