Original Research

Assessment of the impact of lactate dehydrogenase level on covid- 19 patients

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ABSTRACT:
Background: LDH has been shown to be a potential prognostic biomarker in patients with COVID-19. The present study was conducted to assess the impact of lactate dehydrogenase level on covid- 19 patients. **Materials & Methods:** 78 patients diagnosed with SARS- COV 2 infection of both genders were included. Severity of COVID-19 was recorded. The serum LDH levels were investigated at diagnosis and at routine follow-up. **Results:** Out of 78, males were 48 and females were 30. Smoking was seen in 12, Underlying diseases were diabetes seen in 12, hypertension in 10, CKD in 7, chronic airway disease in 4 and hepatitis B in 2. 14 patients were severe and 64 were non- severe. The mean LDL level in non- severe patients was 430.2 U/L and in severe patients was 1028.4 U/L. The difference was significant (P< 0.05). **Conclusion:** The level of LDH was significantly increased with severity of COVID- 19 infection. Hence it could be as an indicator of severity of infection.
Key words: Biomarker, COVID- 19, Lactate dehydrogenase

INTRODUCTION

The fast-growing outbreak of the 2019 novel coronavirus (COVID-19), which originated from Wuhan in central China, reached multiple continents in merely a month. Cross person-to-person transmission of this new virus can result in severe and fatal respiratory disease like acute respiratory distress syndrome (ARDS) in humans.[1] Even though most of the patients with COVID-19 is only mildly symptomatic, a notable proportion of patients deteriorate remarkably, causing multiple organ failure that resulted in death. Cost-effective biomarkers, especially those that are routinely tested, enable risk stratification to allow prudent resource allocation.[2]
Lactate dehydrogenase (LDH) catalyses the last step of aerobic glycolysis, the pyruvate to lactate conversion. LDH has been shown to be a potential prognostic biomarker in patients with COVID-19.[3] Lactate dehydrogenase (LDH) is an enzyme implicated in the conversion of lactate to pyruvate in the cells of most body tissues and increased following

tissue break down.[4] Consequently, elevated serum LDH is present in numerous clinical conditions, such as hemolysis, cancer, severe infections and sepsis, liver diseases, hematologic malignancies, and many others. Nowadays, there was much evidence suggesting that the serum LDH levels serve as a non-specific indicator of cellular death in many diseases. However, the current information about dynamic change of LDH in COVID-19 pneumonia was very still.[5] Consistently, we show that patients infected by SARS-CoV-2 with high levels of LDH on admission are more likely to develop ARDS. Inflammation and cell damage play an important role in the pathological processes of pulmonary tissues. Higher LDH levels have been found in COVID-19 patients than in patients with SARS-CoV-2 negative confirmed pneumonia.[6] The present study was conducted to assess the impact of lactate dehydrogenase level on covid- 19 patients.

MATERIALS & METHODS

The present study comprised of 78 patients diagnosed with SARS- COV 2 infection of both genders. They were made part of the study with their written consent.

Demographic data of each patient was recorded. Severity of COVID-19 was defined according to the diagnostic and treatment guideline for COVID-19 pneumonia issued by Chinese National Health Committee. Management of cases were performed as per guidelines prescribed by WHO. The serum LDH was determined by chemistry analyzer. The serum LDH levels were investigated at diagnosis and at routine follow-up. The time to LDH normalization referred to the time interval from increased LDH to normalized LDH. All were subjected to CT scan chest. CT score was assigned to each lung and each lobe, based on the size of the infected area. The score ranged from 0 to 5, with score 0 for no infected area, 1 for less than 5%, 2 for 6–25%, 3 for 26–50%, 4 for 51–75%, and 5 for more than 75%. Result thus obtained were subjected to statistical analysis using Mann Whitney U test. P value less than 0.05 was considered significant.

