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Research Article

Comparison of SARS-COV-2 Wuhan and Alpha variants: Clinical and laboratory highlights

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Abstract

Objectives: Since December 2019, after the declaration of new cases regarding novel coronavirus disease, many variants have emerged as a consequence of the viral evolution. Although the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) variants have been studied on a molecular basis, their clinical and pathologic disparities have been understood inadequately. The aim of this research was to figure out the differences between the SARS-CoV-2 Al-pha (B1.1.7) variant and the classical Wuhan groups on the clinical basis and laboratory results of the coronavirus disease 2019 (COVID-19) patients who had a positive polymerase chain reaction (PCR) test.

Methods: The study was performed retrospectively inclusive of epidemiological, laboratory data, and clinical symptoms of patients who were admitted to the emergency service between February 15 and March 15, 2021, and had positive COVID-19 PCR test results.

Results: Although there was no statistically significant difference in symptoms between the SARS-CoV-2 Alpha variant and classical variant (Wuhan-type [WT]) groups, C-reactive protein, lymphocyte, and leukocyte counts were statistically significantly higher in the WT group, and prothrombin time, International Normalized Ratio (INR) and serum creatinine values were statistically significantly higher in the Alpha group.

Conclusion: Studies such as ours that investigate both the clinical features and laboratory data of SARS-CoV-2 variants will close the knowledge gaps, so better decisions may be made by health policymakers. Additional studies in this area will increase the understanding of the topic.

Keywords: Alpha variant, emergency department, pandemic, SARS-CoV-2

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) disease loomed large in our globe in December 2019 and soon became the coronavirus disease 2019 (COVID-19) pandemic. Coronavirus disease was observed in a wider clinical spectrum in adult patients. This spectrum could lead to different clinical pictures ranging from asymptomatic ones to patients requiring intensive care support and even death. In March 2022, the number of deaths from SARS-CoV-2 infection was approximately six million globally, while the number of cases was approximately 462 million. During the COVID-19 pandemic, with the emergence of different SARS-CoV-2 variants globally, studies have focused on different variants. Identification of features of the new genetic variants may contribute to a better understanding of the diagnostic processes and the unpredictable increase in disease severity as well as contagiousness [1-3]. Alpha variant (B.1.1.7) was first detected in the UK in September 2020 and spread to many countries [4, 5]. As soon as the Alpha variant was also seen in Türkiye, it became the dominant variant.

In this study, we aimed to investigate the effects of different SARS-CoV-2 variants on laboratory data and patients' outcomes and try to find out a routinely applicative biomarker or

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medical index that has the ability to anticipate the COVID-19 infection progress by different variants.

Materials and Methods

This was a single-centered retrospective study. The patient population included in this study was from the Bursa City Hospital emergency service with the suspicion of COVID-19 and was diagnosed with COVID-19 infection by a real-time polymerase chain reaction (RT-PCR). This study was approved by the Bursa City Hospital Clinical Research Ethics Committee (2021-10/14).

Samples taken from patients via combined oropharyngeal and nasopharyngeal swabs were stored at 4°C in a viral transport medium. For nucleic acid extraction, the Bio-Speedy SARS-CoV-2 Variant Plus kit (Bioeksen, Türkiye) was used in Rotor-Gene Q device (Qiagen, Germany). Variant analyses were performed simultaneously with RT-PCR. RNA-sequencing analyses were not performed.

Blood urea nitrogen, creatinine, aspartate aminotransferase (AST), alanine aminotransferase (ALT), and C-reactive protein (CRP) were measured using a Cobas C 702 (Roche Diagnostics, Germany) analyzer for laboratory examinations made from the sera of the patients. Ferritin, creatine kinase-myoglobin binding (CK-MB), and troponin T levels were measured using Cobas E 801 (Roche Diagnostics, Germany) analyzers. Prothrombin time (PT), activated partial thromboplastin time (aPTT), and D-dimer analyzes were measured using the Cobas T 711 (Roche Diagnostics, Germany) analyzer. Complete blood count was analyzed on the Sysmex XN-9100 hematology analyzer (Sysmex Corporation, Japan).

For statistical analysis, R-based Jamovi 1.6.23 was used. The Shapiro-Wilk test was used to determine whether there was a normal distribution. Student's t-test was used to compare normally distributed parameters between groups, and the Mann-Whitney U test was used to compare nonnormally distributed parameters between groups. The Chi-squared test was performed to investigate whether there was a difference between categorical variables.

Results

The study included 379 COVID-19 PCR-positive patients who applied to Bursa City Hospital Emergency Service between February 15 and March 15, 2021. Of our patient population diagnosed with COVID-19, 190 were infected with Wuhan type (WT) (96 M/94 F) and 189 with the Alpha variant (96 M/93 F). The mean age of the Alpha variant group was 46±15 (46.1; SD 15.0). For the WT group, the mean was 47±15 (46.6; SD 15.4). The demographic characteristics of the patients were not statistically significant in both groups. The comorbidity data of the patients were not available for statistical analyses.

