MEDWIN PUBLISHERS
Committed to Create Value for Researchers

Annals of Immunology & Immunotherapy
ISSN: 2691-5782

The Relationship between Laboratory at the Time of Initiation and Mortality in Covid-19

Karatas E[1]* and Aksoy L[2]

[1]Department of Internal Medicine, Tuzla State Hospital, Istanbul, Turkey
[2]Department of Family Medicine, Marmara University, Istanbul, Turkey

***Corresponding author:** Ercan Karatas, Department of Internal Medicine, Tuzla State Hospital, Istanbul, Turkey, Email: canertaskara@hotmail.com

Research Article
Volume 3 Issue 2
Received Date: August 24, 2021
Published Date: September 15, 2021
DOI: 10.23880/aii-16000150

Abstract

The novel coronavirus infection (COVID-19), is characterized by an exaggerated inflammatory response that can lead to severe manifestations such as adult respiratory syndrome, sepsis, coagulopathy, and death in a proportion of patients. In severe COVID-19 patients, inflammatory, biochemical and coagulation high levels of factors may be prognostic factors indicating a poor outcome. We investigated the relationship between lymphopenia, leukocytosis, anemia, high ferritin, D-dimer, CRP, LDH, Procalcitonin, Troponin blood levels and prognosis. In the first initiation to the hospital, the severity of the disease should be estimated according to these parameters and a more intensive treatment and follow-up should be planned.

Keywords: COVID-19; Inflammation; Intensive Treatment

Background

The coronavirus disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has rapidly developed into a global outbreak characterized [1]. Most patients are asymptomatic or with mild symptoms. In symptomatic patients; the most common symptoms are fever, dry cough and shortness of breath [2]. Many studies have suggested that acute inflammatory markers such as high WBC (White Blood Cell) count, CRP(C reactive protein), Ferritin, IL-6(Interleukin-6) are associated with severe disease [3-5].

In our study, we investigated the relationship between the initial laboratory findings in the hospital and mortality.

Materials and Methods

Patients

This study was carried out at Tuzla State Hospital, Istanbul, Turkey. Patients with severe COVID-19 pneumonia, who were admitted to Tuzla State Hospital between March 20, 2020 and May 30, 2020 and treated, were examined retrospectively. The study conducted according to their health records with no personal information. Therefore, informed consent not asked to the patients whether their families. The study included patients aged over 18 years who were not pregnant, had severe pneumonia (respiratory rate >30/min) with or without comorbidities and/or severe respiratory distress (dyspnea or use of extra respiratory muscles) and/or fingertip oxygen saturation <90% (PaO_2/FiO_2 <300 in patients receiving oxygen), had bilateral multi-lobar ground glass opacities observed in a computed tomography (CT) scan of the lungs. The treatment protocol of the Turkish Ministry of Health was applied to all patients. Currently, there is no universal standard for drug treatment, and various combination therapies are being administered. Our standard treatment involves the administration of antivirals (Favipiravir), broad spectrum antibiotics, low-molecular weight heparin, antithrombotic drugs, corticosteroids, and oxygen therapy. For severe COVID-19 pneumonia, cytokine storm, macrophage activation syndrome, and acute respiratory distress syndrome, convalescent plasma,

interleukin-6 inhibitors, and anakinra, an interleukin-1 receptor antagonist, are added to the treatment. Combination therapy is currently customized for each patient.

Statistical Analysis

The research data were collected retrospectively through the Tuzla State Hospital registration system. Descriptive statistics were used to analyze categorical variables, represented as numbers, and continuous variables, represented as mean ± SD or median and interquartile range. The results were compared using *t*-test with the software SPSS 22.0 Statistics (IBM, Armonk, NY, USA).

Results

We examined 180 patients who were hospitalized with severe pneumonia in the Istanbul Tuzla State Hospital. Of these, 108 patients were aged ≤65 years. Fifteen of these patients died, indicating a fatality rate of 12% (15/108). In addition, 32 of 72 patients who were aged >65 years died; the fatality rate of these patients was 45%. This indicates that fatality increased with an increase in age. It was observed that starting treatment early after the onset of symptoms reduced the fatality. Symptom time to start treatment; survivor 3.11 days, nonsurvivors: 5.72 days. Among the hematological parameters, lymphopenia (lymphocyte count <1 × 10^9/L), low hemoglobin levels (hemoglobin <12 g/dL), leukocytosis (leukocyte count >7.5 × 10^9/L) (P = 0.001) and neutrophilia (neutrophil count >7.5 × 10^9/L) (P = 0.003) are associated with disease severity. In this study, disease severity and platelet count were not correlated (P >0.5). C-reactive protein (CRP) levels were increased in the patients; survivors had mean CRP values of about 85 mg/L, while non-survivors had mean values of 122 mg/L, which correlates with disease severity and prognosis (P = 0.004). Other predictors studied were the serum ferritin and lactate dehydrogenase (LDH) levels. High levels of ferritin (>200 µg/L) and LDH (>260 units/L) are associated with disease severity (P = 0.001). Survivors showed significantly higher plasma D-dimer levels than the non-survivors. Among the coagulation parameters studied, D-dimer level >1,000 ng/mL was a predictor of fatality (P = 0.0003). Procalcitonin, another infectious disease biomarker, was significantly higher in ex patients (p=0,015). Troponin, a cardiac biomarker, was also high in ex patients (p=0.0003) (Table 1).

