



Comparative study of ferritin and d dimer value in mild to moderate covid 19 patients

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ABSTRACT

Aim:- Ferritin is an iron-containing intracellular blood protein, and covid-19 disease is a viral disease caused by the corona virus, which causes mild to moderate respiratory sickness in afflicted people. The level of ferritin in the blood is mostly determined by the severity of the covid-19 illness. The ferritin level may be used as a marker for covid-19 illness.

Method:- The ferritin level in the blood was evaluated in 120 corona virus patients who were utilized as individuals in this investigation (D-Dimer, ESR, C.R protein)

Result:- According to the findings, patients over the age of 60 have a high ferritin level, and the d-dimer was abnormal, with a 65 percent higher than the normal range.

Conclusion:- COVID-19 patients have higher serum ferritin and D-dimer levels.

KEYWORDS: COVID-19; cytokine storm; ferritin; D-dimer, COVID-19 patients

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I. INTRODUCTION

The new coronavirus (SARS-CoV-2) is linked to a high rate of morbidity and mortality, particularly in people with pre-existing medical problems. COVID-19 is a viral infection produced by a new enveloped RNA virus that causes severe pneumonia. Patients with cytokine storm syndrome (CSS) owing to COVID-19 infection have elevated blood ferritin and D-dimer levels.

The Pandemic of COVID-19 India

On January 30, 2020, the first incidence of Covid-19 infections were reported in Kerala, India, by a 20-year-old woman who stated that she had returned to Kerala from Wuhan, China on January 23rd. With more than 9,000,000 recorded instances of COVID-19 infection and more than 100,000 deaths per day, India now has the highest number of confirmed cases in Asia and the second-highest number of confirmed cases in the world after the United States. Cases peaked in India in mid-September, with over 90,000 cases reported every day, and have since dropped to under 40,000 in December. By the middle of May 2020, the country's hey the 60s had accounted for about half of all reported cases in Mumbai, Delhi, Ahmedabad, Chennai, and other cities.

