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Diagnostic and Prognostic Significance of Biochemical Tests among Covid-19 Patients: Bangladesh Perspective

Tarana Jahan

Assistant Professor, Department of Microbiology, Monno Medical College, Manikgonj, Bangladesh; Email: tarana.nipa01@gmail.com; Cell no.: +8801684605056

The pandemic of COVID-19 has spread out all over the World, and over 6.0 million confirmed cases and more than 370,000 deaths has been reported globally[1]. Currently, COVID-19 patients are divided into four groups like mild, moderate, severe, and critical[2], and the COVID-19 patients mainly died from respiratory failure, septic shock, and multiple organ dysfunction syndrome[3]. The diagnosis of this disease has been developed in several ways. However, the biochemical parameters have some importance for the diagnosis and prognosis of the disease.

Many parameters had used to auxiliary diagnosis and monitoring treatment of COVID-19 disease[4]. C-Reactive Protein (CRP) is a non-specific marker of inflammation and can reflect the severity of COVID-19 pneumonia in the early stage, and the level of plasma is useful for physicians to stratify patients for intense care unit transfer. According to retrospective cohort study, higher lactate dehydrogenase (LDH) is associated with higher mortality of COVID-19 patients and 36.0% patients with COVID-19 have elevated D-dimer[5]. IL-6 and IL-10 are acted as pro-inflammatory cytokines and can be used as predictors for fast diagnosis of patients with higher risk of disease deterioration and help physicians correctly allocate patients at an early stage[5]. Disease severity in COVID-19 is associated with a cytokine storm due to higher concentrations of GCSF, IP10, MCP1, MIP1A, and TNF-α, which are associated with higher ICU admissions[6]. For peripheral blood analysis, severe COVID-19 patients tend to have lower LYM and the significant reduction in T-lymphocyte subsets was positively correlated with in-hospital mortality and severity following SARS-CoV-2 infection[7]. Elevated NLR is useful to auxiliary differentiate malign from benign thyroid nodules. However, many other parameters also can be easy to get from routine blood and biochemical analysis; meanwhile, numerous patients with COVID-19 were asymptomatic and severe SARS-CoV-2 infection[5].

There are several biochemical tests used as prognostic bio-markers. According to diagnostic and treatment guidelines for the novel coronavirus, the diagnosis of this disease has been linked to epidemiological history, typical chest computed tomography imaging features of COVID-19, and other etiological investigations[8]. The levels of certain inflammatory biomarkers, such as C-reactive protein (CRP), lymphocyte (L) percentage, neutrophils percentage, interleukin-6 (IL-6), procalcitonin, ferritin, D-dimer, and the white blood cell (WBC) count, have been used to assess disease progression[9]. Some urine biochemical parameters are also helpful to differentiate COVID-19 patients, and urine glucose and proteinuria can be used as effective markers to predict COVID-19 severity. The carcinoembryonic antigen (CEA) level is an independent prognostic marker for COVID-19 disease[10].

Decreased total serum protein levels are also identified in all the deceased patients. Earlier, it was reported that liver aminotransferases and bilirubin were significantly elevated in severe COVID-19 patients requiring ICU admission[10]. Omrani-Nava et al[11] reported that there is also a higher risk of ICU admissions for patients with higher levels of ALT, AST, alkaline phosphatase (ALP), and bilirubin. The incidence of death is also reported to be higher in COVID-19 patients with elevated creatinine levels. This could be because SARS-CoV-2 targets the renal tubular epithelium by a mechanism similar

to that seen in the lungs using the angiotensin-converting enzyme 2 (ACE2) protein receptors, which are expressed not only in type II alveolar, but also in other organs, such as the liver and kidneys[12].

Laboratory medicine has a crucial role for the appropriate COVID-19 management since the early recognition to the assessment of disease severity and the prediction risk of evolution towards severe disease, characterized by the impairment of several organs and tissues[6]. The latter can be due to both indirect and direct effects of SARS-CoV-2 infection. Indeed, the virus can infect cells through the interaction with the ACE2 receptor, which is highly expressed in many organs and tissues. The SARS-CoV-2 infection results in a respiratory disease characterized by several biochemical alterations, which can be detected by specific biomarkers, allowing clinicians to ensure adequate clinical monitoring, the institution of supportive interventions, and improving the clinical outcome[7-9].

Many biomarkers have been associated with poor outcomes and represent a candidate for risk stratification models for predicting severe COVID-19 in order to guide clinical care. In addition to traditional biochemical biomarkers, it would be interesting to assess the role of new promising biomarkers, such as presepsin and MDW, for the early identification of patients at increased risk of complications[13]. Finally, another interesting field of research is the study of the immunological alterations as reflected by serum tests, such as immunoglobulin A (IgA), IgM, and IgG, in order to fully understand the response of the immune system to the SARS-CoV-2 infection.

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