

An Evaluation of the Relationship between Viral Load and Quantitative Chest Computed Tomography Imaging Features in Patients with COVID-19

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Abstract

COVID-19, caused by SARS-CoV-2, is a highly infectious global pandemic. Diagnosis relies on the RTPCR test, with Cycle threshold (Ct) value as an indirect measure of viral load. High-resolution computed tomography (HRCT) chest imaging aids in assessing disease severity as a secondary diagnostic tool. This retrospective study aimed to evaluate the relationship between HRCT quantitative parameters, biochemical markers, and disease severity in 50 COVID-19 confirmed subjects. HRCT images were analyzed using 3D Slicer software to extract lung volumes. Patients were categorized based on Computed Tomography Chest Severity Score (CTSS) grades. Biochemical parameters including Ct value, C-reactive protein (CRP), D-dimer, and serum ferritin levels were collected. The study found that the viral load of COVID-19 subjects ranged from 11 to 33 with a mean value of 21.74 ± 5.42 . No significant correlation was observed between lung volumes and Ct value ($p > 0.05$), but a moderate positive correlation was found between white blood cell (WBC) count and Ct value ($r_s(48) = 0.441$, $p = 0.01$). Although Ct value did not significantly differ between CTSS grades, significant variations in the Ct value among lung volumes and the ratio of affected lung volume to functional lung volume were observed ($p < 0.05$). These findings emphasize the importance of comprehensive evaluations using radiological and biochemical assessments for COVID-19 patients. Further research is needed for better understanding of the relationships between HRCT quantitative parameters, viral load, and disease severity, which can enhance treatment decisions and patient management strategies.

Keywords: *COVID-19, Cycle threshold value, High-resolution computed tomography*