The Relation between CRP and Ferritin in People Infected with COVID-19 in Al- Amariah City

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Abstract

The study aimed at the Covid-19 infection causes an increase in both the effective protein level C and the level of the ferritin of blood in the early diagnosis of COVID-19 infection. In the present study that was carried out in Amariah city from 15th of July to 15th of October 2020, a total of 100 people (60 infected group with COVID-19 and 40 control group without Covid-19) who were admitted to AL-Amariah Hospital whose ages were between 15-75 years. Patients were investigated for the detection of COVID-19 by using Real-Time PCR. The current study showed that the infection with COVID-19 is affected by the age factor of the patient. The highest rate of a patient with COVID-19 was within the age group >50 years with a highly significant relation between COVID-19 and age. The study showed that the highest rate of CRP in the infected group compared with a control group with a highly significant difference. The highest rate of ferritin in an infected group than the control group.

Keywords: *COVID-19; CRP; Ferritin; Al- Amariah City*

Introduction

Coronaviruses are non-segmented, enveloped, positive-sense RNA viruses under a microscope that seem like a crown around a cell. Coronaviruses are originated in birds, dogs, cats, whales, pigs, and humans. but more distributed in bats. (COVID-19) broke out in Wuhan, Hubei, China, and, as of early March 2020[(1)].

In December 2019, an outbreak of new coronavirus (SARS-CoV- 2, also known as 2019-nCoV) infected pneumonia (COVID-19) happened in Wuhan, China, and soon extended to other cities and countries. According to the epidemiological analysis lead by the Chinese Center for Disease Control and Prevention (CCDC), 80.9% of the cases are mild/moderate pneumonia, and by February 11, the crude overall humanity rate is 2.3% [(2)].

In 2019, the new coronavirus was exposed to be a killer and was named SARAS COV-2, which caused death to many Chinese people, and then the world health organization proclaimed it was a pandemic [(3,4)]. Virus SARS- COV caused an outbreak of acute respiratory syndrome in 2003[(1)].

COVID-19 is a new infectious disease, it does not have treatment currently. So necessary to research biomarkers to regulate the severity of the disease. COVID -19 has strong infectivity and a degree of a high incidence example C reactive protein (CRP). C reactive protein is one of the proteins that are complete in the liver and sent to the bloodstream in response to the incidence 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 measured one of the interactive indicators in the body [(5)].

The disease is transmitted via close contact with an infected person and from respiratory drops when an infected person talks, sneezes, or coughs .also the disease is transmitted through direct interaction with the contaminated surface a virus then touching eyes, nose, or mouth [(6)].

The clinical appearances of most patients include fever, cough, shortness of breath and myalgia, etc., and radiographic evidence demonstrated pneumonia with several mottling and ground-glass opacity [(7)].

Treatment and prevention options are partial, including the use of antibody therapy, that is, the use of convalescence plasma taken from infected people after retrieval from the disease, where encouraging clinical results arose after taking this plasma and improving the chance of survival [8].

Material and Methods

The studied sample:- people infected with coronavirus (Covid-19) in Al-Amariah city.

Inclusion criteria:- people infected with COVID-19.

Exclusion criteria:- people infected with other respiratory system infections.

Across sectional study was carried out in Amariah city from 15th of July to 15th of October 2020, a total of 100 people (60 infected group with COVID-19 and 40 control group without COVID-19) who admitted to AL-Amariah Hospital whose ages were between 15-75 years.

Sample collection:- Five ml of vein blood was placed in plane tubes left for 30 minutes at 37 °C then were centrifuged at 3000 round per minute (rpm) for 15 minutes then the clot was removed and the remain re-centrifuged at 3000 rpm for 10 min and the obtained sera were then aspirated using an automatic micropipette and moved into two clean test tubes, for serological tests. The label was fixed on each test tube which was then stored in a deep freeze at -20°C for serological testing for determining the levels of CRP and ferritin. Level of CRP measured in patients' blood by using Genrui PA 54 (Protein Agglutination 54) China. Level of Ferritin measured in patients' blood by using the VIDAS technology and diagnostic materials manufactured by company Marcy- France.

