

COVID-19 related laboratory analyte changes and the relationship between SARS-CoV-2 and HIV, TB and HbA1c in South Africa

The aim of this study was to describe the biochemical and haematological analyte changes seen in COVID-19 patients using South African laboratory data, and to determine the effect of HIV, TB and DM on the risk for acquiring SARS-CoV-2 and the outcomes as measured by intensive and high care admission.

Methods

This was a retrospective analysis of all data for individuals that had at least one PCR test for SARS-CoV-2 at any of our laboratories from the period 1st March to 7th July 2020. Test results for TB, HIV and HbA1c was taken from the six months prior to SARS-CoV-2 testing. Outcome data was not available so we used ICU/high care or critical care admission to determine disease severity. We reported prevalence of HIV and TB for critical versus non-critical groups. HbA1c was stratified into one of 4 categories: [1] optimal control and normal (<5.7%); [2] controlled or pre-diabetic (5.7 – 6.49%); [3] uncontrolled diabetic (6.5 – 10%); [4] poorly controlled diabetic (>10%). CD4 counts were categorized into one of eleven bins, with increments of 100 cells/uL between bins, ranging from 0-99 cells/uL (bin 1) to ≥ 1000 cells/uL (bin 11). The statistical significance between groups for all results was calculated by Wilcoxon rank-sum test for non-parametric data, the Student's t-test was used for parametric data and Pearson's Chi-square test was used for proportions. A p-value of <0.05 was regarded as significant.

Results

We report data for 842,197 individuals, of which 11.7% (98,335) had at least one positive SARS-CoV-2 PCR test, and 88.3% (743,862) tested negative. The mean age for the positive group was 42.3 ± 15.0 years vs. 42.6 ± 14.7 years in the negative group and female prevalence was 61.6% (60,545) vs. 56.3% (419,011) ($p < 0.001$ for both), respectively. The overall prevalence of HIV was 6.3% and did not differ between positive and negative groups, but was higher in the critical group (9.15%) than in the non-critical group (6.24%) ($p = 0.011$). The prevalence of uncontrolled diabetes was 3.4 times higher in SARS-CoV-2 positive cases ($p < 0.001$) but was not higher in the critical vs. non-critical cases ($p = 0.612$). The prevalence of TB in SARS-CoV-2 negative individuals was higher than in the SARS-CoV-2 positive group ($p < 0.001$). The neutrophil-to-lymphocyte-ratio, coagulation markers, urea, cardiac, and liver related analytes were significantly elevated in the critical compared to non-critical cases. Platelet count and creatinine concentration did not differ significantly between the two groups.

Conclusions

Our findings did not support an increased prevalence of either HIV or TB in individuals with SARS-CoV-2 infection but did indicate an increase in disease severity with HIV-positive status. Our findings of clear differences in several commonly measured analytes between the critical and non-critical group suggest that these may be useful in our setting to triage patients.