The Relationship between D-dimer test and COVID-19

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Abstract

Background: COVID-19 is common disease in the world, and it has caused many complications to humans, D-dimers have been shown to be of prognostic value in various diseases, including cardiovascular disease and cancer, and D-dimer is currently the best available marker for COVID-19 associated hemostatic abnormalities. The objective of this study was found the relationship between D-dimer and COVID-19 in the patients.
Methods: In this study 3913 samples were collected from patient with COVID-19, from January 2020 to April 2021, A D-dimer test was conducted at the Misurata Central Laboratory, the Most of the cases that have a high D-dimer protein result have serious complications such as thrombosis and pulmonary embolisms.
The normal range of D-dimer was taken as <0.5 mg/dl as per our laboratory standards. A convenience sampling method was used.
Results: Out of the total 3913 cases of COVID-19 included in this study, 1551 (39.64%) patients had elevated D-dimer by using Integra 400 plus system (P value <0.05) by SPSS.
Conclusion: Our study suggested that the measurement of D-dimer may guide clinical decision-making.

I. INTRODUCTION

Coronavirus disease-19 (COVID-19) is the disease caused by 2019-nCoV/SARS-CoV-2, a novel β coronavirus of group 2B [1]. The illness ranges from asymptomatic or mild infection to severe respiratory tract infections in humans such as those seen in severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS). Presentations include fever, coughing, dyspnea, watery diarrhea, myalgia, severe lymphopenia, prolonged coagulation profiles, cardiac disease, and sudden death. [2,3].

D-dimer is a fibrin degradation product (or FDP), a small protein fragment present in the blood after a blood clot is degraded by fibrinolysis. It is so named because it contains two D fragments of the fibrin protein joined by a cross-link [4,5].

D-dimer concentration may be determined by a blood test to help diagnose thrombosis [6], since its introduction in the 1990s, it has become an important test performed in patients with suspected thrombotic disorders. While a negative result practically rules out thrombosis, a positive result can indicate thrombosis but does not rule out other potential causes. Its main use, therefore, is to exclude thromboembolic disease where the probability is low. In addition, it is used in the diagnosis of the blood disorder disseminated intravascular coagulation[7], A four-fold increase in the protein is a strong predictor of mortality in those suffering from COVID-19 [8,9].

There are two main types of D-dimer assays, each reporting different D-dimer units, The Fibrinogen Equivalent Unit (FEU) reports D-dimer levels based on the molecular weight of fibrinogen (340kDa), whereas the D-Dimer Unit (DDU) reports D-dimer levels based on its own molecular weight (195kDa) (Adam et al., 2009).

Over 5,488,000 coronavirus disease-19 (COVID-19) cases have been reported since December 2019. Many studies have shown high D-dimer in COVID-19 patients [10].

The aim of the current study is to explore risk factors associated with mortality in COVID-19 patients and assess the use of D-dimer as a biomarker for disease severity and clinical outcome

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II. Material and methods:

3913 samples were collected from people infected with COVID-19, infection was confirmed using nasal swab tests and the RT-PCR test, from 07-01-2020 to 30-4-2021, in the Misurata Central Laboratory for Medical analysis (MCL), Their ages ranged from one year to 96 years. The collected samples came from various isolation centers in Misurata City and surrounding areas.

All samples were collected from COVID-19 patients with either mild infection or severely infected hospitalized patients many patients with diabetes, hypertension, renal failure, and asthma.

Venous blood samples were drawn into tubes containing tri-sodium citrate anticoagulant, centrifuged at 3,500 RPM for 10 minutes, to obtain citrate plasma, a D-dimer test was performed using an Integra 400 plus system, and the results were recorded.

III. Results

D-dimer levels in Covid-19 infection:

The study included 3913 samples infected with Covid-19, and the results showed that the D-dimer test was high at 1551 (39.64%), as shown in Table (1) and Figure (1).

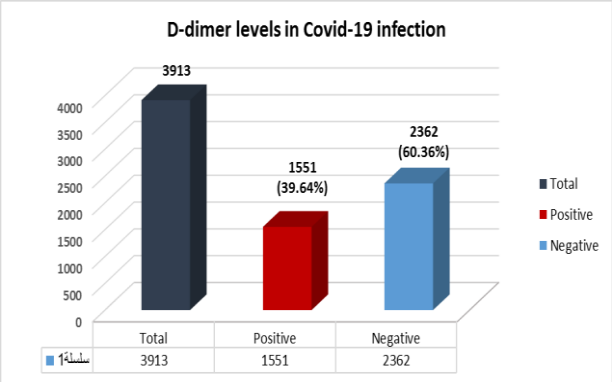

Figure (1): D-dimer levels in Covid-19 infection.