Statistical Analysis

The data are analyzed using SPSS statistical program version 18 software, the categorical changeable was given as percentage and frequencies. T-test was used for comparison between groups. The P. value> 0.05 was considered statistically significant, and for the result which its P. value was less than 0.01 was considered highly significant, while for those whose P. value was greater than 0.05 considered non-significant statistically.

Results

The current study showed the relationship between the age group and the prevalence of infection with the COVID -19, as the virus can infect all age groups (table 1,2), but the age group >50 years were the most affected age, which is 30% as shown in table 3.

Table 1: Frequency according to their age and gender .

Age group	Frequency	Percent
< 20	4	4.0
21-29	28	28.0
31-39	28	28.0
41-49	21	21.0
>50	19	19.0
Total	100	100.0
Gender		
Male	50	50.0
Female	50	50.0
Total	100	100.0

Table 2: Distribution of infected group with COVID-19 and control group according to their age.

Age group	Infected group		Control group		Total	
	N	%	N	%	N	%
< 20	2	3.3	2	5.0	4	4.0
21-29	12	20.0	16	40.0	28	28.0
31-39	11	18.3	17	42.5	28	28.0
41-49	17	28.3	4	10.0	21	21.0
>50	18	30.0	1	2.5	19	19.0
Total	60	100.0	40	100.0	100	100.0
Chi-Square Test			0.001**			

Table 2. shows that there was a highly significant difference between people infected with COVID-19 than people without COVID-19 (P. value <0.01).

Table 3: Relation between CRP and ferritin level with people infected with COVID-19.

Study Groups		Infected group	Control group	P-Value a
CRP	Mean	37.28	4.2	0.001**
	SD	± 41.72	± 1.26	
Ferritin	Mean	227.97	38.83	0.001**
	SD	± 161.89	± 34.71	

Table 3. shows that statistically there was a highly significant difference between CRP and Ferritin levels for infected people with COVID-19 than the control group (P. value <0.01).

The current study shows that the infection with the virus COVID-19 was a significant effect on the levels of serum ferritin. The difference was highly significant (P. value <0.01) as shown in Figure 1, Table 4.

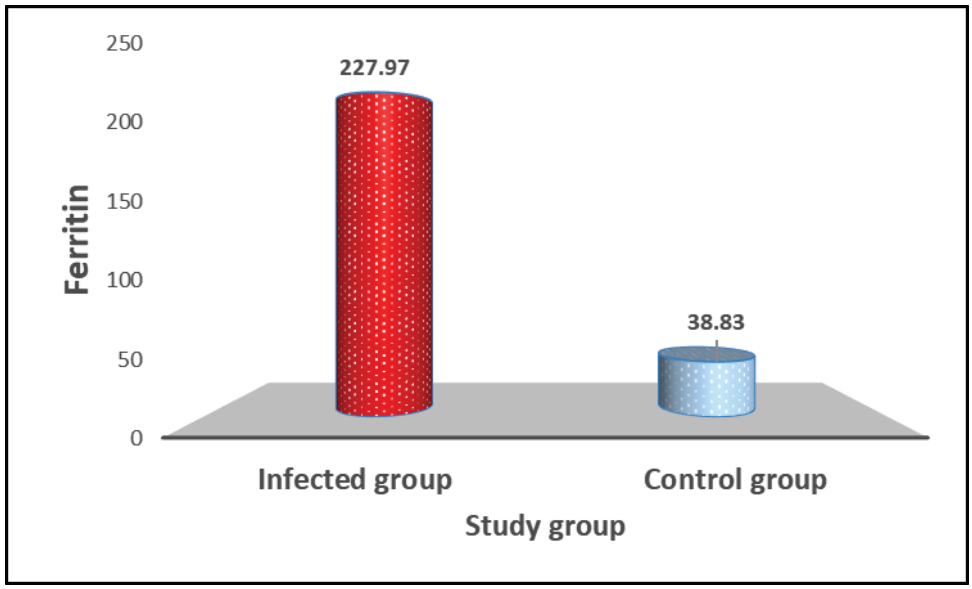

Figure 1: Relation between ferritin levels with people infected with COVID-19 and control group.

Table 4: Relation between ferritin levels with people infected with COVID-19 and control group.

