Relation of CRP, Ferritin and Procalcitonin Level in People Infection with Covid- 19

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Abstract

Introduction: Since December 2019, the coronavirus disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has rapidly developed into a global outbreak characterized by a human-to-human transmission. On March 11, 2020, WHO declared the COVID-19 a pandemic. It has caused a total of 30 675 675 confirmed cases, including 954 417 deaths as of September 20, 2020. Patients with comorbidities such as diabetes, cardiovascular disease, underlying respiratory diseases, and cancer are at high risk of severe complications and even death. This is a global crisis that requires the joint efforts of all mankind to fight it.

Method: This study was a descriptive study, conducted in the respiratory Department and molecular Research laboratory at Datta Meghe medical college (DMMC) Wanadongri, Nagpur and Shalinitai Meghe hospital and research center (SMHRC), Nagpur in collaboration with ABVRH, Sawangi (Meghe).

Result: The Present study showed the relationship between the age factor and the prevalence of infection with the COVID virus-19, as the virus can infect all age groups, but the age group (20-79) years were the most affected age (26/68) 38.23%. Also, the study shows that infection with the virus Covid-19 has a significant effect on the level of the serum Ferritin (p-value < 0.001) and in both sexes (520.25ng/ml in the Men, 460 ng /ml In the Female compared to the Control group (232.30 ng/ml,77.217 ng/ml), respectively. significant increase in the level of C- Reactive Protein (p – value< 0.001 as the protein level reached (46 .60 IU/ML) in infected people compared to the control group (2.41 IU / ML). The current study coronavirus infection caused a significant increase level of PCT (P- value < 0.001) as the PCT level (16.2 ng/ml) in infected people compared to the control group 0.16 ng /ml.

Conclusion: We conclude from the current study that the age and gender factor play an important role in the prevalence of Covid-19 infection and that Covid-19 infection causes an increase in both the effective protein level C, PCT the level of the ferritin of blood, so it can be relied upon in the early diagnosis of COVID-19 infection.

Key words: *CRP, COVID-19, Ferritin, PCT.*

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Introduction:

Coronavirus disease-2019 (COVID-19) is an emerging infectious disease deemed by the World Health Organization (WHO)to be a global public health emergency. Over 3,500,000 cases and 243,403 deaths have been reported worldwide since its founding in Wuhan, China.[1] A small proportion of patients experience

extreme pneumonia, acute respiratory distress syndrome (ARDS), multi-organ failure, and may even die, while most patients with COVID-19 have a mild influenza-like disease or may be asymptomatic.[2]

The cause why certain people, while others do not, become seriously ill remains an unanswered mystery. For risk stratification, co-morbidities and laboratory markers have been suggested.[3-6] There is growing evidence that hyperinflammation traits consisting of elevated serum C-reactive protein (CRP), procalcitonin (PCT), D-dimer, and hyperferritinemia occur in critically ill patients. In COVID-19 pathophysiology, these results indicate a probably crucial function of a cytokine storm.[7]

COVID -19 has strong infectivity and a rate of a high incidence example CRP. CRP is one of the proteins that are made in the liver and sent to the bloodstream in response to the occurrence of inflammation and its level in the normal state is low and its height is a sign of inflammation, disease or disorder because it is considered one of the interactive indicators in the body.[8]

The disease transmitted via close contact with infected person and from respiratory droplets when an infected person talks, sneezes, or coughs. also, the disease transmitted through direct contact with the contaminated surface a virus then touching eyes, nose, or mouth. Treatment and prevention options are limited, including the use of antibody therapy, that is, the use of convalescence plasma taken from infected people after recovery from the disease, where encouraging clinical results emerged after taking this plasma and improving the chance of survival.[9,10.] This is because neutralizing antibodies are of particular importance as they prevent the adhesion of the virus to the surface of the cell and inhibit the fusion of the host's membrane, Consequently, rapid viral removal, which indicates that it is an anti-viral agent. As for non-neutralizing antibodies, it has a role in removing the virus according to the need for the phagocytic process mediated by the antibody-dependent cell and the antibody-dependent cellular cytotoxicity, as well as the activation of the complement.[11,12]

