Nat. Volatiles & Essent. Oils, 2021; 8(4): 16382-16387

NVEO
Natural Volatiles &
Essential Oils

Relation Between D-Dimer Level And Lymphocyte Cells Count With People Infected With Covid-19 In Al- Amariah City

Ban Mohammed Abbas Al-Kanan[1] , Arkan Abdullah Abbas[2] and Mohammed Saleem Ismael[3]

[1]Ph.D. of Biochemistry, Al- Amariah Hospital, Al- Anbar, Iraq.

[2]Ph.D. of Microbiology, Al- Amariah Hospital, Al- Anbar, Iraq.

[3]M.Sc. of Microbiology, Al- Amariah Hospital, Al- Anbar, Iraq.

ABSTRACT

The study aimed at the Covid-19 infection causes increase of D- dimer level and decrease the level of the lymphocyte cell count in the early diagnosis of COVID-19 infection. In the present study that was carried out in Amariah city from 1st of July to 1st of October 2020, a total of 100 people (60 infected group with COVID-19 and 40 control group without Covid-19) who were admitted to AL-Amariah Hospital whose ages were between 15-75 years. Patients were investigated for the detection of COVID-19 by using Real-Time PCR. The current study showed that the infection with COVID-19 is affected by the age factor of the patient. The highest rate of a patient with COVID-19 was within the age groups 41- 49 and >50 years with a highly significant relation between COVID-19 and age. The results showed highly significant increase of D dimer level in infected group comparison with control group and significant decrease of lymphocyte count in infected group compression with control group.

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

1-INTRODUCTION

The coronavirus disease 2019 outbreak (COVID-19) has spread worldwide since December 2019 , outbreak started from Wuhan city, the capital of Hubei province in China[(1)]. Chinese scientists have isolated a novel coronavirus, severe acute respiratory syndrome coronavirus 2(SARS-CoV-2; previously known as 2019-nCoV) in January 7, 2020 from these patients with virus-infected pneumonia[(2)]. The clinical symptoms, high fever, weakness, muscle pain, dry cough and shortness of breath are generally reported as findings of COVID-19 disease[(3)]. Due to the rapid and worldwide outbreak of the COVID-19, the WHO declared a pandemic indicating more than 118,000 infected people in March 11th, 2020, in over 110 countries around the world[(4)].

The SARS-CoV-2's entry mechanism to cell, similar to other pathogenic beta-coronaviruses, relies on the binding of the viral spike (S) protein to the angiotensin-converting enzyme 2 (ACE2) and serine protease of human host cell membrane protein . TMPRSS2 for S protein priming expressed via type II alveolar cells of the lung, heart, intestine, kidney, and blood vessels in particular[(5)]. Although the death rate for previous coronavirus epidemics such as SARS and MERS is higher than recorded of SARS2-COV-2, the much higher absolute number of SARS-CoV-2 infected people will result in far more total deaths in the world. Since the true denominator of those infected is not yet determined, it remains unknown what the overall mortality rate is correlated with Covid-19, but estimates range from 1 to 4%[(6)].

The elderly (>60 years and rising with age), those with immune defects, and those with underlying chronic medical conditions are those at highest risk of dying from Covid-19 (e.g. diabetes, heart disease). While children appear to experience only mild symptoms, Covid-19 has also succumbed to younger, previously healthy adults. Death will occur within a few days for some patients once hospitalized, those with adult respiratory distress syndrome (ARDS), and some with multi-organ dysfunction syndrome (MODS)[7]. The pathophysiology has been associated with an excessive immune response, endothelial damage, and microvascular thrombosis that can lead to endorgan injury. This damage, resulting in elevated troponin, signs of heart failure and cardiac ischemia, is manifested as heart injury, intubation and mechanical ventilation are needed for respiratory failure and acute respiratory distress syndrome (ARDS)[8,9].

Inflammation biomarkers, such as D-dimer and interleukin-6, have been used to assess the severity of Covid-19 . In particular, high D-dimer levels are correlated with in-hospital mortality and severity of illness[10,11].

