COVID-19 is a disease can change the function and morphology of erythrocytes.

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INTRODUCTION: COVID-19 disease initially leads to impairment of the respiratory tract, with coagulation problems being one of the most related complications after pulmonary failure. In this context of blood change, one specific cell type remains with no experimental study: erythrocyte. In this way, we decided to investigate if red blood cell from COVID-19 patients has in some way its functionality changed by this infection. **METODOLOGY:** For the present study, we performed all the analyses with ≈ 64 COVID-19 positives and 20 COVID-19 negatives (control) volunteers (CAAE 30732120.1.0000.5013). Blood samples were submitted to the OMS virus inactivation protocol. Oxygen uptake by control and COVID-19 patients erythrocytes were measured using an OXIGY oxygraph electrode (Hansateh Instrument). For the morphology studies, Raman spectroscopy and atomic force microscopy (AFM) were performed. Activity of some antioxidant enzymes was also measured (SOD, CAT, GPx). **RESULTS:** Verifying the main function of erythrocytes, we have found a decrease of about 51% in oxygen uptake in cells from COVID-19 patients when compared to controls. Moreover, we found a reduction in the activity of antioxidant enzymes (27.9%) SOD, (83.1%) CAT, (38.8%) GPx, which probably indicates a condition of oxidative stress of these cells. For Raman, we saw peak modification related to Fe-O2 bond (564 cm^{-1}); distortion of the porphyrin ring (1400-1300 cm^{-1}); in the motif that describes the conformation of the membrane lipids (1129 cm^{-1} and 1080 cm^{-1}). COVID-19 infection led to an approximately 14.3% increase in the diameter and about 30% decreases in height; stiffness of the erythrocytes increases by up to 74.3%. **CONCLUSION:** From this source, it is valid to state that the COVID-19 virus somehow leads to structural, funcional and morphological damage to erythrocytes, which maybe is one of the factors that aggravate respiratory problems which is the more pronounced manifestations in COVID-19 patients when compared to control.

Keywords: COVID-19, Erythrocytes, Oxygen.