The relationship between sex and D-dimmer:

The number of males was 2155 (55.07%) of the total study samples, and the results showed a high percentage of D-dimer at 433 (20.09%), and the number of females was 1758 (44.39%) of the total study samples, The results showed an increase in the percentage of D-dimer at 706 (40.16%),

The study showed the percentage of d-dimer height was higher in females than in males, Table (2) and Figure (2).

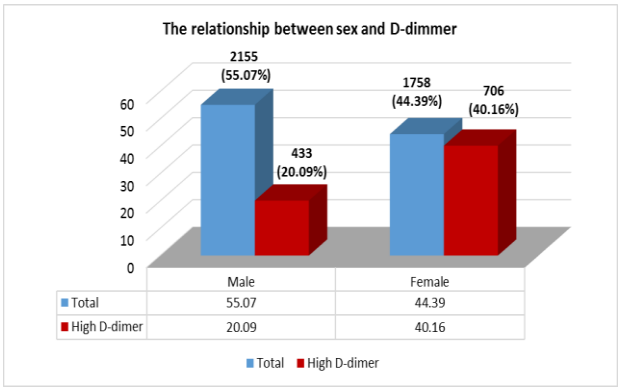

Figure 2: The relationship between sex and D-dimmer

The relationship between age and D.dimer

The results of the study showed that the age group (1-25 years) included 5 (1.15%) samples that were positive for males and 9 (1.27%) were positive for females. And the age group (26-50 years) included 118 (27.25%) samples for males, 95 (13.46%) samples for females, While the age group (51-75 years) included 109 (25.17%) samples, that were positive for males, 391 (55.38%) samples were positive for females, and the age group (76-96 years) showed 201 (46.4%) males, 211(29.89%) females.

The highest percentage of d-dimer was in males in the age group (76-96 years), while the highest percentage in females was in the age group (51-75 years), Table (3) and Figure (3).

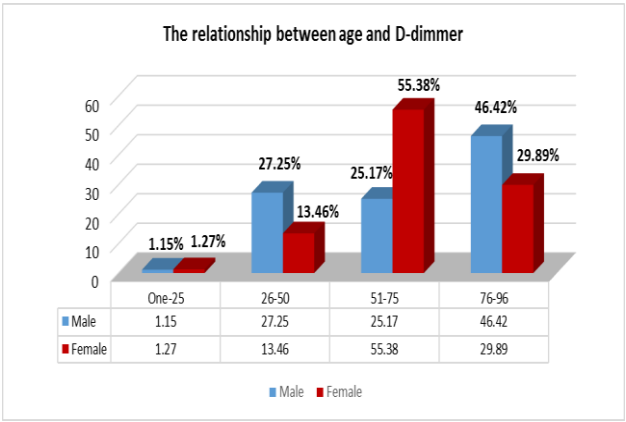

Figure (3): The relationship between age and D-dimmer

IV. Discussion:

When the immune system fights infection with the Corona virus, it produces a wide range of different proteins, glycoproteins, and lipids, such as complements, antibodies, interferons, cytokines, and lymphocytes, All of these compounds increase blood viscosity, especially in the elderly and those with chronic diseases such as diabetes, asthma patients, hypertensive patients, and dialysis patients, This high viscosity of the blood can cause the formation of venous clots in major parts of the body, such as the brain or the heart, It causes a stroke, a heart attack, and deep vein thrombosis (DVT), and disseminated intravascular coagulation (DIC), or angina or pulmonary embolism (PE), as covid-19 infection when it forms in the lungs. [11].

The present study showed that high D-dimer test values are found mainly in old patients at age over 51. , This finding is consistent with many studies in many countries in the world as a study in China (74.6%),[12], another study in China (53.5%),[13.] and another study in China (23.4%), (18), and another study in wuhan china [11], and consistent with a study in UAE, [2]. Similarly, in a study in Western Nepal (67.4%) patients with elevated D-dimer were old patients [14]. Additionally, similar findings were reported in other studies in the United States of America [15].Other studies in various parts of the world have reported similar findings in regard to the relationship between elevated D-dimer and old age in COVID-19 patients in England [16.]

Conclusion:

In conclusion, D-dimer levels are commonly elevated in patients infected with SARS-CoV-2. Significantly higher levels are found in those who are critically ill, the proportion increased of patients with coved-19 in aged pateints.

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