

A Study: Inflammation Markers and their Trend in COVID-19 Patients

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Abstract: Level of inflammation markers help in deciding initiation of steroid, antibiotic and further investigation in COVID-19 patients.

Keywords: CRP, LDH, D-Dimer, Ferritin, IL 6, COVID-19

Hardly there is any disease which has ruled over the world like COVID-19 is doing. In first wave it touched every nation and in second wave in 2021 it penetrates deeper and deeper. Initially it was thought to be purely pneumonia producing viral disease now it is crystal clear that it is more thrombogenic and immunogenic hyperinflammatory state. Health condition of young patients is deteriorating overnight. Those who are with co-morbidity are succumbed to death in more fragile way. With lack of resources it is very difficult for physicians to fight against it. It is essential to know the behaviour of virus and response of the body towards it.

Once a viral load intruded into body, they multiply inside the cells and this stage is called stage of viremia. This stage is followed by inflammatory phase. Body starts producing antibodies against the virus. Inflammatory markers are by-products in this process when antibody also act upon own cells. The appearance and disappearance of such inflammatory markers can be taken as an indirect way to assess body's internal environment. It will be helpful to drive towards a good prognosis. With initiation of steroid at right level of these markers can prevent cytokine storm and thrombogenic events that leads to death.

There are more than fifteen inflammatory markers. But in context of COVID-19 we have studied behaviour of most common five inflammatory markers. They are;

- 1) CRP (C-Reactive Protein),
- 2) LDH (Lactate Dehydrogenase)
- 3) D-DIMER
- 4) Ferritin
- 5) IL-6 (Interleukin 6)

CRP increases in serum when there is any underlying tissue destruction in the body. It is most commonly used inflammatory marker used for prognosis. LDH is associated with interstitial pneumonia which is more consistent with COVID-19. Serum D-dimer implies degradation of fibrin that is strongly associated with thrombogenicity of the blood. Serum Ferritin is a key marker for immune dysregulation. Raised ferritin can be used as a sign of upcoming cytokine storm mainly in diabetics. IL-6 is a pleiotropic cytokine with wide range of functions. IL-6 production is rapidly induced in the course of acute inflammatory reactions associated with injury, trauma, stress, infection, brain death, neoplasia and other situations.

Sequential measurement in patients admitted in ICU showed to be useful in evaluating SIRS, Sepsis and predict the outcome of those patients.

	Normal	Mild	Moderate	Severe
RTPCR		>35	24-35	17-24
CRP (mg/L)	0-6	<26	26-100	>100
D DIMER (mcg/L)	<0.5	<1	>1	>1
IL 6 (pg/L)	0-7	<15	15-100	100-500
N:L RATIO		<3.5	>3.5	>3.5
CT		<8	9-15	>15
LDH (U/L)	0-250			
FERRITIN (ng/L)	13-150			

A study has been conducted regarding the behaviour of these inflammatory markers. There were more than 300 COVID-19 positive patients (confirmed by RT-PCR) in home isolation our team has managed till now. Out of them only 22 drew our special attention with aggravation of some symptoms. Accordingly levels of various inflammatory markers in them have been checked at different phases of the COVID-19.

One person with no COVID-19 (RT-PCR-Negative) has high grade fever. He had all the parameters in normal range except IL6-128. It can be taken as control. Other patients are studied in three stages of disease 0-5th days, 6-10th day and 11th day onwards from the onset of symptoms.

0-5TH DAY

There are four patients in this group, who have been tested for inflammatory markers. One person is without any symptom but COVID-19 positive. All parameters are found within normal limit except IL-6 which was 48.66 (moderately raised). Another positive patient had mild cough, he also had all parameters normal except CRP-16.7(Mild). Another positive case having h/o diabetes tested after five days of continuous fever, cough and found CRP-26.6, Ferritin-1049, IL-6-129. He has been managed to normal with Methyl Prednisolone. Another positive case having h/o diabetes, hypertension developed shortness of breath. His CRP- 24, LDH-346, IL-6-55.3. It is observed that in no case there is elevation of D-Dimer level. It can be generalized that in 0-5th day most of the parameters are coming normal to mildly elevated and CRP mild-moderate elevated.

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6-10th DAY

Two persons are without any symptoms. Their report came almost normal with CRP-9.7 in one and LDH-636 in other. One person had cough only when tested report came with CRP-85, LDH-383, IL6-39. Another with cough and shortness of breath on investigation showed CRP-85, LDH-863, IL-6-150. One diabetic person with fever (102-103°F) for 5 days on investigation showed CRP-10, high Ferritin-2000, LDH-967 and IL-6-1.37. Another diabetic with history of fever for 7 days, productive cough and SPO2-87% in room air showed CRP-108, LDH-885, Ferritin-975 and IL6-172. His D-Dimer level came 2.01. He was hospitalised and Enoxaparin had been started. Another diabetic patient with productive cough and continuous fever showed CRP-35.7, IL-4624, CT Score-10/25.

Another patient with h/o asthma presented with mild shortness of breath, SPO2-95 showed all parameters normal but HRCT Thorax score came 15/25. Another person with no co-morbidity became breathless in home. All parameters came normal except IL6-5000, which came down to 2.5 after 3 days of oral prednisolone. In case of high IL6, strong antibiotic should be started to prevent sepsis.

Therefore, in positive cases with co-morbidities like diabetes present with cough and/or fever, elevated CRP, LDH, ferritin can be generalised. Early initiation of steroid can be life-saving. Start of anticoagulant after D-dimer level is an edge. But in patients with past history of any respiratory disorder, HRCT is indispensable.

AFTER 10th DAY

Nine persons have been tested after ten days. A person with fever has the highest value of CRP of 38. He was hospitalized and CT Score came 6/25. Another diabetic person with last five day fever had IL6- 5000. They are managed with oral prednisolone only. All other seven patients have normal CRP level with very mildly elevated other parameters. Therefore, Inflammatory markers can play a decisive role in assessing the internal condition, initiation of steroid/ antibiotics/ anticoagulant/ combination for a good prognosis.