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**Indications for and Findings on Transthoracic Echocardiography in COVID-19 patients admitted to a Tertiary Care Government Medical Hospital**

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**Purpose:** We aimed to document the performance of transthoracic echocardiography (TTE) and the spectrum of echocardiographic findings as complications associated with coronavirus disease-2019 (COVID-19).

**Methods & Materials:** A retrospective analysis was performed among adult patients admitted to a tertiary care government hospital in Maharashtra between January 01, 2021 and May 31, 2021. Patients were included if they underwent TTE during the hospitalization after a known positive diagnosis for COVID-19. Demographic and clinical data were obtained using chart abstraction from the medical record system.

**Results:** Of 1539 patients, 187 (12.15%) underwent TTE following positive results on severe acute respiratory syndrome coronavirus-2 polymerase chain reaction testing. The most common clinical indications for TTE were concern for a major acute cardiovascular event (52.95%) and hemodynamic instability (32.29%). Although most patients had preserved biventricular function, 41.30% were found to have left ventricular ejection fractions < 50%, and 13.5% had at least moderately reduced right ventricular function. Eleven patients had wall motion abnormalities suggestive of stress-induced cardiomyopathy. Using Spearman rank correlation, there was an inverse relationship between high-sensitivity troponin T and left ventricular ejection fraction (p = -0.41, P < 0.01). Amongst 37 patients with prior echocardiograms, only seven (19.11%) had new reductions in LVEF of > 10%. Clinical management was changed in seventeen individuals (26.98%) in whom TTE was ordered for concern for acute major cardiovascular events and seven (14.58%) in whom TTE was ordered for hemodynamic evaluation.

**Conclusion:** Our study describes the clinical indications for use and diagnostic performance of TTE as well as findings seen on TTE, in hospitalized patients with COVID-19. In appropriately selected patients, TTE can be an invaluable tool for guiding COVID-19 clinical management.

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**Comparison of Cytokines Levels Among Covid-19 Patients Living at Sea Level and High Altitude**

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**Purpose:** The inflammatory response in COVID-19 among people living at different altitudes has not been studied. Given that chronic hypoxia promotes cytokines production in the absence of disease, the inflammatory response against SARS-CoV-2 may also be different in these populations. The aim of this study was to compare pro-inflammatory cytokine levels among healthy and COVID-19 patients living at different altitudes above sea level.

**Methods & Materials:** A descriptive cross-sectional study was performed in two Peruvian cities at different altitudes for comparison: Lima (sea level) and Huaraz (3052 meters above sea level). Patients with COVID-19 diagnosis confirmed by reverse-transcriptase polymerase chain reaction (RT-PCR) were compared to healthy subjects, according to their residing location. Five important pro-inflammatory cytokines were measured including: IL-6, IL-2, IL-10, IFN-γ and TNF-α using ELISA-based assays. Cytokines levels were calculated and their mean, maximum and minimum levels were reported according to each study group. The difference between means was compared using the ANOVA and post-hoc Turkey Test, a significant value of p<0.05 was considered significant.

**Results:** A total of 35 COVID-19 patients and 10 healthy subjects were recruited from each study site. The mean levels of IL-6 (p<0.03) and TNF-α (p<0.01) were significantly different among the study groups. In the case of IL-6, patients from Lima had a mean level of 16.2 pg/ml (healthy) and 48.3 pg/ml (COVID-19), meanwhile, patients from Huaraz had levels of 67.3 pg/ml (healthy) and 97.9 pg/ml (COVID-19). Regarding TNF-α, patients from Lima had a mean level of 25.9 pg/ml (healthy) and 61.6 pg/ml (COVID-19), meanwhile, patients from Huaraz had levels of 89.0 pg/ml (healthy) and 120.6 pg/ml (COVID-19). The levels of IL-2, IL-10 and IFN-γ were not significantly different in the study groups.

**Conclusion:** Patients with COVID-19 residing in high-altitude tend to have higher levels of inflammatory cytokines, particularly IL-6 and TNF-α. Altogether, this findings demonstrates the need to perform more studies in populations residing at high altitude, given that inflammatory response may be significantly different in these populations.

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