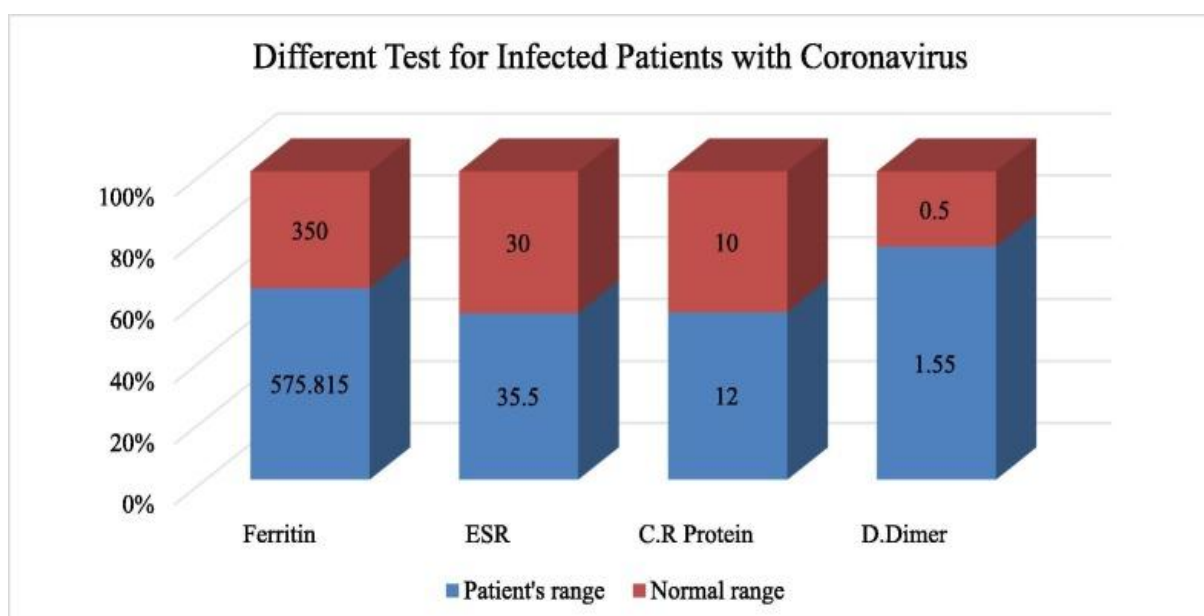
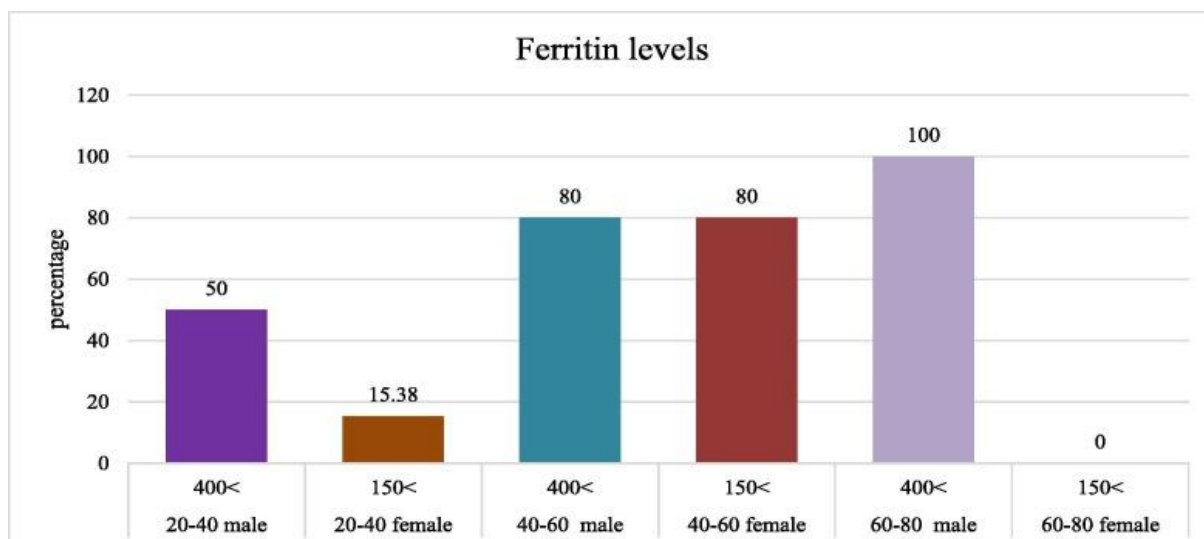
Serum ferritin is an iron storage protein that plays a key role in cellular oxygen metabolism regulation. H and L are the two subunits that make up ferritin. H-ferritin is thought to operate as an immune modulator with both pro-inflammatory and immunosuppressive properties, according to previous research. In COVID-19 infected patients, elevated ferritin serum levels were observed to have a strong correlation with illness severity. Severe cases of COVID-19 had greater ferritin levels than moderate instances, according to a previous study. D-dimer levels have been linked to the severity of COVID-19 infection and mortality in several recent studies. D-dimer is a cross-linked fibrin breakdown product that indicates enhanced thrombin production and fibrin disintegration by plasmin. Acutely unwell people with a variety of viral and inflammatory disorders frequently have high D-dimer levels. The coagulation system is active in critically sick patients, according to studies, and D-dimer levels are linked to the initiation of the pro-inflammatory cytokine cascade that leads to CSS. Venous thromboembolism is thought to be caused by coagulation problems caused by high D-dimer levels, which may contribute to respiratory impairment caused by COVID-19 infection.

II. METHOD

From January to June 2020, only patients with a verified COVID-19 diagnosis or a recent positive lab test and valid ferritin or fibrin D-dimer laboratory results were included. These values were identified using Logical Observation Identifiers Names and Codes (LOINC) codes and were deemed legitimate if they were linked to encounters that included a COVID-19 diagnosis or a recent positive lab test. D dimer levels were found to correspond with disease severity and to be a reliable predictive predictor for in-hospital death in SARS Cov 2 patients. The ferritin level is aberrant in correlation with the severity of covid-19 illness, but its significance has yet to be determined.

During 8 months between June 2020 and January 2021, SARS-CoV2 positive patients were diagnosed by COVID-19 Viral Research Diagnostic Laboratory (VRDL) with Bio-Safety Level-3 (BSL-3) standard covid test in dept. of microbiology and serum ferritin,CRP and D dimar in dept. of biochemistry,PMCH,Patna.