While most patients have mild symptoms and a strong prognosis, acute respiratory distress syndrome (ARDS) and systemic inflammation can be present in extreme COVID-19 cases. Therefore, determining the seriousness of the disease and examining potential biomarkers is urgent in order to make quick and accurate clinical decisions. One recent research has shown that serum C-reactive protein (CRP) (58.3 percent), lactate dehydrogenase (LDH) (57.0 percent) and erythrocyte sedimentation rate (ESR) are typically increased in patients with COVID-19 (41.8 percent). [13]

In order to predict the severity of COVID-19, laboratory biomarkers are important in a pandemic, as the allocation of resources, particularly in the context of respiratory support readiness, must be carefully planned. A systematic review and meta-analysis was performed in the present study to examine the relationship between several biomarkers, including serum CRP, PCT, D-dimer, and serum ferritin, as well as the magnitude of COVID-19.

Materials and Methods

This study was a descriptive study, conducted in the respiratory Department and molecular Research laboratory at Datta Meghe medical college (DMMC) Wanadongri, Nagpur and Shalinitai Meghe hospital and research center (SMHRC), Nagpur in collaboration with ABVRH, Sawangi (Meghe).

Sample size: 60 COVID-19 patients and 50 control subjects.

Study steps: -clinical examination and laboratory diagnosis.

Inclusion criteria: people infected with COVID-19.

Exclusion criteria: people infected with other respiratory system infection.

Sample Collection: Sample collection a vein blood specimen for 5ml was collected in the plain test tube for a measure of CRP, PCT and Ferritin levels. serum was isolated after centrifugation at 3500rpm for 10 min.

Biochemical Analysis:

· **C- Reactive protein (CRP**) level was estimated by turbidimetric method.

· **Ferritin level** was estimated by two – site immunoenzymatic (Sandwich) assay**.**

· **Procalcitonin (PCT)** level was immunoturbidimetric method.

Statistical Analysis

The data were analyzed using SPSS software program, version 20.0. The mean and standard deviation were measured. Analyzed and interpreted using descriptive and inferential statistics. The correlations of C- Reactive Protein (CRP) with Ferritin, and serum Procalcitonin (PCT) were calculated by Pearson's correlation test and relevant 'p' value was calculated as level of significance. The probability value is less than 0.05 ($p < 0.05$) and it was considered as statistically significant.

Result

The Present study showed the relationship between the age factor and the prevalence of infection with the COVID virus-19, as the virus can infect all age groups, but the age group (20-79) years were the most affected age (23/60) 38.33%

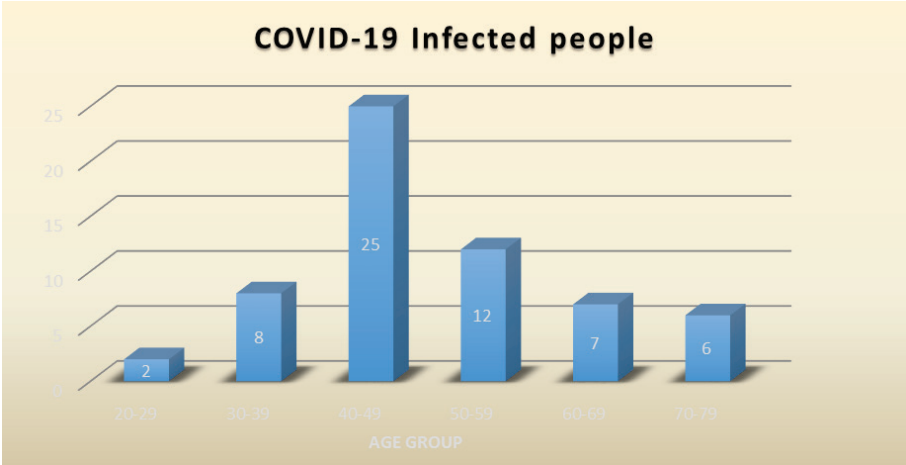

Figure No 1: show the relationship between age and infection by COVID-19. Age group of 40-49 more infected in COVID-19.

