Comparison of Clinical, Hematological and Biochemical Characteristics of Patients Suffering from Delta and Non-Delta Variant of COVID-19

Omair Farooq,[1] Waqas Sami,[2] Alia Waheed,[3] Asim Mumtaz,[4] ZainabYousaf,[5] Eazaz Ali Khan,[6] Atiqa Arshad[7]

Abstract

Objective: To compare the clinical, hematological and biochemical characteristics of patients suffering from delta and non-delta variants of COVID-19.

Method: This cross-sectional study was conducted at Farooq Hospital Westwood Lahore during 1st March 2022 to 31st August 2022. After obtaining informed written consent, nasopharyngeal swabs and 5 ml of blood samples in both EDTA and clotted vacutainers of eighty two infected patients with COVID-19, who were admitted in COVID-19 unit, were collected. The viral nucleic acid was isolated from nasopharyngeal swabs by using a Qiagen nucleic acid extraction kit. RT-PCR was performed to detect the delta variant in COVID-19 infected patients by using SARS-CoV-2 Variant B.1.617 identification kit. Further hematological and biochemical parameters were performed.

Results: We did a comparative analysis of clinical and laboratory characteristic of delta and non-delta COVID-19 patients admitted in Farooq Hospital Westwood, confirmed by RT-PCR and found that patients presented with delta variant had more severe disease with significantly more cough, fever, shortness of breath and lower SpO2 at the presentation. The hematological and biochemical markers showed more lymphopenia, greater CRP, Interleukin 6, LDH and ferritin. Hospital stay of delta variants of COVID-19 patients had longer duration as compared to the non-delta COVID-19 patients.

Conclusion: Delta COVID-19 had more severe disease with more dyspnea, hypoxia, hematological and biochemical parameters abnormalities compared to the non-delta COVID-19 patients. Patients suffering from delta variant of COVID-19 had greater length of hospital stay as compared to the non-delta variant of COVID-19 with more oxygen requirement and more mortality rate.

Keywords: Severe acute respiratory syndrome Coronavirus 2, coronavirus disease 2019, delta variant, non-delta variant

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1. *Department of Pathology, Akhtar Saeed Medical College Lahore*
2. *Farooq Hospital Lahore*
3. *Department of Biostatistician*
4. *Department of Haematology, Pathology Akhter Saeed Medical & Dental College Lahore*

5,6. *Farooq Hospital Westwood Lahore*

Correspondence:
Prof. Asim Mumtaz; *Professor of Chemical Pathology (Pathology department), Akhtar Saeed Medical & Dental College, Lahore.*
Email: drasim123@yahoo.com

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Introduction

Millions of people have lost their lives as a result of the ongoing pandemic of the coronavirus disease 2019 (COVID-19), which has a significant impact not only on the global economy but also on public health. It is believed that severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2) emerged from bats as the natural source of various coronavirus (CoV) strains, including SARS-CoV and SARS-CoV-2.1 SARS-CoV-2 is another name for this contributing agent. As a result of SARS-CoV-2 infections during this ongoing pande-

mic, new variants have emerged that are more robust and have a significant impact on public health. This has provided space and opportunities for evolution and mutation.[2]

The SARS-CoV-2 variants of concern (VOC): Alpha, Beta, Gamma, and Delta have an impact on public health due to their high transmission rates; the probability of an effect on the seriousness of Coronavirus; and the effect of public health measures, treatments, diagnosis, and vaccines that work well.[3-5] Pakistan's COVID-19 infectivity rate appears to be continuing to rise worldwide due to the SARS-CoV-2 Delta variant (B.1.617.2).[6-8] From March to May 2021, the third wave took place in Pakistan, shortly thereafter, in July the fourth wave began. There has been an estimated 1,039,695 cases in the country, with 23,462 deaths.[9-11]

The delta variant transmits approximately twice as much as the preceding variants.[11] One of the reasons for mutations in the spike (S) area, such as P681R and L452R is the higher transmission rate of the delta variant.[12,13] At the moment, the delta variant is the most widely distributed variant worldwide. Notably, the delta variant has been linked to a higher mortality rate than other variants, showing higher risk of serious outcomes, ICU admission, and hospitalization.[14-16] The COVID-19 disease has been linked to numerous prognostic factors. However, our understanding of the delta variant's impact on COVID-19 outcomes is limited.[17,18] In this study, we did the com-parative analysis of clinical, hematological and bioche-mical parameters of patients admitted in Covid-19 unit of Farooq Hospital Westwood Lahore and suffering from delta and non-delta variants of COVID-19.

Material and Method

This cross-sectional study was conducted at Farooq Hospital Westwood Lahore during 1st March 2022 to 31st August 2022 and approved by the ethical & review board of Farooq Hospital. After obtaining informed written consent, samples were collected. The demographics and clinical characteristics were recorded on the predesigned proforma. About 05 ml of blood samples in both EDTA and clotted vacutainers of eighty two COVID-19 infected patients were collected, who were admitted in the said duration. Nasopharyngeal samples were collected with cotton swabs and a viral transport medium (VTM). The VTM was stored at 2-8°C till further procedure.

