

RESEARCH ARTICLE

The effect of age and gender on the severity of coronavirus infection

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ABSTRACT

Background: One of the most noticeable differences in infection patterns was the large disparity in death rates from the coronavirus between men and women , with the number of deaths among men twice the number of women in the United states and Europe , and it was most common among middle - aged people and older adults .

Objective: To identify the effect of age and gender on the severity of coronavirus infection with the corona virus.

Methods: A study was conducted on (260) patients infected with coronavirus (134) males and (126) females, their ages ranged between 15 to 75 years in a private laboratory in the City of Mosul, in order to find out the effect of age and gender on the severity of infection with corona virus by measuring their biomarker (C- Reactive protein, Ferritin and D - dimer). The samples were divided based on the values of biomarker into two cases, the mild case and the severe case.

Results: The results showed that the age group (31-45) years is the most susceptible to infection compared to the rest of the age groups for both cases. The results also showed that the incidence of males in the mild case was higher than females and amounted to (51.42%), (48.57 %) respectively , and all values of vital indicators were recorded within the normal range , while in the severe case , it reached (51.65 %) for males , (48-32 %) for females , and all values of vital indicators were higher than the normal range which increases age with for both sexes.

Conclusions and Recommendations: We conclude from this study that males were more susceptible to infection with the Coronavirus and its complications than women, and that the severity of infection increased with age. Therefore, we recommend and emphasize the adult category to receive vaccinations, reduce contact and take all necessary health and preventive measures to avoid infection and transmission.

Keywords: Infection Coronavirus, Biomarker, C-Reactive Protein ,Ferritin, D-dimer



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INTRODUCTION

COVID-19 disease declared a global pandemic by WHO (Lippi, et al, 2020) the word corona in Latin means crown (Sayed, 2020). Corona virus is a viral infection that causes various respiratory problems in human body (Wolde, 2020). There are some clinical and biological determinants that predict disease progression, which help to identify patients at high risk at an early stage of infection with corona virus (Rostam, et al, 2020). One of these determinants is C - Reactive Protein (CRP), the researchers found CRP acted independent variable correlated with severity of the corona virus (Chen, et al, 2019 ; Qu, et al, 2020). D - dimer is another determinant in the diagnosis of virus disease severity in the patient body (Yu, et al, 2020), it is a sensitive test, as a higher D - dimer levels have been linked to higher levels of pulmonary embolism potential therefore, elevation in D-dimer levels in coronavirus patients may be useful in rapidly identifying those with high disease severity and pulmonary complications (Olson, 2015 ; Schutgens, 2020).

Ferritin is another biomarker which is considered a predictive factor for the severity of corona virus and as indicator of inflammation (Liu , et al, 2020 ; Vargas-Vargas and Cortés-Rojo, 2020 ; Banchini, et al , 2021 and Ahmed, et al, 2021). The severity of symptoms of coronavirus infection varies from one person to another , some patients may experience severe or even fatal symptoms, while others experience mild or even non visible symptoms. Previous studies have separately. and gender investigated the effect of age and gender on the severity of infection with coronavirus. As a team of researchers found that in cases of infection of coronavirus in which severe symptoms appear, the body may attack one of its main immune defenses instead of fighting the virus, and most of them were men, which explains why men are infected more than Women (Undurraga, et al, 2021) . They also point out that children are better off than adults. because of strong immune cells. that diminish with age. The great disparity in the death rates between men and women due to infection with corona virus was one of the most noticeable differences in infection patterns, for example, in the United States , the number of deaths among men was twice that of women due to infection with virus , and men made up (69%) of the victims the of coronavirus in Western Europe which promoted a study of differences between sexes and their impact mortality and infection rates in different countries on the world (Galasso, et al, 2020) . On from the above comes the importance of our current study, which aimed to know the effect of age and gender on the severity of infection with

corona virus by measuring vital indicators (CRP Ferritin, and D - dimer). The study aimed *to find out* the effect of age and gender on the severity of corona virus infection.

METHOD

Blood samples were collected from (260) patients in infected for corona virus in a private laboratory in Mosul city (134) males and (126) females age between (15-75) years, it took about three months to collect all the samples. As (5ml) of blood was withdrawn and placed in the incubator for 15 minutes at 37 °C, placed at in a centrifuge (3000 PPM) for 10 minutes. The samples were divided in two parts (mild and severe) cases according to the severity of the injury in terms of biomarkers values (CRP, Ferritin and D - dimer), and also divided according to the gender and the age groups. Full an automatic laboratory equipment was used to measure biomarkers (D-dimer and Ferritin) in device CL 900i and to measure (CRP) in device I Chroma II, material (kit) manufactured by the Korea company were used to measure all vital indicators.

RESULTS

Table 1. Demographic characteristics related to participants.

