

Taylor K. Collins
Undergraduate
University of Southern California, Los Angeles, California

Dr. Rinku Majumder, PhD:
Department of Biochemistry and Molecular Biology

“The contributions of race, age, and anticoagulant Protein S in predicting COVID-19 prognosis”

The COVID-19 pandemic has caused monumental mortality, and there is, as yet, no adequate therapy. Unlike the SARS-CoV pandemic in 2003, COVID-19 is not simply a disease of the upper respiratory tract. COVID-19 patients experience hypercoagulability and increased risk of venous thromboembolism. Severe cases of COVID-19, i.e., patients who require ventilators, involve hyper-coagulability and disseminated intravascular coagulation (DIC). Moreover, several reports indicate that hypercoagulability, as measured by the D-Dimer level, is present mostly in critically ill and deceased patients. In addition to blood clots of all sizes throughout the body, doctors who treat coronavirus patients report a range of other odd and frightening syndromes, such as kidney failure, cardiac inflammation, and immune complications.

Deficiency of the plasma anticoagulant Protein S is associated with DIC and thrombosis. Ordinarily, Protein S deficiency is due either to homozygous or heterozygous genetic alteration, and Protein S deficiency can result from various pathological states and diseases. In all these cases, Protein S deficiency is associated with a high risk of venous thrombosis. Protein S limits thrombin generation by directly inhibiting Factor IXa. Thus, the high thrombotic risk associated with PS deficiency is due to failure to regulate thrombin formation.

Clinicians measure the D dimer levels of COVID-19 patients because D dimer level is indicative of hypercoagulability and DIC. A positive D-dimer result indicates the presence of an abnormally high level of fibrin degradation products; thus, high D dimer suggests substantial blood clot (thrombus) formation and consequent degradation. Interestingly, race and age affect the severity of COVID-19 and the degree of mortality. The elderly are more susceptible to contracting COVID-19, and they have a higher risk of mortality compared with younger individuals. In addition, people of African and Hispanic origin are also at higher risk of infection.

The purpose of this research was to identify factors that can predict the risk of severe COVID-19 and its prognosis. We found that age, race, and the plasma level of anticoagulant Protein S comprise a list of risk factors that lead to severity and mortality of COVID-19. However, experimental data are required to directly correlate Protein S level with severity of COVID-19 disease.