Assessment of C-Reactive Protein and Lactate Dehydrogenase Levels in Patients Infected with COVID-19.

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Abstract :

Corona virus is one of the serious dangerous viruses that infect the respiratory system, which pose a great threat in the Middle East, including Iraq, which lacks a significant decrease in health services as a result of the military operations and wars that have passed on this country. In view of the large increase in the rate of infections in Iraq, this study suggested an estimate **C-reactive protien and LDH levels** as primary parameters for early detection of Coronavirus. In this work , rate of infected males with COVID-19 is higher than females .All samples were identified by routine diagnosis method and molecular diagnosis using qPCR. All study population (patients and control) were subjected to the evaluation of serum levels of CRP, and LDH. COVID‑ 19 patients showed a significant elevation in the levels of all parameters included in this study when compared with healthy controls. We also found that all of CRP, LDH are significantly associated with the severity of the COVID‑ 19 symptoms.

Key words : **COVID-19 , LDH , C-ractive protien , Corona virus .**

Introduction :

Corona virus spreads rapidly to the rest of the world from its roots in Wuhan City, Hubei Province. Four corona viruses, namely HKU1, NL63, 229E and OC43, circulated in humans and usually caused mild respiratory disease. On December 2019, China reported the outbreak to the World Health Organization and closed the Huanan seafood market on January 1st[1]. Studies identified angiotensin receptor 2 (ACE2) as the receptor by which the virus reaches the respiratory mucosa figur1[2].

There is overwhelming evidence that elevated serum C-reactive protein (CRP), procalcitonin, D-Dimer,LDH, and hyperferritinemia are signs of hyper inflammation in critically ill patients. In addition, lymphopenia is closely linked to the severity of the disorder. The lymphocyte counts of patients who died from COVID19 are significantly lower than those of survivors. Other blood cells, such as neutrophils, eosinophils, platelets, and CD8+ cell counts, have been regarded as determinants in distinguishing mild from extreme COVID19, though their importance is still unknown[3]. According to figure 2 , there are many Theories on laboratory escape of existing COVID-19[4]. This research aimed to determine C- reactive protien and LDH in COVID-19 patients .
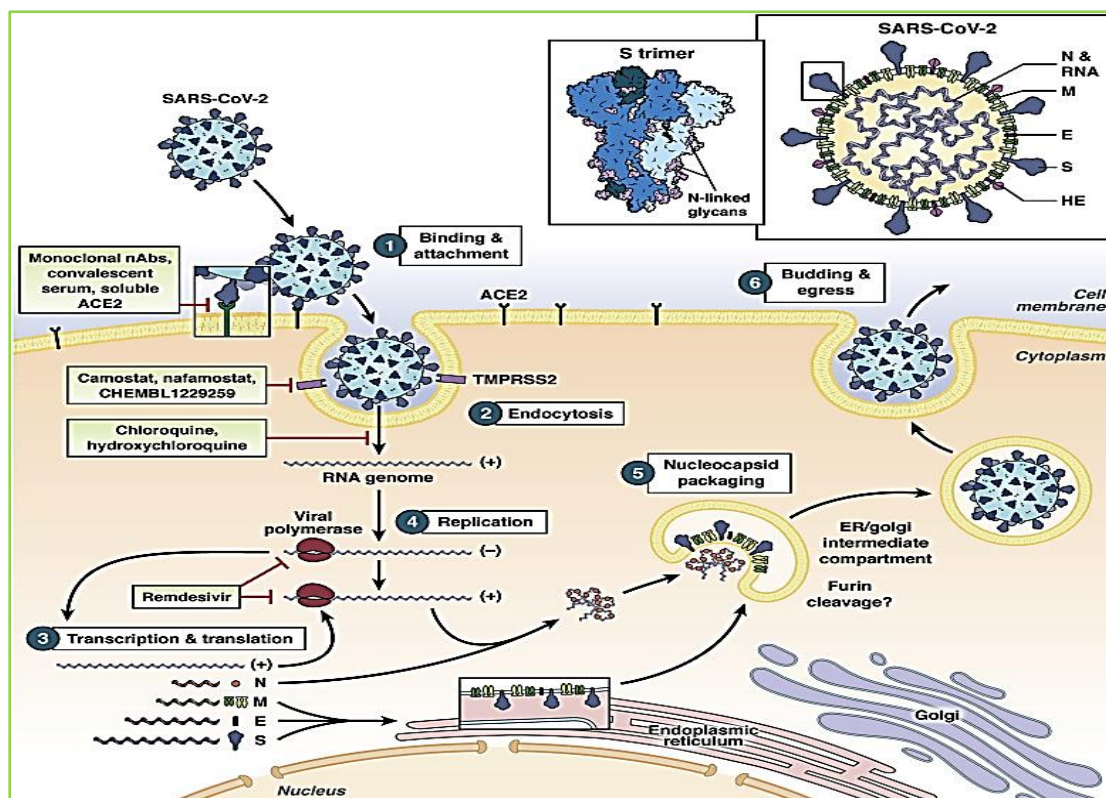
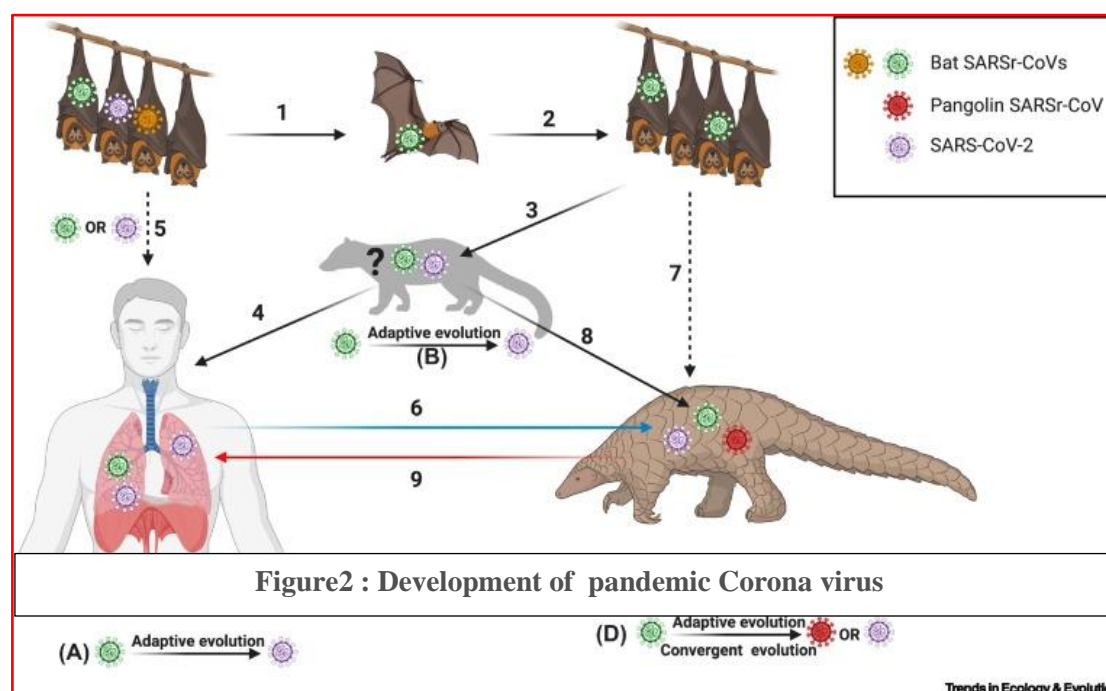**Figure 1 : Role of ACE2 in corona virus replication cycle .**