The D-Dimer level elevation in patients with severe disease may raise the suspicion of underlying abnormal blood coagulation function[12].

The study of Almigdad H. M., et al. 2020 showed that the lymphocyte count was significantly lower in patients with severe COVID-19 than patients with non-severe COVID-19[13].

2-Samples collection and methods

The current study where 100 people (60 infected group with COVID-19 and 40 control group without Covid-19) who were admitted to AL-Amariah Hospital whose ages were between 15-75 years from 1st of July to 1st of October 2020 and confirmed them with COVID-19 infection by PCR technique.

Five ml of vein blood for each people was placed in two tubes, EDTA tube and sodium citrate tube, for label level. The EDTA tube of blood used to count lymphocyte cells by hematology analyzer (cell blood count system), according to standard method.

The enzyme linked fluorescent assay (ELFA) was used to determine D-dimer using an automated quantitative test for use on the VIDAS (biomerieux, France) family of instruments for the imunoenzymatic determination of fibrin degradation products (FBDP) in human plasma (sodium citrate). The reference range in the assay was 0 to 0.5 ng/l. The fibrinogen equivalent unit (ng/l) was used to express the D-dimer result. All measurements were completed within two hours of the blood sample being taken.

3-Statistical Analysis

The data was analyzed with the SPSS statistical program version 18 software, and the categorical variables were interpreted as percentages and frequencies. The T-test was used to compare the groups. P. value less than 0.05 was considered statistically significant, and P. value less than 0.01 was considered highly significant, whereas P. value greater than 0.05 was considered statistically non-significant.

4-RESULT

The findings revealed a relation between age and the prevalence of COVID -19 infection, as the virus can infect people of all ages (table 1,2), but the age groups 41- 49 and >50 years were the most affected ages, as shown in table 3.

Table 1: Frequency according to their age.

Age group	Frequency	Percent
< 20	4	4.0
21-29	28	28.0
31-39	28	28.0
41-49	22	22.0

≥ 50	18	18.0
Total	100	100.0

Table 2: Frequency according to their Gender.

Gender	Frequency	Percent
Male	40	40.0
Female	60	60.0
Total	100	100.0

Table 3: Distribution of infected group with COVID-19 and control group according to their age.

Age group	Infected group		Control group		Total	
	N	%	N	%	N	%
< 20	2	3.3	2	5.0	4	4.0
21-29	12	20.0	16	40.0	28	28.0
30-39	10	16.7	18	45.0	28	28.0
41-49	18	30.0	4	10.0	22	22.0
>50	18	30.0	0	0.0	19	18.0
Total	60	100.0	40	100.0	100	100.0
Chi-Square Test			0.001**			

Table 3. shows that there was a highly significant difference between people infected with COVID-19 than people without COVID-19 (P. value <0.01).

Table 4: Relation between D-dimer level and lymphocyte cells count with people infected with COVID-19.

Study Groups		Infected group	Control group	P-Value [a]
D- dimer	Mean	1.69	0.241	0.001**
	SD	± 1.43	± 0.087	
Lymphocyte	Mean	0.842	2.821	0.001**
	SD	± 0.194	± 0.803	

The results indicate that infected people with COVID-19 had a statistically significant difference with lymphocyte cells count and D dimer levels as comparison with the control group (P. value< 0.01), as show in table 4.