The study also showed that the prevalence of coronavirus infection is influenced by gender, as males are more susceptible to infection than females, where the percentage of males was 63.33% (38/60), while the female percentage is 36.66% (22/60).

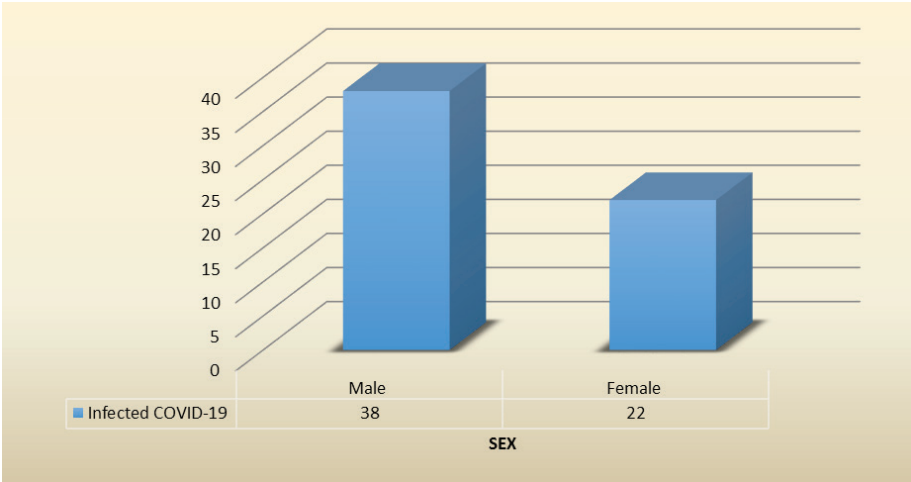

Figure No 2: show the relationship between sex and infection by COVID-19

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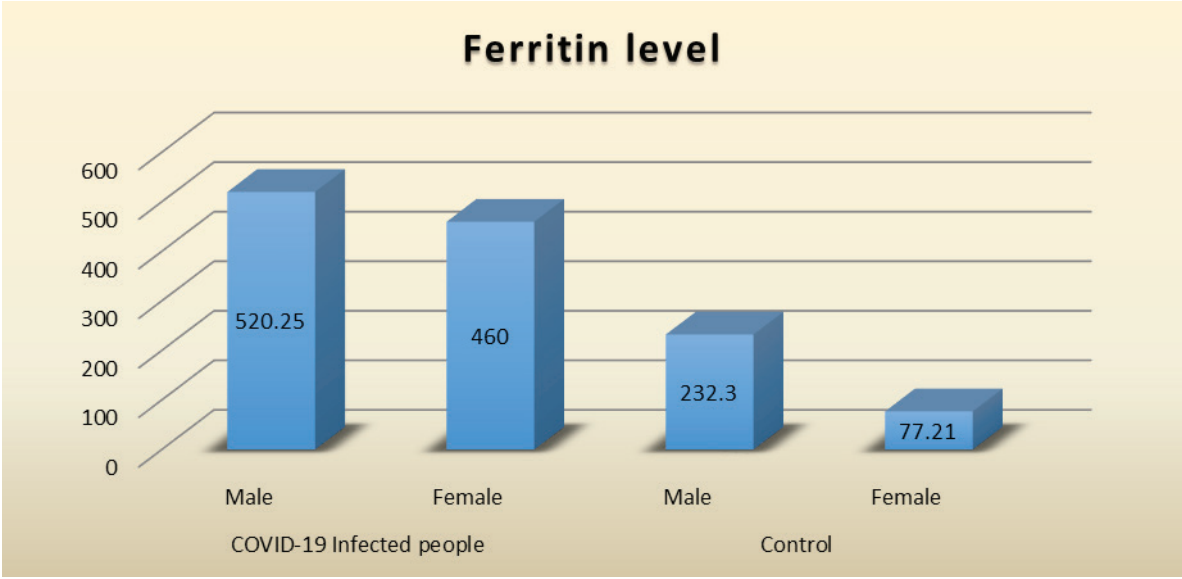

Figure No 3: show the relationship between Ferritin Level and infection by COVID-19.