Characteristic	Total n (% ¹)	Ferritin n (% ¹)	D-Dimer n (% ¹)
Total⁴	52,411 (100.00)	14,958 (28.5)	15,005 (28.6)
Charlson weighted comorbidity index			
0	24,713 (47.2)	4801 (32.1)	5033 (33.5)
1-2	15,065 (28.7)	5413 (36.2)	5170 (34.5)
3-4	5112 (9.8)	2067 (13.8)	2058 (13.7)
≥5	7521 (14.1)	2677 (17.9)	2744 (18.3)
Chronic diseases²			
Myocardial infarction	2624 (5.0)	1015 (6.8)	1121 (7.5)
Congestive heart failure	6333 (12.1)	2292 (15.3)	2351 (15.7)
Peripheral vascular disease	4019 (7.7)	1325 (8.9)	1335 (8.9)
Cerebrovascular disease	3999 (7.6)	1542 (10.3)	1577 (10.5)
Dementia	4303 (8.2)	1760 (11.8)	1788 (11.9)
Chronic pulmonary disease	10,815 (20.6)	3205 (21.4)	3162 (21.1)
Rheumatic disease	1112 (2.1)	351 (2.3)	340 (2.3)
Peptic ulcer disease	863 (1.6)	208 (1.4)	243 (1.6)
Mild liver disease	3368 (6.4)	1021 (6.8)	1012 (6.7)
Diabetes without chronic complication	13,606 (26.0)	5646 (37.7)	5442 (36.3)
Diabetes with chronic complication	4152 (7.9)	1531 (10.2)	1623 (10.8)
Hemiplegia or paraplegia	1144 (2.2)	417 (2.8)	445 (3.0)
Renal disease	9913 (18.9)	3798 (25.4)	3963 (26.4)
Any malignancy, including lymphoma and leukemia, except malignant neoplasm of the skin	2878 (5.5)	880 (5.9)	958 (6.4)
Moderate or severe liver disease	550 (1.0)	174 (1.2)	180 (1.2)
Metastatic solid tumor	667 (1.3)	194 (1.3)	185 (1.2)
HIV/AIDS	377 (0.7)	136 (0.9)	127 (0.8)
Clinical complications			
Hospitalized	27,774 (53.0)	13,366 (89.4)	12,864 (85.7)
Invasive ventilator dependence (IVD)	6150 (11.7)	3828 (25.6)	3713 (24.7)
In-hospital mortality among ventilator dependent	2665 (43.3 ³)	1701 (44.4 ³)	1671 (45.0 ³)
In-hospital mortality	4502 (8.6)	2480 (16.6)	2523 (16.8)
Ventilator dependence among in-hospital deceased	2665 (59.2 ³)	1701 (68.6 ³)	1671 (66.2 ³)



The Indian Council of Medical Research, under the Ministry of Health and Family Welfare, proposed the following inclusion criteria for testing for SARS-CoV-2: The government of India used the selection of suspected COVID-19 with the following:

