EDITORIAL

Quantification of T Cell Subsets in Bangladeshi COVID-19 Patients Creating Prospects towards Broader Research and Improved Patient Care

COVID-19 pandemic has traumatized the health system of both the developed and developing world. At the same time, it has brought together the scientists of all branches of heath science on a single platform. As a result, the key findings of SARS-CoV-2 research on diagnostics, patient management, therapeutic interventions and prevention through new generation vaccines have been disseminated promptly for the concerned authorities. Among the various ground breaking research outcomes related to the COVID-19 infected individuals, changes in blood pictures in the course of SARS-CoV-2 infection is mention worthy. Several studies determined that alteration of several hematological parameters occur in the infected subjects, which may act as significant predictors of outcomes that foresee early recovery to hospital admission followed by shifting at the ICU or even death[1]. Among the observed common hematological parameters during COVID-19 infection like other viral diseases, lymphocytopenia is the potential indicator to monitor infectious process or to anticipate the severity of the infection[2-5].

During the present COVID-19 pandemic, Bangladeshi scientists and clinical practitioners have shown commendable progress in research and patient management. Researchers of the Armed Forces Institute of Pathology (AFIP) has made significant contribution in determining the disease severity through quantifying T Cell subsets by flow cytometry during lymphocytopenic status of hospitalized SARS-CoV-2 infected patients. In their study, 94% of the ICU patients were found with significantly reduced $CD3^+$ T cells counts distributing drastic and moderate decline of $CD4^+$ and $CD8^+$ T cell subsets respectively compared to the non-ICU group[6].

In the mentioned AFIP study, age of the 78% patients enrolled in the study comprising both ICU and non-ICU were >40 years, which might have significant impact in lymphopenia. In addition, mean age of ICU patients was higher than non-ICU group. In a study conducted in Augsburg, Germany identified age dependent decrease in T cell subsets[7] while it was a missed opportunity to observe this finding among Bangladeshi population through the present study. Likewise, studies conducted in Bangladesh and other countries[7-9], male gender was more affected with adverse outcomes as increased mortality compared to females. Although the present study did not mention the association of lymphocytopenia with case fatality rates, which showed significantly reduced lymphocytes count of death cases in other studies conducted elsewhere[7, 9, 10]. SARS-CoV-2 infection, meanwhile, showed evidence of serious clinical complications, especially in elderly patients with previous comorbidities, such as diabetes, cardiac and respiratory diseases etc., causing higher number of deaths than non-comorbid population[11-15]. Moreover, elderly patients having comorbid conditions were severely lymphocytopenic than others, which could have been analyzed in the mentioned study[16]. During COVID-19 acute phase, there is decline of total peripheral T cell counts in symptomatic adult patients along with increased activation of rest of the T cells causing functional 'exhaustion to be determined by PD-1 and Tim-3 immune inhibitory biomarkers[17] but were not carried out as mentioned by authors of the current study[6].

Reviewing of several studies, which conducted in-depth analysis of hematological parameter changes, we observed that decreased lymphocyte counts were the most significant findings among the SARS-CoV-2 infected individuals from their hospital admission to demise[2, 18-23]. The splendid work on cytopenia in T cell subsets in Bangladesh has created ample opportunities for further diverse researches to discover the potential reasons for lymphocytopenia as to be caused by i) lysis of lymphocytes by direct infection through ACE2

receptors on their surface; ii) possible programmed cell death by systemic inflammatory process followed by large cytokines production; iii) impairment of lymphocyte turnover resulting atrophy of lymphoid organs; and iv) inhibition of lymphocyte proliferation by lactic acidosis in COVID-19 patients with comorbidities[24].

In general, several mandatory laboratory investigations like RT-PCR assay, complete blood count, C-reactive protein, renal (serum creatinine, blood urea nitrogen) and hepatic (alanine transaminase, aspartate transaminase, alkaline phosphatase, lactate dehydrogenase) function tests, serum electrolytes, serum ferritin, coagulation profile (platelet count, D-Dimer, prothrombin time, INR, APTT), procalcitonin, arterial blood gas analysis, ultrasonography, x-ray and computed tomography of chest are frequently carried out in hospitalized and intensive care unit admitted COVID-19 patients[25]. Since the AFIP is a sophisticated national multidisciplinary institute, the hospital information repository should have all the above mentioned laboratory and imaging data of the current study subjects. Hence, those patients information can be analyzed along with the present research findings to develop a prognostic algorithm for prediction of COVID-19 patients' status. We anticipate that the AFIP team will be thoughtful enough to work further and come forward to assist clinicians for better indigenous COVID-19 case management strategy.

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