The nucleic acid was extracted within 24 hours after the sample collection. The viral nucleic acid was isolated from nasopharyngeal swabs by using a Qiagen nucleic acid extraction kit. In the manual nucleic acid extraction procedure, different steps were followed. Briefly, we added 25µL qiagen proteinase, 200µL sample, 200µL lysis buffer, 250µL absolute ethanol, 500µL wash buffer 1, 500µL wash buffer 2, 500µL absolute ethanol, and elution buffer. The viral nucleic acid of each sample was eluted with 60µL elution buffer.

The extracted viral nucleic acids were immediately subjected to a one-step RT-PCR reaction. The remaining nucleic acids were stored at -70°C. After the nucleic acid extraction, RT-PCR was performed to detect the delta variant in COVID-19 infected patients by using SARS-CoV-2 Variant B.1.617 Identification Kit. It detected the three mutations (P681R, E484Q, and L452R) in patient samples. The master mix was prepared as per instructions (add (n+1)×19.0µL of RT-PCR Mix and (n+1)×1.0µL of Enzyme Mix into a 1.5mL centrifuge tube). After that, 20µl mastermix was added in a 0.2mL PCR reaction tube. 5µl extracted nucleic acid was added. Positive and negative controls were run with the test batch. All the tubes were placed in a thermocycler (Rotar Gene-Q 5plex). Denaturation was performed at 95°C for 3 minutes and again for 15 seconds. Annealing was performed at 50°C for 45 seconds and 50 cycles were used. The last step of the extension was done at 60°C for 60 seconds and 50 cycles were used. The results were considered positive for delta variant when P681R and L452R sites were detected mutated, while the E484Q site was not. From EDTA and clotted samples, hematological and biochemical parameters were performed.

Results

This study was planned to determine and compare levels of clinical and laboratory parameters in delta and non-delta variant of COVID-19 positive patients. A total of 82 COVID-19 patients were enrolled in this study. The patients were divided in two groups on the basis of the delta variant presence and absence i.e. COVID-19 positive patients with delta variant positive and non-delta variant patients. From total 82 COVID-19 patients, 30 patients were having delta variant while 52 were non-delta strain. The median age of the patients was 63 years in which the youngest patient aged 20 years and the oldest patient aged 90 years of age. Out of 82 patients, 46 patients were males and 36 patients were females. The demographic features of these patients in the two groups are given in table 1. Also, the table represents the association of these parameters with the

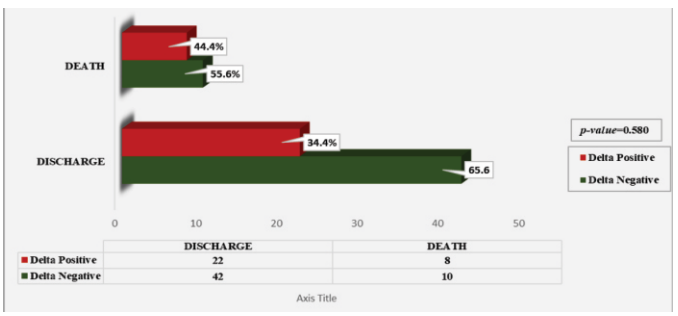
Table 1: *Frequency of demographic features and comparison in the two groups*

Variables	Delta Variant		P-value
	Negative	Positive	
	Median ± IQR	Median ± IQR	
Age	63.00 ± 18	64.50 ± 23	0.482
Variable	**n(%)**	**n(%)**	
Gender			
Female	25 (48.1%)	11 (36.7%)	0.499
Male	27 (51.9%)	19 (63.3%)	
Vaccination Status			
No	28 (53.8%)	17 (56.7%)	1.000
Yes	24 (46.2%)	13 (43.3%)	
Comorbidities			
None	19 (36.5%)	8 (26.7%)	0.970
Hypertension	6 (11.5%)	4 (13.3%)	
Diabetes mellitus	4 (7.7%)	3 (10.0%)	
Ischemic heart disease	1 (1.9%)	1 (3.3%)	
Multiple	22 (42.3%)	14 (46.7%)	
Oxygen Demand			
Room Air	20 (39.2%)	12 (38.7%)	0.977
5 Liter	11 (21.6%)	6 (19.4%)	
10 Liter	7 (13.7%)	4 (12.9%)	
15 Liter	6 (11.8%)	3 (9.7%)	
High Flow	7 (13.7%)	6 (19.4%)	

P value of <0.05 considered significant

groups.

