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Review Article: Laboratory Findings in Covid-19

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ABSTRACT

The COVID-19 epidemic first discovered in December 2019 in Wuhan, China Also known as SARS COV-2 and also associated with mild to severe respiratory disease conditions India became the second most affected by Covid 19 with 12.6 million cases and 1.6 k death to date. Maharashtra offers the highest load status of Covid -19 in the india reporting category for all cases. It is a systemic disease involving various systems such as the heart, respiratory system, intestines, nerves, hematopoietic and immune systems. The disease exhibits variable clinical studies from mild to severe. Most patients have no symptoms, patients with comorbidities have increased clinical decline and death and this is the group of patients we need to diagnose. Numerous studies have shown that many laboratory parameters that are easily accessible and inexpensive, can adequately predict the severity of the disease at an early age. In a country with limited resources such as India, costly investigations could not be carried out in this epidemic. It is necessary for patients to be assessed on these simple and inexpensive parameters specified in this review. During the lymphocyte count process tests a complete blood count showed that lymphopenia was a basic laboratory detection that emerged as a negative predictor factor. Neutrophil lymphocyte levels also have predictive value in determining critical cases. Some of the inflammatory symptoms including LDH, CRP, IL-6 and serum ferritin also indicate cases of malignant speculation and require immediate intervention to improve survival. Serum ferritin levels were higher in patients with severe covid-19 than in patients with non-malignant illness. D-dimer levels were consistently elevated in reported instances and were found to be associated to the severity of the disease. The most common laboratory diagnoses found in covid patients 19 increased CRP, increased D-dimer, decreased albumin, increased ESR, decreased eosinophils, increased IL6, lymphopenia and LDH. These patients need urgent care and need to be transferred to intensive care units.

KEY WORDS: SARS COV-2, COVID-19, CRP, D-DIMER.

INTRODUCTION

As of December 2019, SARS-CoV-2-linked pneumonia, called coronavirus disease 2019 (COVID-19), first appeared in Wuhan, China. The epidemic spread rapidly around the world within three months and by March 11,2020 was recognized as a pandemic by WHO (Kai Duan et al., 2020).

The first case of covid-19 in INDIA was reported on January 27, 2020 and was from Trissur, Kerala. Her laboratory tests were performed on the 3rd, 7th and 20th day of the illness and the parameters were related to the infection.2 More instances were later discovered. The angiotensin converting enzyme 2 (ACE2) receptors are bound by SARS-COV-2.3 Patients with corona virus 2 (SARS-CoV-2) often show abnormal laboratory parameters. Numerous studies have shown that certain simple and inexpensive laboratory parameters can predict the severity of the disease at the onset of the disease. It is

important to investigate the effect of laboratory levels on the adverse effects of corona virus 2019 (COVID-19).

Affected laboratory levels increase active C protein (CRP), increase erythrocyte sedimentation rate, decrease eosinophils, increase interleukin -6, increase procalcitonine, lymphopenia, neutrophil lymphocyte ratio (NLR) thrombocytopenia, increases LDH and elevates D-dimer. An increase in CRP, lymphopenia, and LDH are all highly linked with severity, according to a metaanalysis of 30 studies. These data suggest that when interpreting laboratory findings in COVID-19 patients, extra caution is required. Patients with elevated CRP, lymphopenia, or LDH should be managed properly and, if necessary, referred to an intensive care unit. Studies have reported laboratory differences between those admitted to icu and standard units. High levels of white blood cell counts and neutrophils, creatinine kinase and creatinine are seen in icu patients (Wang D et al., 2020). Early identification of individuals who are at risk of becoming critically ill is vital in the treatment of this disease (Zhao Q et al., 2020). In this article we tried to show the differences of laboratory parameters of covid 19 patients with different severity and survivability.

METHODS

We examined the PubMed, Scopus, Web of Science, and Google Scholar medical databases for literature published before May 21 in order to gain a better understanding of the laboratory results in SARS cov2. The link between various laboratory test results and the severity and course of the disease was researched and assessed in 30 studies that provided a list of laboratory tests in Covid 19 patients.

DISCUSSION

As the covid 19 epidemic is spreading rapidly around the world, that is why systematic meta-analysis is urgently needed for early detection of potentially dangerous patients, their effective management and treatment to control the severity and progression of the disease. These studies have shown that the most common findings in the laboratory are increased CRP, reduced albumin, increased ESR, decreased eosinophils, increased IL6, Lymphopenia and increased LDH. SARS- CoV-2 has a high affinity for spike protein binding to angiotensin-converting enzyme 2 present in the surface of alveolar type 2 cells, kidney cells. The kidneys are one of the most important organs of the virus that causes severe kidney failure in many cases in general. In the later stages of the disease the adverse clinical condition is accompanied by a rapid increase in levels of acute phase reactants (CRP, ESR), coagulation findings and cellular confusion.

Lymphocyte and SARS-COV-2: Lympopenia is seen in the majority of instances. Lymphocytes contain ACE2 receptors on their surfaces, therefore the virus directly affects them and causes them to lyse, implying that SARSCoV2 consumes immune cells and inhibits immunological function in people (Evengelos Terpos et al., 2020). In addition cytokine storms lead to increased levels of interleukins (IL-6, IL-2, IL-7, granulocyte colony stimulating factor, etc.) and TNF alpha causing lymphocyte apoptosis. damages lymphocyte gains.3 Lympopenia is linked to a higher risk of ARDS. Increased neutrophils and lymphopenia have been linked to the severity of sickness in COVID-19 patients in several investigations (Chen T et al., 2019).