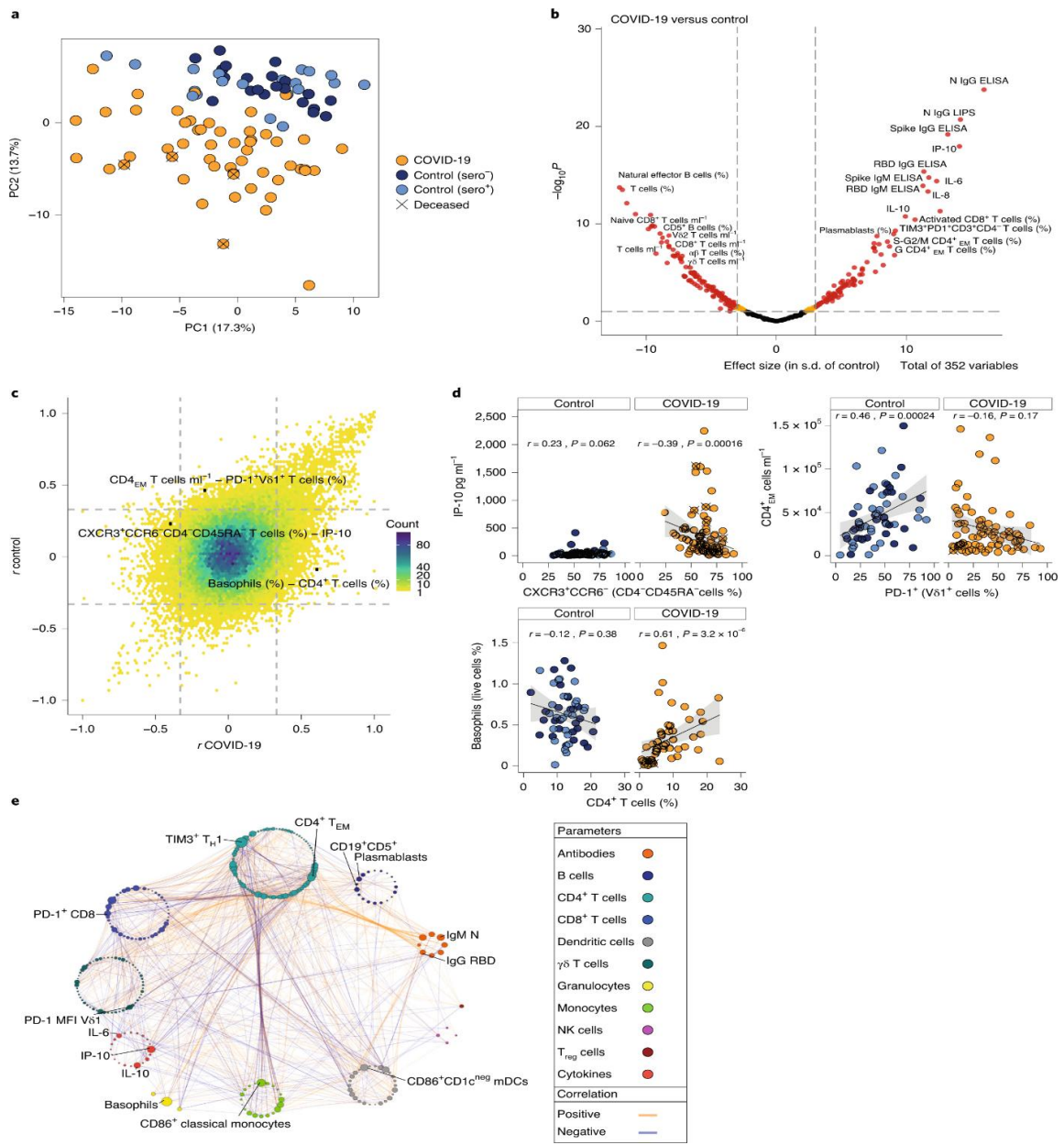
- all subjects with at least one suspicious symptom, such as a fever, a change in smell or taste, or an acute respiratory infection (cough and respiratory distress),
- all close contacts of SARSCoV-2 RT-PCR positive cases,
- clinical symptoms that are not explained by other diseases or that are suggested by a computed tomography scan
- people who returned to the country from an international destination or where the infection was endemic in the 14 days before symptom onset, and
- From the patient's file, various complaints, radiological and epidemiological signs suggestive of atypical pneumonia, and blood test results of patients were collected.

III. RESULT

395 symptomatic patients were enrolled who tested positive for SARS-CoV-2 by RT-PCR and had a CT value of less than 36 in this investigation. After treatment, 322 (81.5%) of them were able to walk again. Males were more common than females among infected and hospitalized cases (275 [69.6%] vs.120 [30.4 percent], $p=0.001$). The mean age and gender distribution of the cases analyzed were similar across death and recovery patients. Among normally distributed data, the different biochemical parameters across death and recovered patients were expressed as mean and standard deviation. Although CRP was much greater in dying