Study groups	Ferritin-N						Total	
	Normal		Hypo		Hyper			
	N	%	N	%	N	%	N	%
Infected group	46	76.7	0	0.0	14	23.3	60	100.0
Control group	24	60.0	16	40.0	0	0.0	40	100.0
Total	70	70.0	16	16.0	14	14.0	100	100.0
Chi-Square Test				0.001**				

The present study showed a high percentage of CRP level in males 51.7% than females 48.3% so high percentage of ferritin levels in males 64.3% than females 35.7% as shown in table 6.

Table 5: Frequency of CRP and ferritin level according to their gender.

Gender	CRP		Ferritin			
	Abnormal		Normal		Hyper	
	N	%	N	%	N	%
Male	31	51.7	9	64.3	31	51.7
Female	29	48.3	5	35.7	29	48.3
Total	60	100.0	14	100.0	60	100.0
Chi-Square Test			0.281			

The present study showed a high percentage of ferritin levels in males 64.3% than females 35.7% as shown in table 5.

The present study revealed that there was a positive correlation between CRP and ferritin in people infected with COVID-19 (Pearson correlation 0.614). There was a highly significant difference between them (P. value = 0.000) as shown in Figure 2.

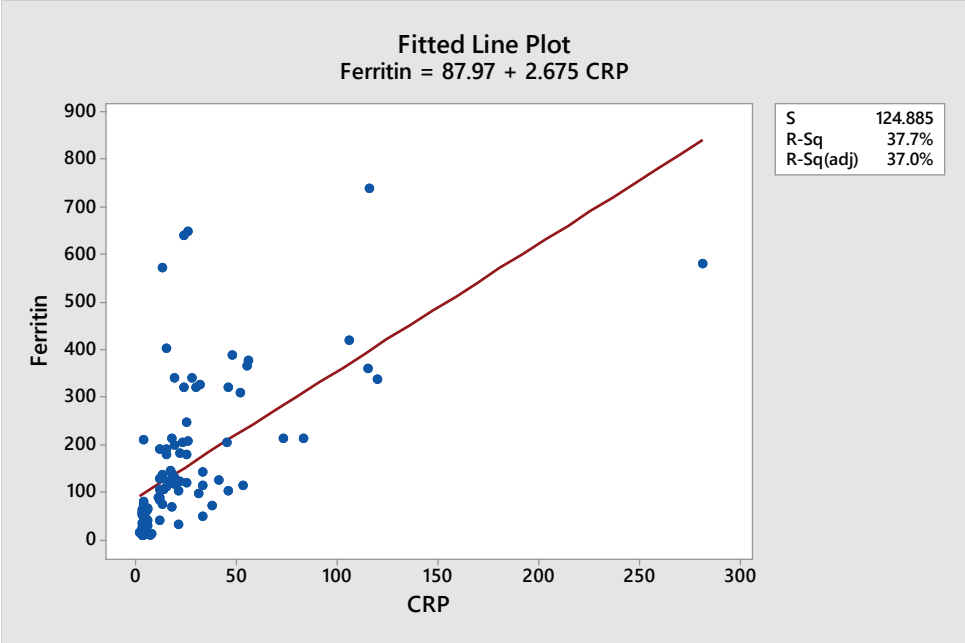

Figure 2: Positive correlation between CRP and ferritin in people infected with COVID-19.

The present study revealed that there was a negative correlation between CRP and ferritin with people without COVID-19 (Pearson correlation 0.018). There was no significant difference between them, P. value > 0.05 as shown in Figure 3.

