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# Blood Viscosity at the First Clinical Presentation in Fatal and Non-Fatal COVID-19: An Observation

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COVID-19 is the important public health problem. The thrombohemostatic problem in COVID-19 is possible but limited studied. In the previous publication, bleeding is confirmed as a possible clinical problem in COVID-19 patients[1]. Additionally, the thrombotic problem is also reported in COVID-19.[2] During COVID-19 infection, the change of blood rheological process might occur and the hyperviscosity of blood is mentioned in the literature.[2] The change of blood cell component and plasma biochemical are possible underlying factors resulting change of whole blood viscosity and this pathophysiological process might further result in a thrombotic event.[3] Adding to the previous report,[1] the authors retrospectively analyzed on the available data of 1,458. COVID patients (279 fatal and 1,174 non-fatal cases) to compare the blood viscosity at the first clinical presentation in fatal and non-fatal COVID-19. The calculation for extrapolated whole blood viscosity, based on hematocrit and total blood protein values, is done. According to this analysis, the average extrapolated whole blood viscosity values of COVID-19 on admission of fatal and non-fatal COVID-19 groups are equal to 16.40 $\pm$ 1.44 and 14.37 $\pm$ 1.56, respectively. The average extrapolated whole blood viscosity value is slightly higher in the fatal COVID-19 group. This might confirm that high blood viscosity on admission might further induce thrombotic complication in COVID-19 and can further result in fatality of the patient. An important limitation due to the nature of retrospective analysis of this study should be noted. There are other uncontrollable factor that might be associated with final outcome of the patient such as therapeutic management and other underlying disorders of the patient. Further studies based on this preliminary observation are required for final conclusion on the clinical association between blood viscosity and clinical course/outcome in COVID-19. Despite the limited number of cases reported in this letter, we feel it is important to share this information to spurn on additional investigation. There are potential implications of altered blood viscosity occurring among COVID-19 patient outcomes. The role of underlying genetic characteristics and clinical association with thrombo-hemostatic characteristics is worthy of additional study.

## Declaration of Conflicting Interests

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