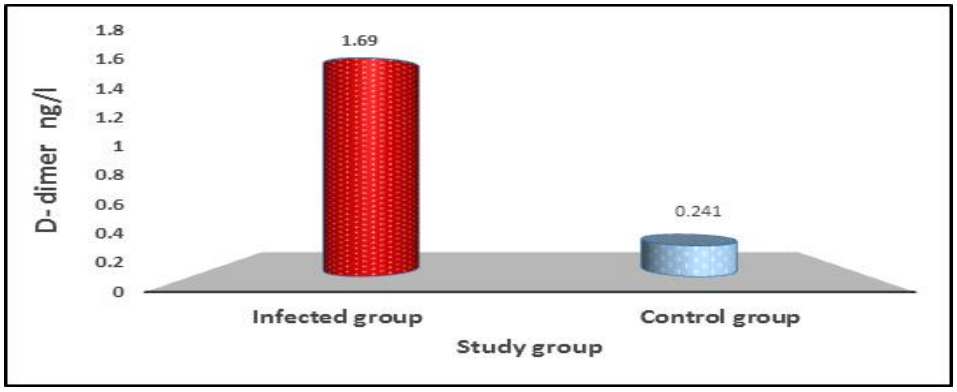

Figure 1: Relation between D- dimer levels with people infected with COVID-19 and control group.

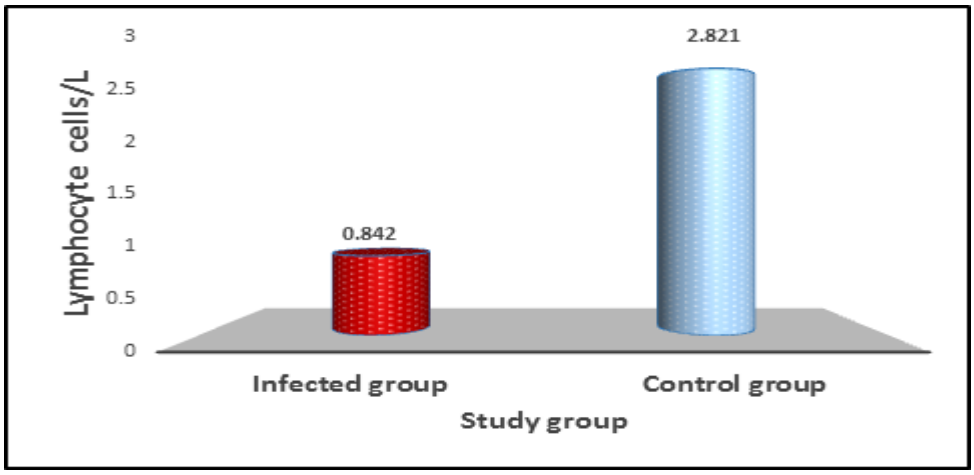

Figure 2: Relation between Lymphocyte cells count with people infected with COVID-19 and control group.

The results showed increase of D-dimer level in infected group comparison with control group and decrease of lymphocyte count in infected group comparison with control group, as shown in Figures 1 and 2.

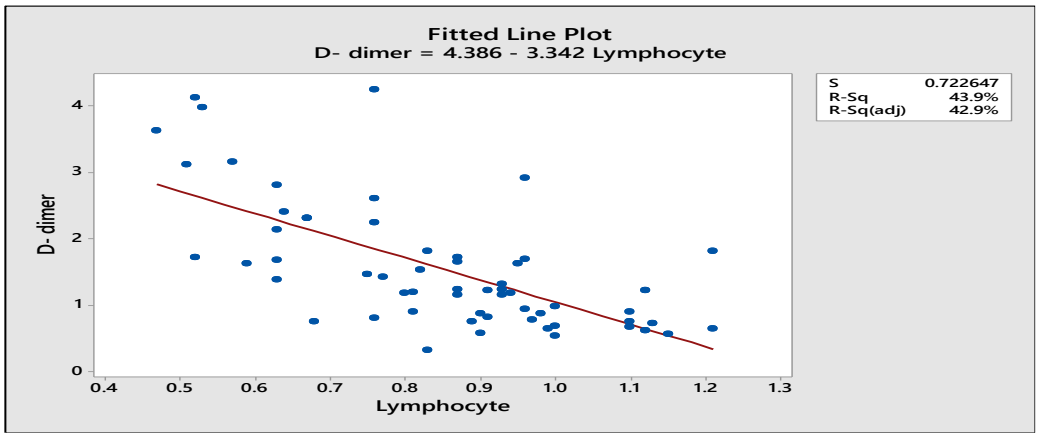

Figure 3: Positive correlation between D- dimer level and lymphocyte count in people infected with COVID-19.