RESULTS

Table I Baseline characteristics

Parameters	Variables	Number	P value
Gender	Male	48	0.12
	Female	30	
Smoking	Yes	12	0.01
	No	66	
Underlying diseases	Diabetes	12	0.05
	Hypertension	10	
	CKD	7	
	Chronic airway disease	4	
	Hepatitis B	2	
Severity	Severe	14	0.02
	Non- severe	64	

Table I, Graph I shows that out of 78, males were 48 and females were 30. Smoking was seen in 12, Underlying diseases were diabetes seen in 12, hypertension in 10, CKD in 7, chronic airway disease in 4 and hepatitis B in 2. 14 patients were severe and 64 were non- severe. The difference was significant (P< 0.05).
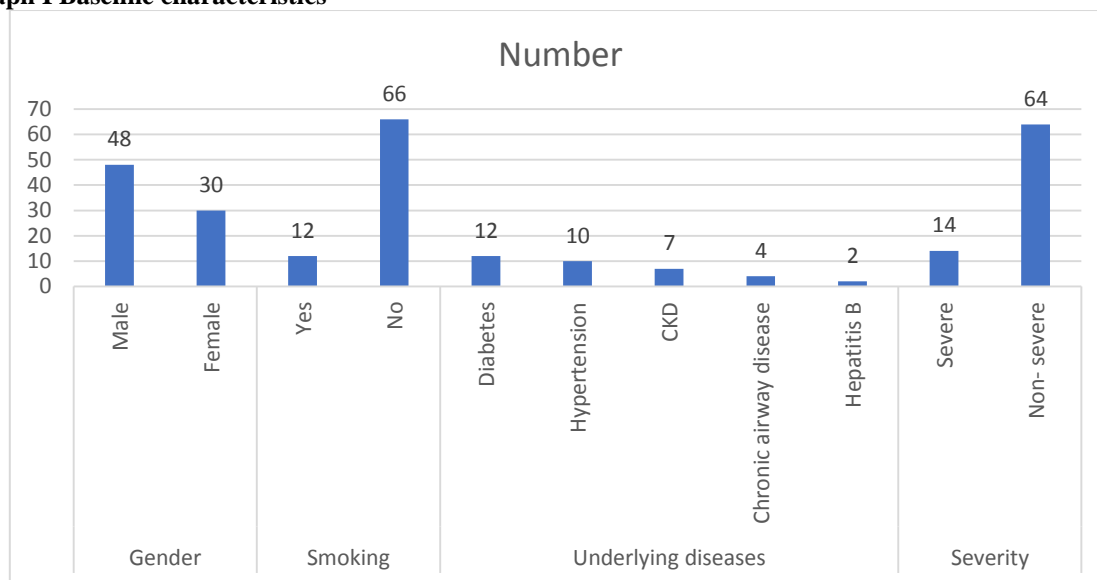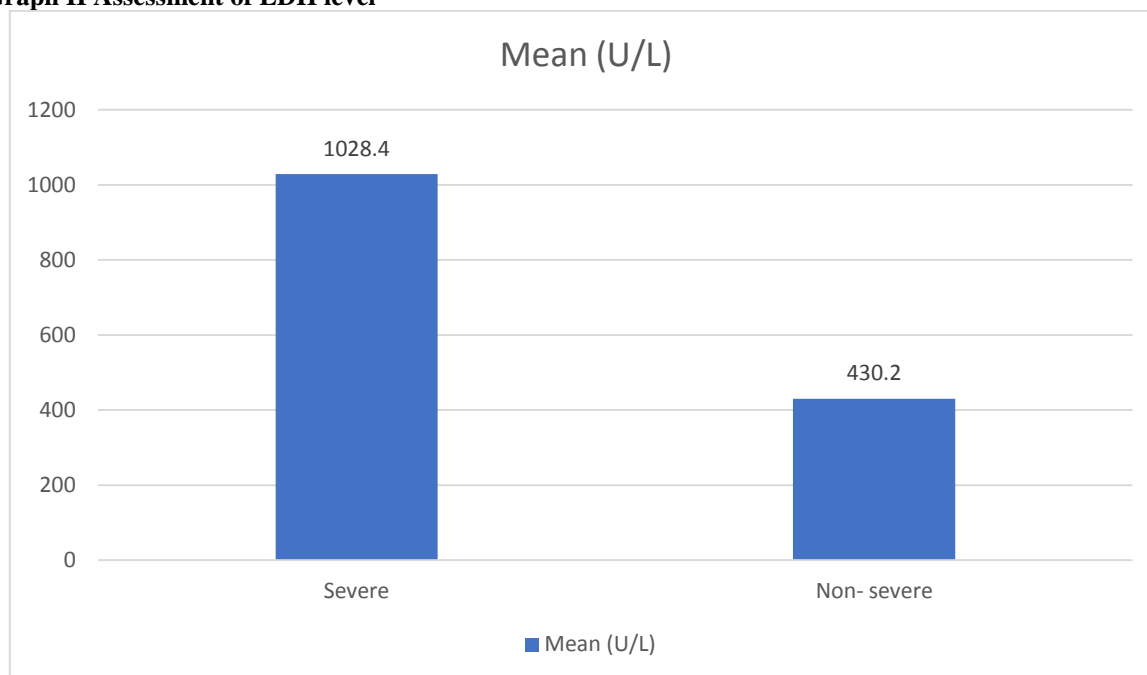
Graph I Baseline characteristics