The laboratory parameters were also analyzed in the two groups. The normality of these parameters was determined by Shapiro-Wilk test and it showed that all of these parameters were not normally distributed. Mann-Whitney U test was applied to determine the differences of these parameters in the two COVID-19 patients. C-reactive protein (CRP), ferritin and procalcitonin (PCT) showed statistically significant differences in the groups with p-value 0.026, 0.012 and 0.026 respectively. CRP, ferritin and PCT levels were statistically higher in the group with delta strain positive. The median



with IQR of these laboratory parameters in the two groups and the association is shown in the table 2.

Table 2: *Clinical and laboratory parameters with delta variant status of patients*

Variables	Delta Variant		P-value
	Negative	Positive	
	Median ± IQR	Median ± IQR	
Oxygen saturation	88.00±11.0	89.50±10.0	0.197
Hemoglobin	13.00±3.0	12.45±2.8	0.698
Total leukocyte count	9.2±8.5	10.85±5.6	0.622
Lymphocytes	11.0±8.0	10.0±6.0	0.567
Neutrophils	84.0±11.0	85.0±7.0	0.521
Platelets	223.5±10.0	205.50±81.0	0.509
Alanine aminotransferase (ALT)	37.5±29.0	44.50±42.0	0.275
Aspartate aminotransferase (AST)	38.50±21	40.0±34.0	0.890
Total protein	6.0±1.0	7.0±1.0	0.069
Albumin	4.0±1.0	4.0±0.0	0.129
Urea	42.0±23.0	40.50±36	0.698
Creatinine	1.0±0.1	1.0±0.1	0.565
Sodium	135.0±8.0	137.0±5.0	0.065
Potassium	4.0±0.0	4.0±1.0	0.158
CRP	56.0±42.0	73.5±41.0	0.026*
Ferritin	456.0±772.0	1059.5±962.0	0.012*
D-Dimer	0.69±0.54	0.67±0.53	0.491
Interleukin-6	40.5±67.3	35.0±56.0	0.609
Vitamin D	24.0±16.3	27.0±20.7	0.241
PCT	0.095±0.22	0.23±0.38	0.026*
Hospital stay	6.0±4.0	6.5±5.0	0.258

**Statistically significant association between the laboratory parameters and the delta variant status of the patient*
IQR= Inter quartile ranges
P value of <0.05 considered significant

Fig- 1: *Outcome of treatment among the delta negative and delta positive COVID-19 patients*

The outcome of the COVID-19 patients was also evaluated if they were discharged or died after the treatment. Almost 77% patients got discharged after the treatment and 21% patient died. The outcome status of the patient after treatment among the delta positive and negative patients is given in the figure 1.

Discussion

The delta variant is a globally growing dominant variant. The delta variant of SARS-CoV-2 disease was spread all the more pervasively, prompting considerable more infected cases unlike low transmission and high mortality of MERS-CoV and SARS-CoV disease that happened a few years prior. The symptoms of the delta variant are different from other variants in terms of severity. One of the reasons for the speedy transmission of the

delta variant was that the people did not wear face masks and stopped following necessary guidelines designed for SARS-CoV.19,20 The comparative analysis of clinical and laboratory parameters of delta and non-delta SARS-CoV-2 patients admitted in Covid-19 unit of Farooq Hospital Westwood was done. Patients presented with delta variant had lower oxygen saturation at the time of presentation. Delta variant patients had a longer hospital stay than non-delta COVID-19 patients. The prevalence of delta variant in vaccinated and unvaccinated patients was not different. A study is consistent with the present study that also showed that the prevalence of delta variant was not affected by vaccination.[21]

Patients with several other comorbidities like hypertension, diabetes mellitus, and ischemic heart disease are associated with severity and mortality.[22] In this study, comorbidities were not found to be significant with the delta variant. But they are still related to the high death ratio and needed admissions to the hospital's ICU. The hematological parameters were found to be not associated with the delta variant. In other words, the complete blood count parameters were less changed and not helpful in diagnosis and treatment outcome of this disease. Another important finding in the present study was that serum CRP, PCT and ferritin were quite deranged in delta variant patients. In COVID-19 these biochemical parameters were also found associated with the disease progression and severity.[23-25] This association represents the similarity in pathogenesis of delta variant and non-delta variant diseases.

Conclusion

In this study, we found a higher rate of hospital admissions and emergency care of patients with COVID-19 patients infected with the delta variant as compared with the non delta variant. The consequence of this study shows that the person with young age can also develop the delta variant infection. The patients with delta variant had more serious illness with lower oxygen saturation. Biochemical markers showed higher levels of CRP, PCT and ferritin. Delta positive patients also had longer hospital stay with high mortality rate than non-delta COVID-19 patients.

Conflict of Interest *None*

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Authors Contribution

AM: Conceptualization of Project
EAK, AA: Data Collection
OF: Literature Search
WS: Statistical Analysis
ZY: Drafting, Revision
AW: Writing of Manuscript