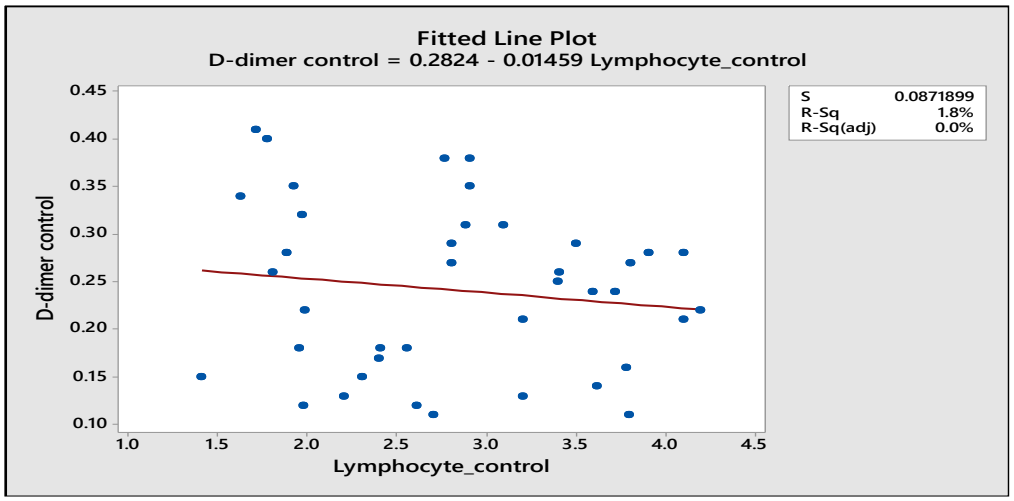

Figure 4: Negative correlation between D-dimer level and lymphocyte count in control group.

5-DISCUSSION

The disease is characterized by a variety of pathophysiological derangements, including pulmonary inflammation and (micro)-thrombosis, that may also spill over into the systemic circulation . The associated hyper inflammation and coagulopathy is in turn associated with a wide derangement in various hemostasis

parameters, including D-dimer[14]. D-dimer is a by-product of plasmin degrading fibrin clots and is a valuable thrombotic activity marker. It has become a valuable laboratory marker to measure illness severity in hospitalized Covid-19 patients because of its prognostic importance[15].

The findings revealed a relation between age and the prevalence of COVID -19 infection, as the virus can infect people of all ages, but the age groups 41- 49 and >50 years were the most infected ages. Several factors affect COVID-19, the most significant, sex, and the age of the patient. Male is connected to the danger of extreme COVID-19[16].

The study revealed that infected people with COVID-19 had a statistically significant difference with lymphocyte cells count and D dimer levels as comparison with the control group. Lymphopenia and high levels of CRP, LDH, and D-Dimer are associated with severe COVID-19. These laboratory markers could be used as clinical indicators of worsening illness and poor prognosis of COVID-19. This will help in developing different algorithms for managing COVID-19 patients according to the anticipated severity of the disease[13].

The present study showed that there was increase of D-dimer level in infected group comparison with control group and decrease of lymphocyte count in infected group comparison with control group. The result of the current study was agreed with Huang et al. whose are founded that an elevated D-dimer in patients with COVID-19[17], and Almigdad et al. whose are founded the low lymphocyte count and high levels of CRP, LDH, and D-Dimer are associated with severe COVID-19[13].

The current study showed that there was positive correlation between D- dimer level and lymphocyte count in people infected with COVID-19, and negative correlation between D-dimer level and lymphocyte count in control group. The effect of D-dimer widens to include not only the correlation with the severity of the disease but also with mortality in people infected with COVID-19[18].

