

COVID-19 & INFLAMMATORY MARKERS IN TERTIARY CARE HOSPITAL.

Biochemistry

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ABSTRACT

The COVID-19 infection results in cytokine storms and results in the elevation of various inflammatory markers (procalcitonin, ferritin, CRP, IL-2R, IL-6, IL-8, IL-10, TNF- α , LDH, high sensitivity CRP to lymphocyte ratio, etc.). The laboratory biomarkers help in forecasting the severity of COVID-19 pandemic. The present retrospective study was conducted in Acharya Shri Chander College of Medical Sciences (ASCOMS) with the aim to determine the various inflammatory markers; such as, Interleukin-6, Ferritin, Procalcitonin and D-Dimer among COVID-19 patients. In this study the data of 500 patients were evaluated and categorized into two groups (group-I consist of 350 COVID-19 positive patients and group-II consist of 150 COVID-19 negative patients). The majority of the cases were in the age group of 40-49 years (29%) and the male to female ratio of 1.47:1. 70% patients had positive RTPCR and 30% patients had negative RTPCR. The most common symptoms among COVID-19 positive patients was fever both the groups. There was a statistically significant difference ($p < 0.5$) between the COVID-19 +ve and COVID-19 -ve patient's inflammatory markers. It was concluded that early investigation of inflammatory markers should be done which will give a favourable prognosis.

KEYWORDS

COVID-19, C-Reactive protein, Interleukin-6, Ferritin, Procalcitonin, D-Dimer and Pandemic.

INTRODUCTION

The severe acute respiratory syndrome coronavirus 2 is the causative agent of novel coronavirus disease-2019, emerged in Wuhan city of China.¹

Similar to other infectious diseases, inflammation is also a common feature of COVID-19, which results in various unfavourable outcomes.²

It is evident from the literature that SARS-CoV-2 infection delay the type I interferon response, results in inefficient virus clearance, increases the neutrophil extracellular traps and pyroptosis. This results in increase in inflammatory markers (procalcitonin, ferritin, CRP, IL-2R, IL-6, IL-8, IL-10, TNF- α , LDH, high sensitivity CRP to lymphocyte ratio, etc.) and decrease in immune cells (lymphopenia), which leads in hyper-inflammation, and multi-organ damage.^{2,3}

The COVID-19 infection results in cytokine storms. The laboratory biomarkers help in forecasting the severity of COVID-19 pandemic.⁴

Thus, the present study was undertaken to discuss the various inflammatory markers among COVID-19 patients.

Aims and Objectives

To study the various inflammatory markers; such as, Interleukin-6, Ferritin, Procalcitonin and D-Dimer among COVID-19 patients admitted in selected hospital, Jammu.

Material and Methods

This retrospective study was conducted in Acharya Shri Chander College of Medical Sciences (ASCOMS) over a period of four months after obtaining the ethical permission from the concerned authorities.

In the present study the data of 350 RTPCR positive patients and 150 RTPCR negative patients aged between 20 to 90 years were evaluated.

Inclusion Criteria

- Hospital admitted patients with RTPCR positive report.
- Mild to moderate symptoms of COVID-19 like fever, cough, low oxygen saturation.
- Patients with age group 20-90 years.
- Patients with comorbidities like obesity, diabetes, high blood pressure.

Exclusion Criteria:

- OPD patients with RTPCR positive report.
- Patients under the age of 20 years.
- Patients with underlying malignancy.
- Patients suffering from end stage diseases like coronary artery

disease, cardiac failure, chronic kidney disease.

A detailed history was collected. The demographic data such as, age, etc. were collected.

All the study subjects were tested for inflammatory markers. The data was recorded in Microsoft Excel and analysed with the help of SPSS 22.0 version.

OBSERVATIONS AND RESULTS

Table 1. Age Distribution

Age range (Years)	No. of cases	Percentage
20-29	73	14.6
30-39	57	11.4
40-49	145	29
50-59	108	21.6
60-69	46	9.2
70-79	68	13.6
80-89	3	0.6
>90	0	0

Table 1 showed that the majority of the cases were in the age group of 40-49 years (29%) followed by 50-59 years (21.6%), 20-29 years (14.6%), 70-79 years (13.6%), 30-39 years (11.4%), 60-69 years (9.2%) and 80-89 years (0.6%).

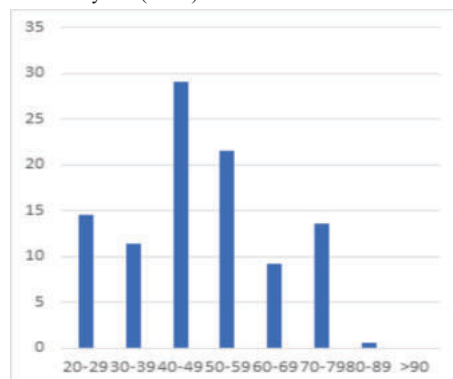


Figure 1. Age Distribution

Table 2 Gender Distribution

Gender	No. of cases	Percentage
Male	298	59.6
Female	202	40.4

In the present study majority of the cases were males 59.6% and 40.4% cases were females with the male to female ratio of 1.47:1 as depicted in table no. 02.