The laboratory test results of the patients are shown in Table 1. Leukocyte count (p=0.024), lymphocyte count (LC) (p=0.018), PT (p=0.014), international normalized ratio (INR) (p=0.023), and CRP level (p=0.049) were found to be statistically significant between the groups. Leukocyte count (p=0.012), LC (p=0.009), and CRP (p=0.025) were found to be statistically significantly higher in the WT group. PT (p=0.007), INR (p=0.011), and creatinine (p=0.042) were found to be statistically significantly higher in the Alpha variant group. When the symptoms were compared between the groups, no statistically significant differences were found for any of the symptoms.

In this study, when patients with COVID-19 infection were evaluated in terms of mortality, 8 patients out of 189 patients with Alpha variant and 6 patients out of 190 patients with WT died. There were no statistically significant differences between the Alpha variant and WT.

The parameters of fever, fatigue, cough, shortness of breath, anosmia, ageusia, diarrhea, headache, arthralgia, myalgia, and sore throat were examined. On behalf of the symptoms encountered in the patients, no statistically significant difference was found between the two groups.

Discussion

As the mutated SARS-CoV-2 virus emerges, new variants affect the clinical picture and laboratory data. In the present study, we compared the clinical and laboratory data of patients with SARS-CoV-2 Alpha variant and WT.

Symptoms such as fever, cough, weakness, shortness of breath, and loss of taste and smell, which are frequently encountered in SARS-CoV-2 infection, are nonspecific symptoms. In a study conducted by Bhatraju et al., [6] the most common symptoms of COVID-19 patients in the intensive care unit were cough and shortness of breath. Fever was observed in 50% of these patients at the time of admission to the hospital. In a study conducted with the data of 1099 patients in China, when the duration of hospital stay is included, the most common symptom was fever, while the second symptom was cough [7]. In our study, malaise and fever were found to be the most common symptoms in both groups.

In a survey of patients infected with the Alpha variant, cough, fatigue, sore throat, myalgia, and a history of fever within 7 days prior to the test were more common, while loss of taste and smell (anosmia and ageusia) were found less when compared with the WT [8]. Furthermore, Graham et al. [9] showed that there was no relation in terms of symptoms as in this study.

So as the analysis of deaths occurring in 636 patients with a diagnosis of COVID-19 infected with the Alpha variant by Tsai et al., [10] the mortality rate of patients with findings such as fever, chills, and early-onset cough was low; patients with advanced age and no symptoms at baseline have a higher mortality rate. However, in our study, no statistically significant difference was found when we compared groups in terms of mortality and symptoms.

In different studies, statistically significantly higher rates of hospitalization, admission to intensive care units, and death were found in the Alpha variant compared with the classical variant

Table 1. Summary of symptoms and laboratory test results

Variables	Wuhan type, n=190		Alpha variant, n=189		p
	n	%	n	%	
Outpatient	140	73.7	126	66.7	
Inpatient	42	22.1	48	25.4	
ICU	8	4.2	15	7.9	
Gender					0.958
Female	94	49.5	96	50.5	
Male	93	49.2	96	50.8	
Age, years	45.5	24	45	20	0.744
WBC (10^3 μL^{-1}), median (IQR)	6.22 (2.35)		5.76 (2.03)		**0.024**
Neutrophil (10^3 μL^{-1}), median (IQR)	3.69 (2.24)		3.46 (2.03)		0.231
Lymphocyte (10^3 μL^{-1}), median (IQR)	1.57 (0.85)		1.46 (0.90)		**0.018**
NLR, median (IQR)	2.22 (1.78)		2.15 (2.34)		0.599
Hemoglobin (g/dL), median (IQR)	13.9 (2.48)		14.2 (2.30)		0.351
Platelet (10^3 μL^{-1}), median (IQR)	212.5 (87.8)		231 (81)		0.119
MPV (fL), median (IQR)	10.4 (1.3)		10.2 (1.2)		0.148
PT (s), median (IQR)	8.585 (0.68)		8.78 (0.81)		**0.014**
INR, median (IQR)	0.97 (0.07)		0.99 (0.09)		**0.023**
aPTT (s), median (IQR)	28.3 (4.7)		28.9 (4.7)		0.314
D-Dimer (µg/mL FEU), median (IQR)	0.28 (0.3075)		0.28 (0.27)		0.897
BUN (mg/dL), median (IQR)	11.5 (5.85)		11.9 (5.70)		0.521
Creatinine(mg/dL), Median (IQR)	0.820 (0.2875)		0.890 (0.35)		0.084
AST (U/L), median (IQR)	20 (11.75)		21 (13)		0.223
ALT (U/L), median (IQR)	21 (14.75)		21 (18)		0.229
Ferritin (µg/L), median (IQR)	112.5 (162.5)		110 (212)		0.676
CK-MB (µg/L), median (IQR)	1.085 (1.22)		1.13 (1.08)		0.712
Troponin T (ng/L), median (IQR)	4.25 (3.975)		4.30 (3.6)		0.715
CRP (mg/L), median (IQR)	7.80 (16.15)		5.10 (10.50)		**0.049**
Fever	54	28.42	51	26.98	0.755
Fatigue	71	37.37	71	37.57	0.968
Cough	110	57.89	116	61.38	0.490
Dyspnea	36	18.95	37	19.58	0.877
Anosmia and ageusia	23	12.11	15	7.94	0.177
Diarrhea	6	3.16	5	2.65	0.766
Headache	34	17.89	34	17.99	0.981
Arthralgia	43	22.63	43	22.75	0.978
Myalgia	22	11.58	18	9.52	0.515
Sore throat	40	21.05	35	18.52	0.536
Death	6	3.16	8	4.23	0.579