6-**CONCLUSIONS**

The study showed that the age play a role in the development of COVID-19 infection. The COVID- 19 infections cause an increase in D-dimer level and decrease of lymphocyte count in infected group and play important role in the early diagnosis of COVID-19 infection. These laboratory markers could be used as clinical indicators of worsening illness and poor prognosis of COVID-19.

REFERENCES

1. Phelan A.L., Katz R., Gostin L.O.. The novel coronavirus originating in Wuhan, China: challenges for global health governance. Jama 2020;323(8):709–710.
2. Gorbalenya A.E., Baker S.C., Baric R.S., De Groot R.J., Drosten C., Gulyaeva A. A. Sev Acute Respir Syndr Coronavirus Species Its Viruses–A Statement Coronavirus Study Group. bioRxiv 2020;7.
3. Azhar E.I., Hui D.S.C., Memish Z.A., Drosten C., Zumla A. The middle east respiratory syndrome (MERS). Infect Dis Clin 2019;33(4):891–905.
4. WHO. Director-General's opening remarks at the media briefing on COVID-19.2020.
5. Hoffmann M., Kleine-Weber H., Schroeder S., Krüger N., Herrler T., Erichsen S., et al. SARS-CoV-2 cell entry depends on ACE2 and TMPRSS2 and is blocked by a clinically proven protease inhibitor. Cell. 2020;181(2):271–280.
6. Lipsitch M., Swerdlow D.L., Finelli L.. Defining the epidemiology of Covid-19—studies needed. N Engl J Med 2020;382(13):1194–1196.
7. Wang D., Hu B., Hu C., Zhu F., Liu X., Zhang J., et al. Clinical characteristics of 138 hospitalized patients

with 2019 novel coronavirus–infected pneumonia in Wuhan, China. Jama 2020;323(11):1061–1069.

8. Sandoval Y., Januzzi J. J., Jaffe A.S. Cardiac troponin for the diagnosis and risk-stratification of myocardial injury in COVID-19: JACC Review Topic of the Week. J Am Coll Cardiol 2020.
9. Marini J.J., Gattinoni L. Management of COVID-19 respiratory distress. Jama.2020;323(22):2329–2330.
10. 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 Covid19. J Thromb Haemost 2020;18(6):1324–1329.
11. Wool G.D., Miller J.L. The impact of COVID-19 disease on platelets and coagulation. Pathobiology 2021;88(1):14–26.
12. Qin, C., Zhou, L., Hu, Z., et al. Dysregulation of immune response in patients with COVID-19 in Wuhan, China. SSRN Electronic Journal 2020.
13. Almigdad H. M., Sagad O. O. M, Ibrahim H. E. E, Mohamed E. H., Abazr A. H. et al. The Association of Lymphocyte count, CRP, D-Dimer, and LDH with Severe Coronavirus Disease 2019 (COVID-19). Sudan Journal of Medical Sciences 2020.9-21.
14. Levi M., Thachil J. Coronavirus Disease 2019 Coagulopathy: Disseminated Intravascular Coagulation and Thrombotic Microangiopathy—Either, Neither, or Both. In: Seminars in thrombosis and hemostasis. Thieme Medical Publishers 2020.781–784.
15. Yao Y., Cao J., Wang Q., Shi Q., Liu K., Luo Z., et al. D-dimer as a biomarker for disease severity and mortality in COVID-19 patients: a case control study. J intensive care 2020;8(1):1–11.
16. Scully E.P., Haverfield J., Ursin R.L., Tannenbaum C., Klein S.L. Considering how biological sex impacts immune responses and COVID-19 outcomes. Nat Rev Immunol. 2020; 16(10):626–638.
17. Huang I., Pranata R., Lim M.A., Oehadian A., Alisjahbana B. C-reactive protein, procalcitonin, D-dimer, and ferritin in severe coronavirus disease-2019: a meta-analysis. Ther. Adv. Respir. Dis. 2020; 14: 1–14.
18. Zhou, F., Yu, T., Du, R., et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. The Lancet 2020; 10229 (395): 1054–1062.