Table II Assessment of LDH level

Patients	Mean (U/L)	P value
Severe	1028.4	0.01
Non- severe	430.2	

Table II, graph II shows that mean LDL level in non- severe patients was 430.2 U/L and in severe patients was 1028.4 U/L. The difference was significant (P< 0.05).

Graph II Assessment of LDH level

DISCUSSION

As of March 9, 2020, more than 100,000 cases of coronavirus disease-2019 (COVID-19) were reported in more than 100 countries with thousands deaths globally. It is now known that Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) is a new type of coronavirus causing COVID-19 infection.[7] The most common clinical feature of SARS-CoV-2 infection is fever. Moreover, acute respiratory distress syndrome (ARDS) is the most frequent cause of admission to intensive care unit in COVID-19 patients.[8] Lactate dehydrogenase (LDH), a key enzyme in the glycolytic pathway and a cytoplasmic enzyme found in most organs, has been linked to inflammation response and cell damage. Currently, the role of serum LDH levels in ARDS patients infected by SARS-CoV-2 is unclear.[9] The present study was conducted to assess the impact of lactate dehydrogenase level on covid- 19 patients.

In present study, out of 78, males were 48 and females were 30. Smoking was seen in 12, Underlying diseases were diabetes seen in 12, hypertension in 10, CKD in 7, chronic airway disease in 4 and hepatitis B in 2. 14 patients were severe and 64 were non- severe. Wu et al[10] study was performed in 87 cases confirmed by COVID-19 infection. The serum LDH levels were determined at diagnosis and follow-up visits. The evaluation of clinical response to therapy was based on chest CT scan. They selected the value of LDH around the data of chest CT scan (− 1 ~ + 1 day). At diagnosis, significant differences in LDH levels were found between non-severe and severe group (P < 0.05). It was demonstrated that increase or decrease of LDH was indicative of radiographic progress or improvement (P < 0.05). The time to LDH normalization (5.67 ± 0.55, days) was positively correlated with the time to radiographic absorption (5.57 ± 0.65 days, r = 0.53, P < 0.05). Applying the cut-off value of the increase in LDH has good specificity to predict disease progression.

We observed that mean LDL level in non- severe patients was 430.2 U/L and in severe patients was 1028.4 U/L. Martha et al[11] found that there were 10 399 patients from 21 studies. Elevated LDH was present in 44% (34%–53%) of the patients. Meta-regression analysis showed that diabetes was correlated with elevated LDH, but not age (p=0.710), male (p=0.068) and hypertension (p=0.969). Meta-analysis showed that elevated LDH was associated with composite poor outcome. Subgroup analysis showed that elevated LDH increased mortality. Elevated LDH has a sensitivity of 0.74, specificity of 0.69, positive likelihood ratio of 2.4, negative likelihood ratio of 0.38, diagnostic OR of 6 and area under curve of 0.77. Elevated LDH would indicate a 44% posterior probability and non-elevated LDH would in indicate 11% posterior probability for poor prognosis. Meta-regression analysis showed that age, male, hypertension and diabetes did not contribute to the heterogeneity of the analyses.

LDH can be released during tissue damage and is involved in various pathophysiological processes and serve as a non-specific indicator of cellular death in many diseases. A number of previous studies have shown that an elevated serum LDH is associated with a poor prognosis in malignancy.[12] In most scoring systems presented so far, prognostic variables including LDH were used as static variables determined at the time of diagnosis. The dynamics of the disease, however, may also be of great importance, especially when considering 'decision

points' in treatment algorithms such as stem-cell transplantation.[13]

CONCLUSION

Authors found that the level of LDH was significantly increased with severity of COVID- 19 infection. Hence it could be as an indicator of severity of infection.

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