Platelets and SARS-CoV-2: Thrombocytopenia has been observed in rare situations. The severity of covid -19 illness is strongly linked to thrombocytopenia. Due to increased platelet activation, a high platelet to lymphocyte ratio may signal a more intense cytokine storm. Thrombocytopenia is seen in 5-41.7 percent of COVID-19 patients, and it is usually modest (counts range from 100 to 150 times 109/L). The platelet count of patients with severe illness is only 23 x 109/L to 31 x 109/L lower than that of those with mild illness. 7, 16-17 In COVID-19 individuals, for example, severe thrombocytopenia has only been documented seldom in combination with an immune thrombocytopenic purpura-like condition.

CRP and SARS-COV-2: CRP is a important biochemical inflammatory marker, severe cases are associated with raised CRP. 7 Higher CRP indicates viral induced cytokine storm , and has been linked to unfavourable aspects like ARDS development. CRP has a normal concentration of less than 6 mg/L, rises fast within 6-8 hours, and peaks 48 hours after the commencement of the disease. It has a half-life of around 19 hours and declines in concentration as the patient heals. CRP levels of 20 to 50 mg/L have been found in people with COVID-19 in various studies. CRP levels were reported to be up to 86 times higher than normal in severe COVID-19 patients8,19,20. Patients with severe illness courses had significantly higher CRP levels than mild or non-severe patients. According to one research, individuals with more severe symptoms had an average CRP concentration of 39.4 mg/L, whereas those with minor symptoms had an average CRP concentration of 18.8 mg/L. CRP levels were observed to be higher in the severe group than in the mild group at the outset.

In another study, the mean CRP concentration in severe patients (46 mg/L) was substantially greater than in non-severe patients (23 mg/L). CRP levels were 10 times greater in COVID-19 individuals who died than in those who survived (median 100 vs 9.6 mg/L).8,21,22 According to a recent study, roughly 7.7% of non-severe COVID-19 patients developed severe disease courses after being admitted to the hospital, and the aggravated patients had significantly higher CRP concentrations (median 43.8 vs 12.1 mg/L) than the non-severe cases. CRP levels were found to have a significant connection with non-severe COVID-19 patients' deterioration. CRP was presented as a suitable marker for predicting the aggravation probability of non-severe COVID-19 patients by 1 and the authors, with an appropriate threshold value of 26.9 mg/L.7,21,22 In patients with COVID-19, every one-unit rise in CRP concentration increases the probability of experiencing

severe episodes by 5%, according to the authors.

LDH and SARS–COV–2: LDH levels were significantly higher in severe patients than in non severe patients. 7 LDH levels are known to be increased in obstructive lung disease and microbial pulmonary disease. 8,9 Multiple organ damage and failure appear to have a more important role in this pathophysiology in impacting clinical outcomes in COVID-19 individuals with elevated LDH levels. In thrombotic microangiopathy, which is linked to renal failure and cardiac damage, LDH levels are also high. Severe infections may result in tissue damage mediated by cytokines and the production of LDH. Because LDH is present in lung tissue (isozyme 3), patients with severe COVID-19 infections should anticipate to release more LDH into the blood, since the condition is characterised by a severe type of interstitial pneumonia that typically progresses to acute respiratory distress syndrome. There was a >6-fold increase in the odds of severe illness and a >16-fold increase in the chances of mortality in individuals with increased LDH, according to many studies. In three studies, non-survivors had higher LDH levels than survivors, with >95 percent of non-survivors having higher LDH levels than survivors.

D-dimer and SARS–COV–2: Patients with community-acquired pneumonia have higher D-dimer levels, which are linked to difficulties and poor outcomes. D-dimer testing is strongly recommended in covid 19 patients, according to recently published guidelines. In patients with increased D-dimer levels, the SARS CoV-2 trial found a substantial link between acute and covid impact 19. Increased D-dimer levels imply coagulation and fibrinolytic adherence, both of which necessitate ongoing diagnostic and treatment methods. On the other hand, low-dose DDimer can be used to rule out venous thrombotic (VTE) events such as venous thrombosis (DVT) and pulmonary embolism (PE). (ILI) due to the effectiveness of coagulation with respiratory bacteria .Tests are often used as part of a diagnostic algorithm to rule out a diagnosis of thrombosis. Patients with severe COVID-19 infections have higher D-dimer levels than those with mild infections, and D-dimer levels more than 0.5 g / ml are linked to severe infection in COVID-19 patients.

IL–6 and SARS–COV–2: Patients with high IL-6 levels are at a higher risk of developing respiratory failure. In patients who needed to be ventilated, IL-6 levels were considerably higher.

LFT and KFT: Other side effects of COVID-19 patients include parameters to assess liver and kidney function. The majority of patients had high concentrations of alanine aminotransferase, aspartate aminotransferase, amount of bilirubin, lactate dehydrogenase, alkaline phosphatase and γ-glutamyl transpeptidase and were significantly higher in patients who died compared to obese patients. On the other hand, hypoalbuminemia has been shown in COVID-19 patients. The concentration of urea nitrogen in the blood, ferritin, potassium and

triglycerides was significantly increased in all COVID-19 patients, but was higher in obese patients than in patients diagnosed.11, 12 In China, a research found that died COVID-19 patients had considerably lower levels of thyroid stimulating hormone and free triiodothyronine than recovered COVID-19 patients. 11 Many studies on various aspects of Covid-19 and it's clinical implications were reported. Godhiwala et. al. reported about leukemoid reaction in a covid-19 patient. Articles on best practices and guidelines in different clinical specialties were reviewed.

CONCLUSION

Elevated CRP, elevated D- dimer, decreased albumin, elevated ESR, decreased eosinophils, increased IL6, lymphopenia, and increased LDH were the most prevalent laboratory results in covid 19 individuals. These individuals require immediate care and should be transferred to intensive care units.

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