The present results demonstrated that coronavirus infection caused a significant increase in the level of C-Reactive Protein (p – value< 0.001 as the protein level reached (46 .60 IU/ML) in infected people compared to the control group (2.41 IU / ML).

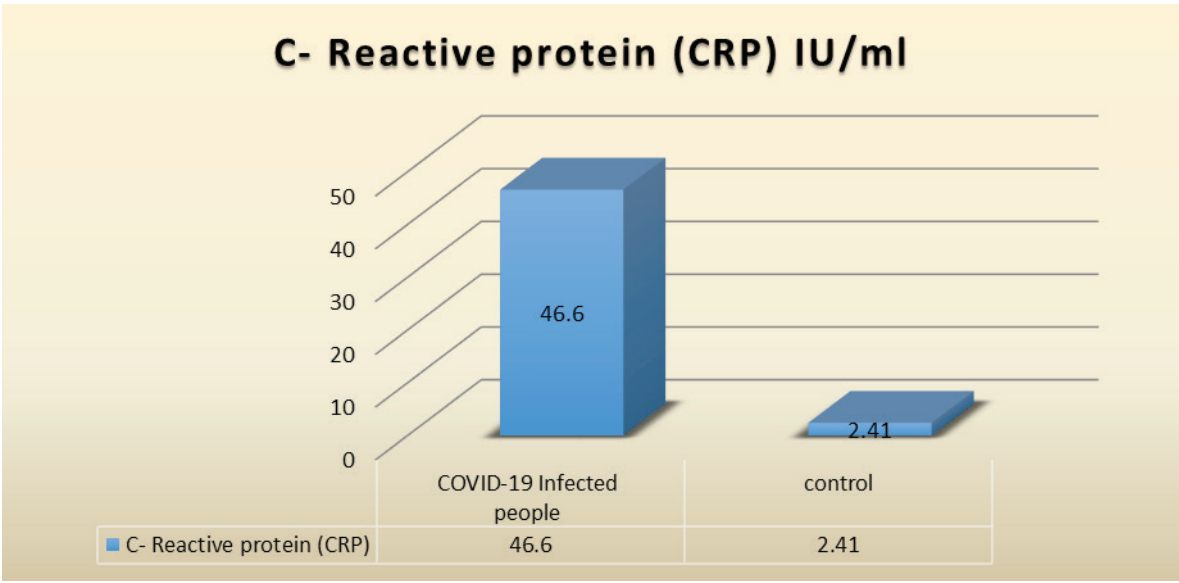

Figure No 4: show the relationship between CRP level and infection by COVID-19.

The current study coronavirus infection caused a significant increase level of PCT (P- value < 0.001) as the PCT level (16.2 ng/ml) in infected people compared to the control group 0.16 ng /ml.