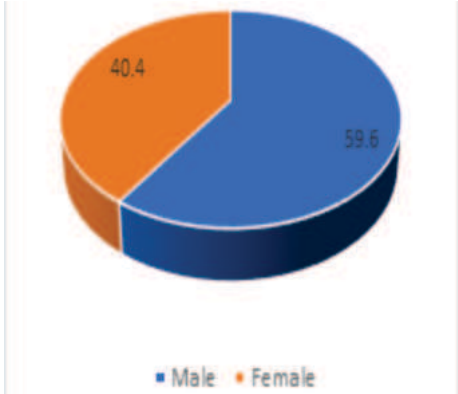


Figure 2 Gender Distribution

Table 3 RTPCR Status

RTPCR status	No. of cases	Percentage
Positive	350	70
Negative	150	30

The present study found that 70% patients had positive RTPCR and 30% patients had negative RTPCR as presented in table 3.

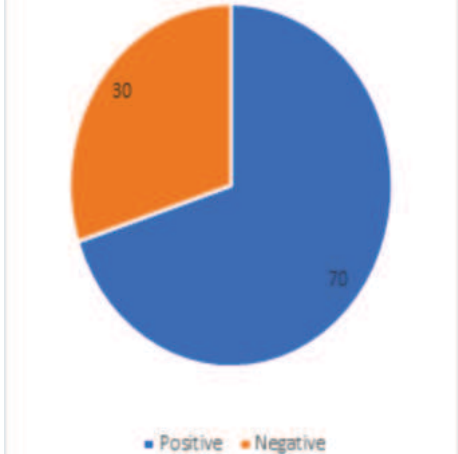


Figure 3. RTPCR Status

Table 4 Sign and Symptoms

Sign and symptoms	COVID-19 +ve (%)	COVID-19 -ve (%)
Fever	99	87
Sore throat	89	59
Headache	78	65
Muscle ache / bodyache	50	30
Fatigue	79	62
Breathlessness	31	0
Cough	78	6
Rhinorrhoea	31	10
Loss of smell	26	2
Loss of taste	29	2
Nausea	11	0
Vomiting	13	5
Diarrhoea	39	2

The current study reported that the most common symptoms among COVID-19 positive patients was fever (99%) followed by Sore throat (89%), Headache (78%), Muscle ache / body ache (50%), Fatigue (79%), Breathlessness (31%), Cough (78%), Rhinorrhoea (31%), Loss of smell (26%), Loss of taste (29%), Nausea (11%), Vomiting (13%) and Diarrhoea (39%).The most common symptoms among COVID-19 negative patients was fever (87%) followed by Headache (65%),Fatigue (62%), Sore throat(59%), Muscle ache / body ache (30%),Cough (6%), Rhinorrhoea (10%), Loss of smell, loss of taste and diarrhoea (2% respectively) and Vomiting (5%) as depicted in table 4..

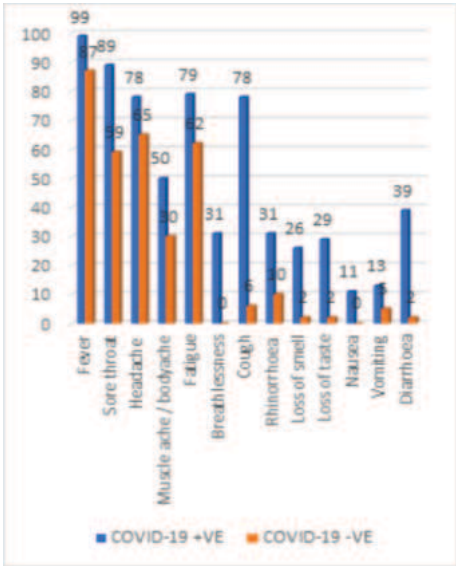


Figure 4. Sign and Symptoms

Table 5. Laboratory (Inflammatory) Parameters

Parameters	COVID-19 +ve (%)
↑ Interleukin-6	55.7
↑Ferritin	50.28
↑Procalcitonin	45.71
↑D-Dimer	37.14

In our study the normal range of included parameters was IL-6normal up to 7.0 Pg/ml, Ferritin (Male30-400 ng/ml women 13-150 ng/ml), Procalcitonin normal 0.046 ng/ml, d-dimer <0.5 ugFEU/ml. On comparison of COVID- 19 +ve and COVID- 19 – ve, it was found that there was significant elevation of Ferritinin 50.28% COVID-19 patients, D-dimerin37.14%COVID-19 patients, Procalcitoninin 45.71%COVID-19 patients and IL-6 in 55.7% COVID-19 patients as shown in table 5.