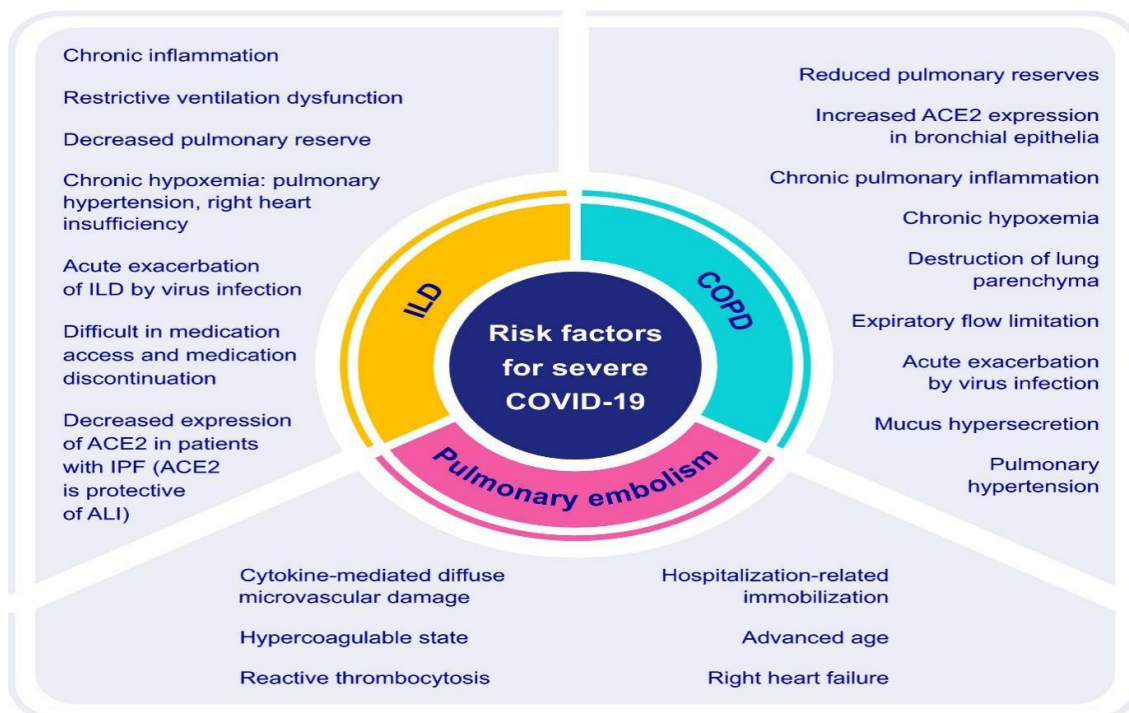
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cases than in recovered cases, important liver function tests such as SGOT, SGPT, and ALP were comparable. D-dimer, a marker for an unexplained source of symptoms, was considerably greater, and serum ferritin was also significantly higher with a trend significance value among those who died compared to those who survived.



Laboratory indexes associated with severe and critical COVID

Peripheral blood cell counts	Biochemical parameters	Coagulation indicators
Leukocytes ↑	LDH ↑	Platelet counts ↓
Lymphocytes ↓	CRP ↑	D-dimer ↑
Neutrophils ↑	PCT ↑	Fibrinogen ↑
Eosinophils ↓	AST/ALT ↑	PT ↑
NLR ↑	BUN/Scr ↑	APTT ↑
	cTnl ↑	
	IL-6 ↑	
	IL-1β ↑	
	KL-6 ↑	
	Ferritin ↑	



The Statistical analysis was done using the WizardMac software. WizardMac is the most popular statistical analysis software for Mac users. It has two key advantages: you don't have to type and you don't have to do any programming or input code to analyse data. As a result, it is far faster than other statistical tools available.

IV. DISCUSSION

Cytokine release syndrome (CRS), an inflammatory immunological reaction that leads to organ failure, is thought to be the cause of Covid 19. Elevated levels of interleukin (IL) 6, which promotes the liver to create C- reactive protein (CRP) and fibrinogen, have been related to severe Covid 19 and CRS. LDH and ferritin, in addition to CRP and fibrinogen, are linked to plasma IL-6 levels.

Clinical studies have shown that changes in the levels of various blood indicators are connected to the severity and death of Covid 19 patients. Among these clinical parameters, serum CRP has been identified as a key measure that varies considerably in severe Covid 19 patients. CRP is a protein generated by the liver that acts as an early indicator of infection and inflammation. In individuals with COVID-19, CRP levels rise by 20 to 50 mg/L on average. Ferritin is a critical modulator of immunological dysregulation, especially in extreme hyperferritinemia, contributing to cytokine storm through direct immune suppressive and proinflammatory actions. Covid 19 has reported that fatal results are accompanied by cytokine storm syndrome, implying that disease severity is influenced by cytokine storm syndrome. Ferritin can be used to detect liver damage, significant disease, and therapy outcomes. Ferritin is an acute-phase protein that can be released from hepatocytes that have been damaged. Patients with abnormal ferritin levels in Covid-19 are at a higher risk of liver injury and severe illness; prior research has also discovered that liver injury is common in Covid-19 patients.

V. CONCLUSION

The blood parameter demonstrates that after influencing with Covid-19, the ferritin level will increase in the second week and that other parameters, such as D-Dimer, ESR, and C.R protein, will change to normal ranges. A Continuous study is needed to better understand the progression of SARS-CoV-2 infection, its pathogenesis, and illness progression employing various biomarkers, as well as close monitoring of the CT value of RT-PCR.

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