

Study of biochemical markers as a prognostic indicators in Covid 19 patients

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Abstract

Background: Severe Acute Respiratory Syndrome Corona virus Diseases (SARS – COVID – 19) was identified in Wuhan, China 2019. This disease has symptoms like atypical pneumonia cases and primarily transfers through the respiration and body contact. There are six species have been found to cause disease in humans and are known to infect the neurological, respiratory, enteric, and hepatic systems. However, these clinical criteria are susceptible to subjective and objective factors, which may lead to an extended time for diagnosing and the possibility of misdiagnosing severe COVID-19. Therefore, it is worth to find a potential biomarker that could effectively diagnose and prognosis of severe COVID-19. **Materials and Methods:** This observational study was conducted in the Department of Anaesthesia, General Hospital, Chikkanayakanahalli, Tumkur, Karnataka. A total 100 Patients were included In these study and categorized into 2 groups mild (n 50) and severe (n 50) on the basis of severity of clinical presentation, each between 30-70 yrs. of age. We reviewed retrospectively the clinical and laboratory findings from patients admitted under medicine department. The values of laboratory parameters included markers Lactate dehydrogenase (LDH), D – DIMER, Ferritin and Procalcitonin. The tests were conducted on fully automatic Clinical Biochemistry analyser- Vitrous-360 and AIA 360. **Results:** The Lactate Dehydrogenase, D DIMER, Procalcitonin, Ferritin and Chest CT Score mean levels had statistically significant difference between two groups of mild and severe COVID 19 Patients. The positive correlation of Chest CT Score with LDH, D – DIMER, Procalcitonin and Ferritin was found. **Conclusion:** This study suggests that chest CT Score can aid in predicting COVID 19 disease outcome. Correlation of CT score with laboratory investigations is useful for diagnosis and prognosis of COVID 19 Pneumonia.

Keywords: COVID 19, D-DIMER, Procalcitonin, Ferritin and LDH.

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INTRODUCTION

Severe Acute Respiratory Syndrome Corona virus Diseases (SARS – COVID – 19) was identified in Wuhan, China 2019. These disease has symptoms like atypical pneumonia cases and primarily transfer through the respiration and body contact.¹ Patients with coronavirus disease demonstrated a series of clinical symptoms,

including raised body temperature, cough, headache, nausea, vomiting, anorexia, diarrhea, dyspnea, multiple organ dysfunctions.² A large proportion of infected patients reported mild symptoms of the disease and recover. Some patients progressively develop serious complications, including sepsis, acute respiratory failure, metabolic acidosis, heart failure, kidney injury, hypoxic encephalopathy, and eventually die of the illness.³ A recent report reported a few new symptoms, including anosmia and ageusia. Considering high transmission and infectivity patterns, World Health Organisation announces it as an emergency of public health concern on March 31, 2020. In the initial phase of the disease outbreak, the mortality ranges from 2 to 5%, much higher in the elderly.⁴ The mortality in coronavirus cases admitted in Wuhan city reached 7% in the outbreak's initial days. There are six species have been found to cause disease in humans and are known to infect the neurological, respiratory, enteric, and hepatic systems. SARS-CoV-2 is highly contagious

and has resulted in a rapid pandemic of COVID-19.⁵ Clinical spectrum of COVID-19 ranges from asymptomatic patients to septic shock and multiorgan dysfunction. The disease can be classified into mild, moderate and severe on the basis of severity of clinical presentation. Patients with mild illness may present with uncomplicated upper respiratory tract infection and may have mild symptoms such as fever, cough, sore throat, nasal congestion, malaise, headache without evidence of breathlessness or hypoxia (normal saturation).⁶⁻⁸ Around 80% cases are mild in severity. Patients with moderate illness presents with pneumonia and no signs of severe disease. Patients with severe disease present with severe pneumonia, acute respiratory distress syndrome (ARDS), sepsis, or septic shock and clinical presentations include the presence of severe dyspnea, tachypnea (respiratory rate > 30/minute), respiratory distress, SpO₂ d” 90%⁹⁻¹⁰. However, these clinical criteria are susceptible to subjective and objective factors, which may lead to an extended time for diagnosing and the possibility of misdiagnosing severe COVID-19. Therefore, it makes sense to find a potential biomarker that could effectively diagnose severe COVID-19. Furthermore, acute respiratory distress syndrome could lead to death in some severe COVID-19 patients, and this is often accompanied. In this study, we investigated 4 serum biochemical markers Lactate dehydrogenase (LDH), D – DIMER, Ferritin and Procalcitonin for assessing disease severity. We aimed that to continuous monitored these laboratory investigations abnormalities encountered in patients with SARS COVID infection. This might be useful in indicating progression from mild to severe disease and reducing mortality and shortening the hospitalization period.

RESULTS

Table - 1 Shows the demographic and clinical characteristics of the mild and moderate COVID 19 Patients, The Lactate Dehydrogenase, D DIMER, Procalcitonin, Ferritin and Chest CT Score mean levels statistically significant difference between two groups of mild and severe COVID 19 Patients (P 0.0001**) by using independent sample (2 tailed) T- Test. Significantly elevated levels of laboratory investigations in patients with severe COVID 19 when compared to mild Patients.