	Survivors (n=133)	Non-survivors (n=47)	Normal range	P value
Age mean(IQR)	54(45-67)	71(60-82)		
Male	77	30		
Female	56	17		
Symptom-time to start treatment	3,11(1-5)	5,72(2-7)		
Wbc, median(IQR), 10^9/L	7,4(4,8-8,8)	9,2(6,3-11,2)	11-Apr	0,001
Hb, median(IQR), g/dL	12,7(11,6-13,9)	9,2(9,8-12,5)	Male:13-18 Female:11,5-16,5	0,001
Lym,median(IQR), 10^9/L	1,17(0,8-1,4)	0,75(0,4-1)	1.5-4,5	0001,
Neu, median(IQR), 10^9/L	5,5(3-6,5)	7,94(4,7-10,1)	2.0-7,5	0,003
PLT, median(IQR), 10^9/L	230(151-274)	236(175-256)	150-450	>0,5
Crp,median(IQR),mg/liter	85(23-108)	122(111-233)	<8.0 mg/L	0,004
Ferritin ,median(IQR), mcg/L	330(94-339)	812(218-1043)	Females 10 to 200 mcg/L; males 30 to 300 mcg/L	0,001
LDH, median(IQR), units/L	333(222-369)	528(368-640)	110 to 210 units/L	0,001
Kreatinin mg/dL	0,9(0,7-1.025)	1,3(0,7-1,7)	<1,2	0,004
Alt U/L	31(22-39)	33(17-35)	<24	>0,5
Na mEq/*L*	135(133-139)	136(133-140)	135-145	>0,5
D-Dimer, median(IQR),ng/mL	1390(430-1210)	2897(1070-3185)	<500 ng/mL	0,0003
Procalcitonin, µg/L	0,087(0,06-0,14)	0,13(0,1-0,23)	<0,05µg/L	0,015
Troponin, ng/mL	7(2,1-9,1)	30,2(3,5-33,7)	<0.06ng/mL	0,0003

P-values were calculated using Pearson's chi-square test.
IQR; interquartile range, ALT; alanine aminotransferase, Na; Sodium.
Table 1: Labaratory Findings.

Discussion

Covid cases with poor prognosis should be detected early and intervened quickly. COVID-19 is a systemic infection with a significant impact on the hematopoietic system and hemostasis [6]. The following biomarkers have been identified: hematological (lymphocyte count, neutrophil count, inflammatory (C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), procalcitonin (PCT)), immunological (interleukin (IL)-6 and biochemical (D-dimer, troponin, creatine kinase (CK), aspartate aminotransferase (AST)), especially those related to coagulation cascades in disseminated intravascular coagulation (DIC) and acute respiratory distress syndrome (ARDS) [7-10]. A high D-dimer level indicates increased thromboembolic complications. It is also associated with a poor prognosis [11,12]. In the outpatient clinic or in hospitalized patients, the severity of the disease should be estimated by evaluating the inflammation markers, biomarkers and coagulation markers together. Patients who require hospitalization or require more intensive treatment should not waste time.

Conclusion

Clinicians should consider low lymphocyte and hemoglobin counts as well as the high leukocyte, CRP, LDH, ferritin, Procalcitonin, Troponin and D-dimer serum levels. These serum values can be used in risk stratification to predict severe and fatal COVID-19.

References

1. Zhou P, Yang XL, Wang XG (2020) A pneumonia outbreak associated with a new coronavirus of probable bat origin. Nature 579: 270-273.

2. Wiersinga WJ, Rhodes A, Cheng AC, Peacock SJ, Prescott HC (2020) Pathophysiology, Transmission, Diagnosis, and Treatment of Coronavirus Disease 2019 (COVID-19): A Review. JAMA 324(8): 782-793.

3. Xiao KH, Shui LL, Pang XH (2020) Clinical features of coronavirus disease 2019 in Northeast area of Chongqing: analysis of 143 cases. J Third Mil Med Univ 42(6): 549-554.

4. Ulhaq ZS, Soraya GV (2020) Interleukin-6 as a potential biomarker of COVID-19 progression. Med Mal Infect 50: 382-383.

5. Fang XW, Mei Q, Yang TJ (2020) Clinical characteristics and treatment analysis of 79 cases of COVID-19. Chin Pharmacol Bull 36: 453-459.

6. Terpos E, Ntanasis Stathopoulos I, Elalamy I (2020) Hematological findings and complications of COVID-19. Am J Hematol 95(7): 834-847.

7. Ponti G, Maccaferri M, Ruini C, Tomasi A, Ozben T (2020) Biomarkers associated with COVID-19 disease progression. Crit Rev Clin Lab Sci 57(6): 389-399.

8. Tjendra Y, Al Mana AF, Espejo AP (2020) Predicting Disease Severity and Outcome in COVID-19 Patients: A Review of Multiple Biomarkers. Arch Pathol Lab Med 144(12): 1465-1474.

9. Ziadi A, Hachimi A, Admou B (2021) Lymphopenia in critically ill COVID-19 patients: A predictor factor of severity and mortality. Int J Lab Hematol 43(1): e38-e40.

10. Zhao Q, Meng M, Kumar R (2020) Lymphopenia is associated with severe coronavirus disease 2019 (COVID-19) infections: a systemic review and meta-analysis. Int J Infect Dis 96: 131-135.

11. Asakura H, Ogawa H (2021) COVID-19-associated coagulopathy and disseminated intravascular coagulation. Int J Hematol 113(1): 45-57.

12. Miesbach W, Makris M (2020) COVID-19: Coagulopathy, Risk of Thrombosis, and the Rationale for Anticoagulation. Clin Appl Thromb Hemost 26: 1076029620938149.