Figure2 : Development of pandemic Corona virus

Methods

Study Design :

The current study involved (100) patients suffering from COVID‑ 19, aging between (18 and 45) years old and of both sexes. In addition, (100) apparently healthy persons of the same

ages and sexes were included in this study as a control group. All of the patients and healthy persons were subjected to the estimation of serum D‑ Dimer, lactate dehydrogenase (LDH), and CRP .

Samples collection :

Five ml of venous blood is collected from the study groups and healthy control. Blood samples was centrifuged to obtain serum which is used for the determination of serum concentration of LDH, and CRP.

Diagnosis of COVID-19 patients :

 COVID-19 viruses was identified using   qPCR   and the antisera titer of IgG/IgM was estimated using Rapid test.

Determination of serum D‑ dimer and C‑ reactive protein :

Serum concentrations of LDH and CRP were evaluated using a specific automated protein analyzer (PA120) provided by (Shenzhen Genius Electronics Co., Ltd. China 2019). Serum samples for each of the patients and healthy persons were applied to the instrument then the concentrations of LDH and CRP are calculated automatically.

Statistics

The results of the current study are analyzed using (graph pad prism 8.0) to find the variation in the results of the study. Statistical significance was defined as a ($P < 0.05$). Statistical tests such as (paired t‑ test, percentage) were used for data analysis.

Results and discussion :

Gender and infection :

In the current study, which is conducted in Anbar city, appeared that   57% of the COVID-19infected women and 40% for men figure 3. Previous studied reported that male's percentage of infection were higher than females and reached (56%) in Italy, (52%) in Germany, (53%) in France, (50%) in Spain, and (51%) in Canada[5]. Another study conducted by Safaa *and his worker* documented that the infected male with covid-19 was higher than females [6], [7].