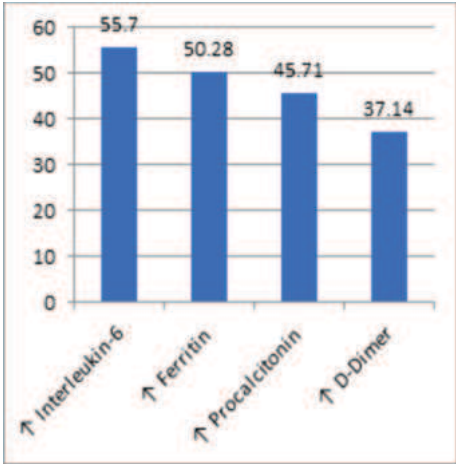


Figure 5. Laboratory (Inflammatory) Parameters

Table 6 COVID-19 +ve vs COVID-19 -ve

Group	IL-6	D-Dimer	Ferritin	Procalcitonin
RTPCR +ve	150-440pg/ml	0.7-16pg/ml	441-1806pg/ml	0.100-8.2pg/ml
RTPCR -ve	Up to 7.0pg/ml	<0.5 ugFEU/ML	Men:30-400 Women:13-150 ng/ml	<0.046ng/ml

The present study observed that there wasa statistically significant difference (p<0.5) between the COVID- 19 +ve and COVID- 19 – ve patients inflammatory markers as there was significant elevation in the values as depicted in table 6.

DISCUSSION

In this retrograde study the data was collected, analysed and discussed with previously available literature.

In our study the majority of the cases were in the age group of 40-49 years (29%) and the male to female ratio of 1.47:1. The findings are correlated with the study conducted by Berven LL, et al., (2022) found that the mean age of the study COVID-19 positive patients was 17.8 years and COVID-19 negative patients was 17.7 years. In both the groups there was male predominance.⁵ In another study conducted by Parimoo A, et al., (2021) observed that the most of the patients were males and the mean age of the patients was 55.67 + 17.41 years and 49.50 + 15.36 years.⁶

The present study found that 70% patients had positive RTPCR and 30% patients had negative RTPCR. The most common symptoms among COVID-19 positive patients was fever (99%) followed by Sore throat (89%), Headache (78%), Muscle ache / body ache (50%), Fatigue (79%), Breathlessness (31%), Cough (78%), Rhinorrhoea (31%), Loss of smell (26%), Loss of taste (29%), Nausea (11%), Vomiting (13%) and Diarrhoea (39%). The most common symptoms among COVID-19 negative patients was fever (87%) followed by Headache (65%), Fatigue (62%), Sore throat (59%), Muscle ache / body ache (30%), Cough (6%), Rhinorrhoea (10%), Loss of smell, loss of taste and diarrhoea (2% respectively) and Vomiting (5%). These results are comparable with the study conducted by Bagiu IC et al., (2022) found that the most common symptoms was fever (51.38%), cough (25.97%), sore throat (18.23%), fatigue (17.68%), headache (16.02%) and 21.31% patients were COVID-19 positive out of 849.⁷ In another similar study conducted by Moorthy S et al., (2021) reported that the most common symptoms was fever, sore throat, cough, dyspnea, diarrhea, anosmia and myalgia and.⁸

In our study it was found that there was significant elevation of Ferritin in 50.28% COVID-19 positive patients, D-dimer in 37.14% COVID-19 positive patients, Procalcitonin in 45.71% COVID-19 positive patients and IL-6 in 55.7% COVID-19 positive patients. There was a statistically significant difference ($p < 0.5$) between the COVID-19 +ve and COVID-19 -ve patients inflammatory markers. These outcomes are consistent with the meta analysis conducted by Zeng F et al., (2020), reported the significant increase in inflammatory markers (IL-6, CRP, PCT, ESR, SAA & Ferritin) among COVID-19 patients and concluded that there was significant association of severity of disease with inflammatory markers.⁹ In another similar studies conducted by Parimoo A et al., (2021), Bagiu IC et al., (2022), Rai DK et al., (2021) and Ahmeidi AA et al., (2020) reported that there was significant association between inflammatory markers and COVID-19 severity.^{6,7,10,11}

CONCLUSION

The results show that the COVID-19 admitted patients with increased levels of inflammatory markers, Interleukin-6 (55.7%), D-Dimer (37.14%), Ferritin (50.28%), Procalcitonin (45.71%) which affected the prognosis of disease and also the duration of hospital stay. Therefore, we conclude that early investigation of inflammatory markers should be done which will give a favourable prognosis.

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