Abstract

Background

COVID-19 manifests with a wide range of severities, from asymptomatic to critical conditions. Immunological profiles in patients positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) may serve as early indicators of disease severity, aiding in prioritizing patient care.

Methodology

Archived patient plasma samples were retrieved from the Molecular Lab Bio-repository, ensuring equal representation of males, females, and various disease severities. Socio-demographic and disease severity data were obtained from patient health records. Levels of pro-inflammatory cytokines (interferon-gamma [IFN-γ], tumor necrosis factor-alpha [TNF-α], interleukin-2 [IL-2], and interleukin-17 [IL-17]) and anti-inflammatory cytokines (interleukin-4 [IL-4], interleukin-6 [IL-6], and interleukin-10 [IL-10]) were measured using the BD FACSCalibur flow cytometer. Data analysis involved comparing cytokine levels across different disease severities, with demographic data expressed as means ± standard deviation (SD). Statistical significance was set at $P \leq 0.05$.

Findings

The mean ages for males and females were 49.6 ± 22.7 and 48.4 ± 23.7, respectively. Mean ages for disease severity categories were 33 ± 19 (asymptomatic), 45.2 ± 21.5 (moderate), 56.8 ± 18.7 (severe), and 61.95 ± 22 (critical). Comorbidities were present in 25 % of patients, with cardiovascular disease (41 %) and pulmonary disease (31 %) being the most common. Predominant symptoms in critical patients included dyspnea (63 %) and myalgia (60 %), while rhinorrhea (46.2 %) and chest pain (45.7 %) were common in severe cases. Gastrointestinal symptoms were observed only in severe and critical groups. Levels of the pro-inflammatory cytokines (IFN-γ, TNF-α, and IL-17) increased linearly with disease severity. Among anti-inflammatory cytokines, IL-6 and IL-10 levels also rose significantly with increasing severity.

Conclusion

Levels of TNF-α, IL-17, and IL-6 correlated with disease severity and may serve as prognostic biomarkers. Advanced age and underlying comorbidities were independently associated with higher disease severity.