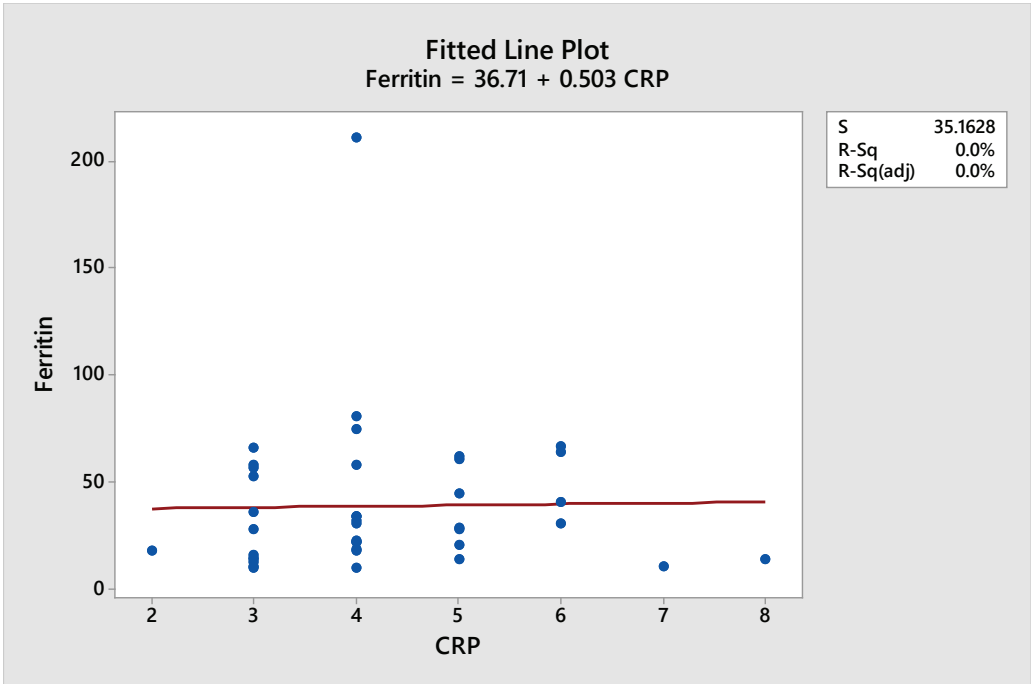

Figure 3: Negative correlation between CRP and ferritin with the control group.

Discussion

There is rising evidence that in critically ill patients, there are characteristics of hyper inflammation, which consist of higher serum C-reactive protein (CRP), procalcitonin (PCT), D-dimer, and hyperferritinemia. These findings suggest a possibly crucial role of a cytokine storm in COVID-19 pathophysiology [9].

The current study showed that the virus can infect all age groups, but the age group >50 years were the most affected age. The present study showed a high percentage of CRP and ferritin levels in males than females. Several factors affect COVID-19, the most significant, sex, and the age of the patient. Male is connected to the danger of extreme COVID-19 [10]. The reply antibody in plasma of convalescent from men as associated with women is amazing given women usually more immune responses than men [11]. The present study showed men infection more than women this could be attributed to the nature of men's work, in addition to secondary elements such as smoking and drinking alcohol that affect the immune system in addition to the hormonal difference.

The current study showed that statistically there was a highly significant difference between CRP and Ferritin levels for infected people with COVID-19 than the control group (p. value <0.01). The infection of Coronavirus affects the level of CRP and Ferritin. The increase causes secondary infection by bacteria and aggravates COVID-19 infection [12]. This result was agreed with Khudair and Al-Hadraawy who found the age and gender factor play important role in the prevalence of COVID-19 infection causes an increase in both the effective protein C level and the level of ferritin in blood and play important role in early diagnosis of COVID-19 [13].

The present study revealed that there was a positive correlation between CRP and ferritin in people infected with COVID-19. CRP has great analytic exactness in early predicting extreme COVID-19. Generally, writing proof proposes that in the start phase of COVID-19, CRP levels could reflect infection severity [14]. Iron is careful one of the minerals necessary for the health of the body and shows a fundamental role in the formation of hemoglobin in the blood responsible for moving oxygen to the cells, and it is recognized that its deficiency causes anemia. The other studies established that COVID-19 affected both sexes causes a significant increase in the level of stored iron [15,16].

The recent evidence has shown that serum CRP level could also be used in nursing the progression and development of patients with COVID-19 [17]. The result of the current study was agreed with Huang *et al*. whose are founded that an elevated serum CRP, PCT, D-dimer, and serum ferritin were associated with a composite poor outcome in patients with COVID-19 [18].

Conclusions

The study concluded the age and gender play a role in the development of COVID-19. The COVID-19 infections cause an increase in both levels of CRP and ferritin of blood and play important role in the early diagnosis of COVID-19 infection.

Ethical Clearance: None

Source of funding: None

Conflict of Interest: None

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