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Impact of Sickle Cell Trait on Morbidity and Mortality from Sars-Cov-2 Infection

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Blood (2020) 136 (Supplement 1): 31.

http://doi.org/10.1182/blood-2020-142835

Introduction: The high morbidity and mortality of SARS-CoV-2 in Blacks or African American in the United States is well established. Individuals with sickle cell trait (SCT), who are mostly Black or African American, have adverse health outcomes in situations of increased physiologic stress. The novel coronavirus SARS-CoV-2 causes a severe multi-systemic viral infection that induces intense inflammation and metabolic derangements that can exacerbate RBC sickling and organ damage. The purpose of this study is to evaluate the impact of SCT status on the outcome of patients hospitalized for SARS-CoV-2.

Methods: We conducted a multi-center, IRB-approved, retrospective analysis of Black/African American patients who were admitted for management of SARS-CoV-2 infection from March 24, 2020 to June 2, 2020. Patients were identified using an electronic medical record (EMR) report that selected for race as "Black or African American" and a positive SARS-CoV-2 PCR test during that admission. We excluded patients admitted for reasons other than SARS-CoV-2 infection and reviewed only the in-hospital experience. Patient demographics, co-morbidities, admission laboratory values, complications of SARS-CoV-2 infection, and status on discharge were abstracted by manual chart review. High performance liquid chromatography (HPLC) was performed on discarded blood of patients to test for sickle cell trait. The primary objective was to evaluate the impact of SCT status on morbidity outcomes of Blacks/African Americans hospitalized with SARS-CoV-2 infection. Categorical data were tested using the Fisher
exact test, and quantitative data were tested using the Wilcoxon rank sum test. Testing was done at the nominal 0.05 two-sided significance level.

Results: One hundred and sixty-six Black or African American patients admitted for SARS-CoV-2 infection are included in the analysis. Twenty patients had SCT, 143 had normal hemoglobin (AA) and 3 had hemoglobin C trait (AC). The 146 patients with AA and AC hemoglobin were pooled together. Patient demographics, comorbidities, and lab values on admission by SCT status are shown in Table 1. Complications of SARS-CoV-2 by SCT status is shown in Table 2. Among Black or African American patients admitted for SARS-CoV-2 in this study, SCT represented 12.0% of the total. At the time of admission, individuals with SCT had significantly higher creatinine (p=0.004) but were less likely to present with a history of chronic lung disease (p=0.004). However, a history of chronic lung disease was not in itself associated with death in hospital, p=0.056, and creatinine at admission was not associated with death, p=0.483. Correspondingly, a total of 19 of the 146 patients without SCT died in the hospital (13%), compared to 3 of 20 SCT patients (15%), Fisher exact test p-value = 0.732, despite the difference in the groups at admission.

Discussion: The higher morbidity and mortality from SARS-CoV-2 infection in Black or African Americans is well-documented. This study showed equivalent outcomes in patients admitted for SARS-CoV-2 infection whether, or not they had SCT. There was a lower rate of chronic lung disease in patients with SCT, but no difference in respiratory outcome from SARS-CoV-2 between the groups. Patients with SCT also had worse creatinine at presentation but there was no difference in hospital death or end organ complications at discharge. Notably, individuals with SCT made up 12% of Black patients admitted for SARS-CoV-2 in this study which is higher than the reported prevalence of SCT of 7.31% in the African American population (p=0.025), but this is of unclear significance. Our study is limited by the restriction to one metropolitan area and by being retrospective in nature, but the initial data suggests that those with SCT may be more frequently admitted to hospital when infected by SARS-CoV-2 than individuals without SCT. A larger prospective study across multiple regions of the United States should be considered to
further assess the prevalence of SARS-CoV-2 in the African American community and the apparent increased rate of hospitalizations for SARS-CoV-2 infection in individuals with SCT.

Table 1: Patient demographic information, co-morbidities, and lab data on admission

|                                | AA/AC N=146 | SCT N=20 | P value |
|--------------------------------|-------------|----------|---------|
| **Age (median, range)**        | 63 (22-103) | 67 (22-81) | 0.688   |
| **Male gender**                | 75 (52%)    | 11 (55%) | 0.815   |
| **Comorbidities**              |             |          |         |
| BMI                            | 27.87 (16.61-69) | 28.85 (19.49-50.52) | 0.725   |
| **Smoking History**            |             |          |         |
| Current                        | 11          | 4        | 0.091   |
| Former                         | 33          | 4        |         |
| Never                          | 99          | 9        |         |
| **Hypertension**               | 110 (76%)   | 14 (70%) | 0.779   |
| **Diabetes Mellitus**          | 69 (58%)    | 11 (65%) | 0.793   |
| **Chronic Lung Disease**       | 38 (27%)    | 0 (0%)   | **0.004** |
| **Coronary Artery Disease**    | 19 (13%)    | 3 (15%)  | 1.00    |
| **Admission Labs**             |             |          |         |
| Creatinine                     | 1.15 (0.39-32.6) | 2.06 (0.56-14.3) | **0.004** |
| LDH (129/20)                   | 386 (148-966) | 330 (202-580) | 0.267   |
| Hb                             | 12.35 (6.4-16.5) | 11.95 (5.8-17.4) | 0.650   |
| Platelets                      | 218.5 (6-620) | 222.5 (128-464) | 0.509   |
| Lymph                          | 15.4% (0-95%) | 12.1% (1-30.1%) | 0.203   |
| Abs. lymphocyte Ct             | 1.05 (0-5.24) | 1.07 (0.39-4.97) | 0.605   |
| PT                             | 14.1 (11.9-35.8) | 14.2 (12.8-36.5) | 0.969   |
| PT INR                         | 1.1 (0.9-3.6) | 1.1 (1-3.7) | 0.922   |
| PTT                            | 32.4 (20.6-150) | 35.6 (30.1-150) | 0.111   |
| D Dimer                        | 1681.5 (172-10,000) | 2480.5 (438-5000) | 0.232   |
| Fibrinogen                     | 570.5 (303-936) | 651 (233-838) | 0.648   |
| C-RP                           | 78.5 (0.4-479.1) | 83.7 (0.7-300) | 0.517   |
| hs C-RP                        | 94 (0.5, 300) | 155.85 (9.7,300) | 0.730   |

Table 2: Complications of SARS-CoV-2 infection

|                                | AA/AC N=146 | SCT N=20 | P Value |
|--------------------------------|-------------|----------|---------|
| **Respiratory Compromise**     |             |          | 0.450   |
| None                           | 41          | 9        |         |
| Non-RB NC (1-6 L)              | 55          | 3        |         |
| Non-RB/oxymerizer (7-15 L)     | 10          | 1        |         |
| Intubation                     | 55          | 7        |         |
| Renal Failure                  |             |          | 0.532   |
Disclosures

Neuberg: Madrigak Pharmaceuticals: Current equity holder in publicly-traded company; Celgene: Research Funding; Pharmacyclics: Research Funding. Achebe: Global Blood Therapeutics: Other: Advisory Board; Fulcrum Pharmaceuticals: Consultancy; Pharmacosmos: Other: Advisory Board.

Author notes

* Asterisk with author names denotes non-ASH members.