ICU: Intensive care unit; WBC: White blood cell; IQR: Interquartile range; NLR: Neutrophil-lymphocyte ratio; MPV: Mean platelet volume; PT: Prothrombin time; INR: International normalized ratio; aPTT: Activated partial thromboplastin time; BUN: Blood urea nitrogen; AST: Aspartate transaminase; ALT: Alanine transaminase; CK-MB: Creatine kinase-myoglobin binding; CRP: C-reactive protein.

[11, 12]. Besides, similar to our study, Graham et al. [9] showed that the rate of asymptomatic patients and hospital admissions did not change with the infection of the Alpha variant.

In COVID-19 infection, lymphopenia, leukocytosis, hypoalbuminemia, neutrophilia, thrombocytopenia, increased troponin, creatinine, AST, ALT, CRP, PT, aPTT, and D-dimer levels were observed [13, 14]. In our study, PT and creatinine values were found to be statistically higher in the Alpha variant group. The Alpha variant may be more prone to induce kidney injury and impair the synthetic capability of the liver. The effects of the infection with the Alpha variant should be further investigated experimentally.

In a study conducted by Guan et al. [7] with the data of 1099 patients, 83% lymphocytopenia, 36% thrombocytopenia, and

34% leukopenia were found at the time of admission. While CRP elevation was the most common, ALT, AST, CK, and D-dimer elevations were observed less frequently.

While the WBC counts were higher in severe COVID-19 infections, the LCs were statistically significantly lower. A high neutrophil-lymphocyte ratio (NLR) indicates critical illness and poor prognosis [15, 16]. In addition to the increase in the NLR, some studies also show an increase in CRP and D-dimer levels, supporting the severity of the COVID-19 infection [17, 18].

Many studies have reported a positive association between the COVID-19 disease severity and baseline levels. CRP has been found to be superior to neutrophil count (NC), LC, and the erythrocyte sedimentation rate [19, 20]. Increased NC and CRP level and decreased LC is the expected pattern in COVID-19 disease. We found statistically significantly higher levels of CRP, NC, and LC in the WT group. With the data obtained, we could not express that the WT group had more severe COVID-19 disease. These differences between the groups might be studied using larger population sizes.

In the study conducted by Song et al., [21] CRP, CK, and D-dimer levels were found to be statistically significantly higher in the Alpha variant group than in the WT patient group. There was no statistically significant difference between the two groups in terms of WBC, neutrophil, platelet, lymphocyte, ALT, and AST values. In another study with 158 patients, Vassallo et al. [22] found that the platelet count was higher in the Alpha variant patient group, while the CRP, D-dimer, and NLR were not statistically significantly different between the two groups. The Alpha variant patient group was found to have a fourfold higher risk of death and hospitalization in intensive care. We did not find any evidence of higher mortality in the Alpha variant patient group.

There were some limitations in this study. First, this study was single-centered and retrospective. Second, variant analyses were not performed using RNA-sequencing. To date, many biomarker studies regarding the severity and progression of COVID-19 have been conducted. These studies had two major drawbacks. They had retrospective study designs and small patient populations. Due to these problems, more studies using new technologies should be performed regarding the use of biomarkers. The data related to comorbid conditions of the patients who had died was not available, so this issue was another limitation.

Conclusion

In this study, no statistically significant differences were found in terms of symptoms and mortality in both variant patient groups. CRP, lymphocyte, and leukocyte were found to be statistically significantly higher in the WT patient group. PT and creatinine were found to be statistically significantly higher in the Alpha patient group. Studies having prospective designs should be conducted to understand the effects of SARS-CoV-2 variants on human biology. Currently, animal experiments with different SARS-CoV-2 variants could be carried out to understand the molecular and cellular processes of the COVID-19 disease.

Conflict of Interest: The authors declare that there is no conflict of interest.

Ethics Committee Approval: The study was approved by The Bursa City Hospital Clinical Research Ethics Committee (No: 2021-10/14, Date: 02/06/2021).

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