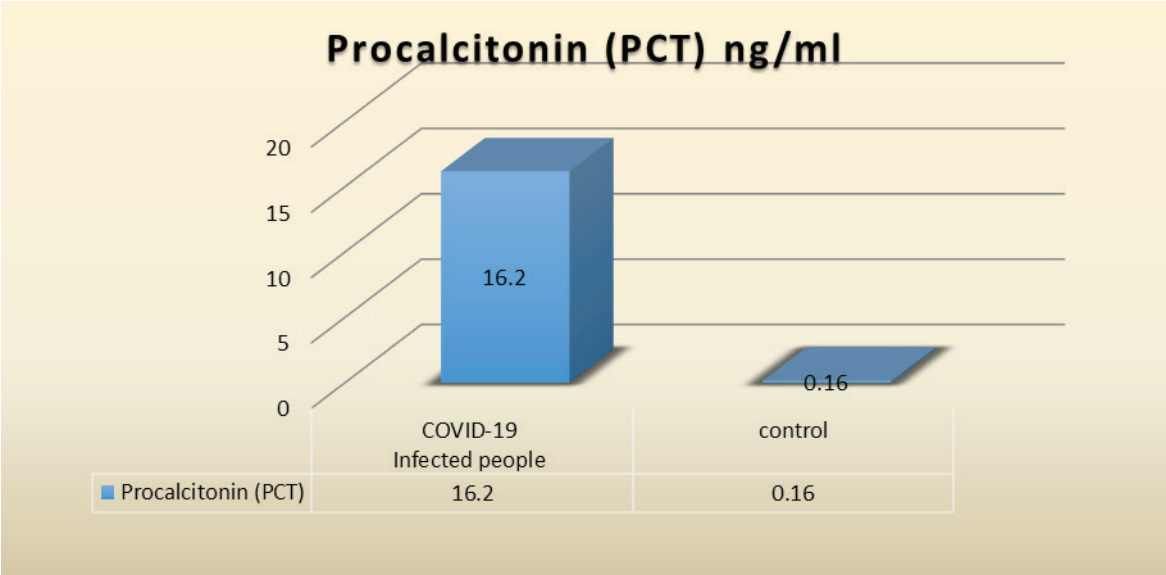

Figure No 5: showing the relationship between procalcitonin level and infection by COVID-19.

Discussion

COVID-19 pandemic is a significant general health danger that requires quick activity. Notwithstanding the extreme endeavours to discover novel medications for SARS-CoV2, this procedure is tedious with constrained advancement to date. Hence, medicate repurposing has been recognized as the quickest method of figuring it out restorative specialists for COVID-19 to meet the desperation of the situation.[14]

The present study showed that elevated serum CRP, PCT, and serum ferritin levels in COVID-19 patient compare to control group.

CRP(C-Reactive protein) is an inflammatory acute phase protein that can be elevated in many conditions, such as inflammation, cardiovascular disease, and infection, developed by the liver. [15]

infection by coronavirus effect on a biomarker of body, as the level of CRP and Ferritin.in this study, the CRP and Ferritin levels in the serum are increased in patients with COVID-19. This excess might cause secondary infection by bacteria and exacerbate of COVID -19 infection. In the current study evaluated levels of ferritin in the patient's serum COVID -19, which are significantly high.[16]

As we known, when inflammation or tissue damage happens, CRP can be significantly increased in serum, which is usually used as a unique inflammatory marker in the current clinical practice.[17]

On the other hand, PCT, as the precursor of calcitonin, is a kind of glycoprotein without hormone activity, which is significantly higher in bacterial infection, but remain normal or slightly increased in viral infection [17,18]

several studies supported our results about the level of CRP e.g. (**wel Chen et. al**) who demonstrated an increased level of CRP in COVID-19 infection, reaching 23.40 mg/l. so clinically depend on an increased level of CRP as an indicator of nosocomial infection COVID-19 patients who were slow to recover. [19,20]

Mr. Kais Khudair also find from the current study that the age and gender factor play an important role in the prevalence of Covid-19 infection and that Covid-19 infection causes an increase in both the effective protein level C and the level of the ferritin of blood, so it can be relied upon in the early diagnosis of COVID-19 infection. [21]

Conclusion

We conclude from the current study that the age and gender factor play an important role in the prevalence of Covid-19 infection and that Covid-19 infection causes an increase in both the effective protein level C, PCT the

level of the ferritin of blood, so it can be relied upon in the early diagnosis of COVID-19 infection.

Conflict of Interest: Nil

Source of Funding: Nil

Ethical Clearance: taken from institutional ethics committee

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