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ROLE OF D-DIMER AND SERUM LDH IN DETERMINING SEVERITY, PROGRESSION AND PROGNOSIS OF COVID -19 PATIENTS.

Dr. Dennis Vineet Shinde[1] (Resident) **& Dr. RitikaBharti**[2] (Resident)

[1&2] Dept. of Pathology, Index Medical College and Hospital, Indore, Madhya Pradesh

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Corresponding author: Dr. Ritika Bharti
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Abstract

Background: D- dimer and serum LDH is inflammatory marker which can be used to determine severity, progression and prognosis of covid 19.

Aim: To establish role of D-dimer and serum LDH in determining severity, progression and prognosis of covid 19 patients.

Result: The study population included 43 males and 32 females having COVID- 19 infection. The study showed that raised D-dimer levels were associated with increased coagulation activity and thereby poor prognosis. The study also showed that all the patients with raised serum LDH levels had more severe form of disease leading to rapid disease progression and prolonged hospital stay.

Conclusion: Any abnormal rise in D-dimer levels along with other inflammatory markers suggests that the patient requires vigorous anticoagulation therapy. The serum LDH's elevated levels are usually employed in determining the disease progression from mild to moderate and severe forms.

Keyword: covid 19, D-dimer, serum LDH

Introduction:

The SARS-COV2 belongs to beta-corona virus 2b lineage, a new strain of RNA virus not being previously identified in humans[1]. Its name was then changed to corona virus disease 2019 (COVID- 19) by WHO in February 2020as the disease spread worldwide[2].

Laboratory biomarkers have been the preferred modality to monitor and predict outcomes and prognosis of disease since they are less expensive, faster and easier to obtain[3]. D-dimer is a fibrin degradation product shown to be useful in a clinical decision rule for ruling out pulmonary embolism[4]. Levels of 2.0 micro g/mL or more on admission is the optimum cut –off to predict the in-hospital mortality for COVID -19[5].

LDH is an enzyme converting pyruvate to lactate, whose secretion is triggered by necrosis of the cell membrane, hinting to viral infection or lung damage, such as the pneumonia induced by SARS-CoV-2[6].An increase in LDH by 62.5U/L has an acceptable sensitivity and high specificity for a significantly higher probability of disease progression, when chest CT scan is employed to confirm the prediction[7].

Material and Method:

This is a prospective study done at Index Medical College and Hospital which is one of the designated hospital for the hospitalization of COVID- 19 patients. The study was conducted from November 2020 till April 2021 and on total 75 patients with confirmed COVID- 19 pneumonia by RT-PCR assay for SARS-CoV-2 was included in this study. However, patients with negative or absent RT-PCR assay were excluded from this study. Patients with secondary infections including bacterial and fungus, or patients with lack of pre treatment laboratory findings were also excluded.

Result:-

The study population included a total of 75 patients out of which 43 were males while 32 were females having COVID- 19 infection. The study showed that raised D-dimer levels were associated with increased coagulation activity and thereby poor prognosis. It was found that D-dimer levels had a great co-relation with inflammatory or infection related biomarkers, inflammatory cells and coagulation function related factors levels.

Table 1: MEAN VALUES OF D-DIMER AND SERUM LDH IN NON-SEVERE AND SEVERE PATIENTS OF COVID-19

Biomarker	Level in non severe patient(mean)	Level in severe patient(mean)
D-dimer	0.29(0.058-3.88)	61.28(0.26-3800)
Serum LDH	39(276-791)	66.30(289-4400)

The study also showed that all the patients with raised serum LDH levels had more severe form of disease leading to rapid disease progression and prolonged hospital stay. Hence, serum LDH level is a predictive marker of severity of the disease.

Discussion:

The abrupt rise in D-dimer levels might be an indicator of active coagulation pathway requiring anticoagulation therapy. The D-dimer levels tend to normalize in convalescent stage in most of patients.

Since, there is already evidence that under inflammatory conditions the alveolar hemostatic balance is shifted towards a predominance of prothrombotic pathway and inflammatory cytokines lead to endothelial damage, this may activate coagulation pathway and inhibit fibrinolysis in patients with sepsis[8,9]. Hence, these patients are at increased risk of thrombus formation. Some of the studies conducted so far on D-dimer and serum LDH levels in COVID-19 patients are as follows:-

This study also showed that raised serum LDH levels are associated with more clinically severe form of disease and poor outcome which is consistent with many of the previously conducted studies. Therefore, serum LDH levels may be used for determining disease progress thereby helping in reducing risk of complications and allowing early intervention as seen in previously conducted studies.

Table 2: PREVIOUS STUDIES CONDUCTED ON CO-RELATION OF D-DIMER AND SERUM LDH LEVELS WITH COVID-19 DISEASE.

S. No	Authors	Comments/ Results
1.	Luo et al. 2020	Higher LDH levels reported in severe patientsvsnon severe patients.
2.	Xiong et al. 2020	LDH values linked to CT score (used to assess severity).
3.	Guan et al. 2020	Higher LDH levels present in majority of severe patients vs non severe.
4.	Mo P et al. 2020	Retrospective +China+155, refractory vs general. LDH levels were higher in refractory cases.
5.	Ferrari D et al. 2020	Retrospective + Italy+ 141 LDH measured in COVID positive vs negative. LDH levels wew higher in COVID positive patients.
6.	Wang et al. 2020	Retrospective, non ICU vs ICU .LDH levels were higher in ICU patients.
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Conclusion:

Though D-dimer levels alone are not predictive of thrombus formation but, any abnormal rise in their levels along with other inflammatory markers suggests that the patient requires vigorous anticoagulation therapy.

The serum LDH is a marker of cellular damage seen in numerous conditions and its elevated levels are usually employed in determining the disease progression from mild to moderate and severe forms.

Reduction in the levels of D-dimer in the later course of disease must be in synchronicity with reduction in levels of other inflammatory markers in order to indicate improvement.

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