Females and males have a variable response to viral infection such as SARS CoV, CoV, SARS CoV2, and other viruses. These differences lead to disease severity and incidence between both genders. Multiple factors lead to gender-specific disease outcomes following viral infections. Sex-specific steroids and X-linked gene activity, both modulating innate and adaptive immune response to virus infection, affect immune response[8]. In addition, the differences in the expression of angiotensin-converting enzyme (ACE) 2 receptor and cellular serine protease TMPRSS2, essential for binding and priming SARS CoV2, may play an important role. We also believe that increased stress and domestic work during the pandemic, especially in Iraq, may also affect women's immune system capabilities against COVID-19[9].
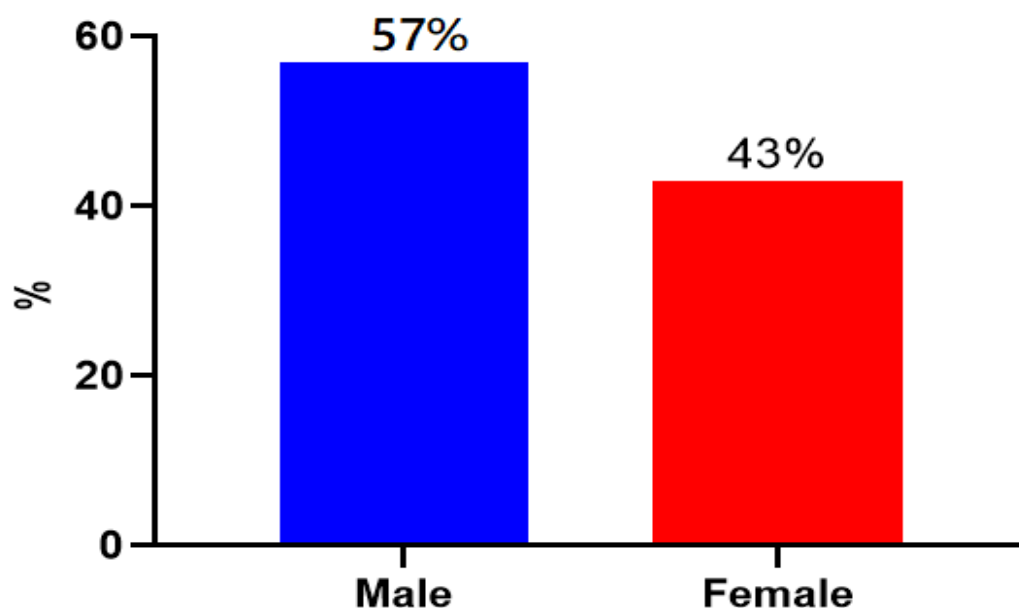
Figure 3 : Distribution of corona virus according to gender

C-reactive protien and LDH:

According to table 1 , There is a strong significant increase in the levels of CRP, and LDH in COVID‑ 19 patients.

Table1 : The statistical relationship of CRP and LDH.

Parameters	Patients	Control	P-value
	Mean ± Standard deviation		
C-reactive protein	133.2±79.1	4.52±1.87	0.01
LDH	533±93	132±57	0.01

LDH is a cytoplasmic glycolytic enzyme used in almost all tissues. Its elevation, in general, indicates tissue damage. Increased LDH was a common finding in MERSCoV infected patients [10]. For patients with severe acute respiratory syndrome, separate mortality factors have been reported [11] and H1N1 infection[12] . Previous studied reported that increasing LDH in severe COVID‑ 19 cases suggested possible subclinical tissue injury. Since the virus binds to the human ACE2 receptor in the lungs, which explains why the lungs are the first affected organs, various cytokine defects and multiple organ dysfunction can be found in severe patients as the disease progresses [13] , [3] [14].

CRP levels were elevated in COVID19 patients, and it was discovered that survivors had a median CRP of approximately 40 mg/L, whereas non survivors had a median CRP of (125 mg/L), implying a strong connection between disease severity and prognosis[10] , [15] , [16] .

Conclusion :

In contrast to previous research, this current study discovered that females could have a low risk of contracting COVID-19. Infection with COVID19 results in a substantial increase in CRP and LDH levels. These distinctions were found to be significantly correlated with disease severity and progression, implying the utility of certain clinical markers in identifying serious illnesses. Both C-Reactive Protein and Lactate Dehydrogenase are biomarkers for detecting Coronavirus.

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