Table 1: Shows the Data Distribution of biochemical parameters and Chest CT Score in COVID 19 patients

S. No	Parameter	Group 1	Group 2	Significance
1	Age	48 ± 9.2	52 ± 6.7	-
2	LDH	864 ± 249	1654 ± 594	<0.0001**
3	D – DIMER	791 ± 163	3324 ± 1085	<0.0001**
4	Procalcitonin	7.62 ± 0.6	13.47 ± 2.67	<0.0001**
5	Ferritin	424 ± 67.63	826 ± 134	<0.0001**
6	Chest CT Score	12.54 ± 5.12	18.03 ± 3.64	<0.0001**

Table – 2 shows the positive correlation of Chest CT Score with LDH, D – DIMMER, Procalcitonin and Ferritin (r = 0.634, 0.472, 0.195, 0.419, P- 0.0001**) in patients with both the groups of COVID 19 patients.

MATERIALS AND METHODS

This observational study was conducted in the Department of Anaesthesia, General Hospital, Chikkanayakanahalli, Tumkur, Karnataka. The posteriori (retrospective) strategy was used for data collection. The study used data of patients who were presented with symptoms of COVID-19 to our centre. Our study included COVID-19 positive patients diagnosed with the COVID-19 based on the results of RT-PCR conducted at our centre. The exclusion and inclusion criteria were based on WHO guidelines. A total 100 Patients were included In these study and categorized into 2 groups mild (n 50) and severe (n 50) on the basis of severity of clinical presentation, each between 30-70 yrs. of age. We reviewed retrospectively the clinical and laboratory findings from patients admitted under medicine department. The clinical data summarized was conveniently collected between 1st April 2021 to June 2021. Information about age, gender and values of biochemical parameters were noted and used for data analysis. The values of laboratory parameters included markers Lactate dehydrogenase (LDH), D – DIMER, Ferritin and Procalcitonin. The tests were conducted on fully automatic Clinical Biochemistry analyser- Vitrous-360 and AIA 360.

Statistical Analysis

Categorical data was represented in the form of frequency. Association between variables were assessed with Chi Square Test, Quantitative data was represented as mean and standard deviation. Comparison of variables has been done with T test. P value of <0.05 was considered statistically significant. Data was analyzed with IBM SPSS Version 22 for windows.

Table 2: Pearson's correlation analysis of the biomarkers in COVID 19 Patients.

Parameter		LDH	D – DIMER	Procalcitonin	Ferritin
	r	0.634	0.472	0.195	0.419
Chest CT Score	P – Value	0.0001**	0.0001**	0.0001**	0.0001**

DISCUSSION

In this study, the relationship between disease severity and clinical and biochemical parameters was comprehensively analyzed. Most critical ill patients were older and had a greater number of co-morbid conditions than patients with mild to moderate illness. This study also found that the increased levels of Procalcitonin, D- DIMER, LDH and Ferritin were associated with the severity of COVID-19.¹¹⁻¹² These Levels were increased when severe bacterial, fungal and systemic inflammatory response syndrome occurs, and it is generally not elevated with virus infections.¹³ Previously other studies also reported increased levels of CRP, CBC, PCT levels in inflammatory conditions like COVID 19 Patients and also they suggested these laboratory investigations are useful for prognosis of COVID 19.¹⁴⁻¹⁸ In the present study we observed that there are significantly elevated levels of Procalcitonin, D – DIMER, LDH and Ferritin in Covid-19 patients. We also observed that the chest CT Score was positively correlated with D- DIMER, Procalcitonin, LDH and Ferritin. Previous study also reported the chest CT Score positively correlated with biochemical parameters and they suggested continuous monitoring of these laboratory investigations were useful for knowing progression of disease and deciding treatment modalities of patients with COVID 19.¹⁹ With the continuous spread of COVID-19 cases worldwide and different speculations of its effect on the human body are also flashing every day, we are still inexperienced in understanding a few aspects of COVID-19. However, we still have a lot to know about the effect of COVID-9 on different biochemical profiles in patients who survived or died due to COVID-19.²⁰ This comparison is useful in the clinical setting to support clinical decisions and improving the survival rate in severely ill patients. Exact match to the earlier research on patients with COVID-19 disease. However, some clinical indicators reported controversy in the present work compared to earlier work, including-D- DIMER and platelet count in patients with COVID-19. The change in findings may be due high mortality among patients with COVID-19 in initial days and a lack of complete information on the status of D- DIMER in all patients with COVID-19.²¹ From present study we suggest that increased levels of D DIMER, Procalcitonin, Ferritin and LDH in COVID 19 patients, directly indicates increased levels of inflammation, Hence continuous monitoring of these laboratory investigations are useful for determining disease progression and treatment modalities.

CONCLUSION

This study suggests that chest CT Score can aid in predicting COVID 19 disease outcome. Correlation of CT score with laboratory investigations is useful for diagnosis and prognosis of COVID 19 Pneumonia.

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