Age	Male		Female	
	No.	%	No.	%
15-30	22	16.42	28	22.22
31-45	52	38.80	56	44.44
46-60	24	17.90	22	17.46
61-75	36	26.87	20	15.87
Total	134	99.99	126	99.99

Table 2. Effect of the age and gender of biomarker for mild cases for corona virus (case number 140).

Age	Male					Female				
	No.	%	CRP mg/L	Ferritin ng/ml	D-dimer ng/ml	No.	%	CRP mg/L	Ferritin ng/ml	D-dimer ng/ml
15-30	10	8.33	20-40	400-500	600-800	16	13.33	20-40	400-500	600-800
31-45	20	16.66	40-60	500-600	800-1000	22	18.33	40-60	500-600	800-1000
46-60	16	13.33	60-80	600-700	1000-1200	10	8.33	60-80	600-700	1000-1200
61-75	16	13.33	80-124	700-1000	1200-2000	10	8.33	80-126	700-900	2000
Total	62	51.65				58	48.32			

Biomarker (CRP (N. R=< 10.0 mg/L), Ferritin (M=80-350 ng/ml), D-dimer (N. R=<500 ng/ml))

Table 3. Effect of the age and gender of biomarker for severe cases for corona virus (case number 120)

Age	Male					Female				
	No	%	CRP mg/L	Ferritin ng/ml	D-dimer ng/ml	No.	%	CRP mg/L	Ferritin ng/ml	D-dimer ng/ml
15-30	12	8.57	< 10.0	(20-60)	≤ 100	12	8.57	< 10.0	(20-60)	≤ 100
31-45	32	22.85		(60-100)	(100-200)	34	24.28		(60-100)	(100-200)
46-60	8	5.7		(100-140)	(200-300)	12	8.57		(100-140)	(200-300)
61-75	20	14.28		(140-350)	(300-500)	10	7.14		(140-250)	(300-500)
Total	72	51.42%				68	48.57%			

Biomarker (CRP (N. R=< 10.0 mg/L), Ferritin (M=80-350 ng/ml), D-dimer (N. R=<500 ng/ml))

DISCUSSION

Table 1: shows that the patients whose ages between (31-45) years for male and females are more susceptible to infection with corona virus then the other age groups, their percentage was

(38.80 %) and (44.44 %) respectively, because of the rate of exposure of this age group more than other groups to direct contact between members of society. This results were confirmed by some previous studies(Ad'hiah,et al,2020; Asghar,et al,2020) , they indicated that the available data on the number of cases classified by age and sex in the Arab region is still limited, and that the data announced by WHO regarding the Arab

region, about (67%) of cases of infection with corona virus are among adults aged between 20-59 years, that (24%) fall among elderly aged to years and over, and that only (9%) of cases are among young people who are 19 years old or younger.

Table 2: show, it was noted that the effect of infection on sex, as the percentage in males was somewhat higher than in females, where the percentage amounted to about (51.42%), while the percentage in females was approximately (48.57%) of the total patients. This means that there is a higher risk of infection for males than females. From the observation of the values listed in table (2), also show the relationship between the biomarker in mild cases of coronavirus patients, it was observed that (CRP, Ferritin) values are within the normal range in the mild cases. This indicates that the infection is early.

It is also known that the biomarker CRP (C-Reactive Protein) is an acute-phase reactant that is synthesized by the liver in response to inflammation or infection (Abbaspour, et al, 2014). As the most of the values CRP in mild cases appeared within the normal range, and this indicates the absence of any inflammation, which indicates that the infection with the Corona virus is mild.

As for the other factor which is ferritin in mild cases, we note that the level of ferritin is within the normal range, and this indicates that the infection is in its infancy. So an elevated level of ferritin plays a role in pro-inflammation (Das, et al, 2021). As it is known that the production of ferritin under inflammatory conditions of the body is an important acute phase reactant (Yu, et al, 2020). There is no increase in the values of ferritin from the normal range, this means that there is no acute inflammation in the body, and this is confirmed by previous studies.

While d-dimer, we note from the values installed in the above table that there is a slight increase, and this indicates the prediction of an injury, but in its initial stages. As it is known that elevated levels of D-dimer in coronavirus patients than patients with community acquired pneumonia (Malik, et al, 2021). Can be used as helpful biomarker in the early management of the high-risk and pulmonary complication coronavirus patients (Chalmers, et al, 2019).

Table 3: shows that the infection rate for males is higher than females, as their percentage (51.65%), (48-32%) respectively. In addition, the age group between 31 to 45 years were more susceptible to infection with the virus for both sexes than the other groups. Table (3) also shows that all the biomarkers (CRP, Ferritin and D-dimer) have recorded a noticeable increase in their values, and this indicates the occurrence of infection in advanced stages, where it was noted that most of the values CRP in severe cases were high, this indicates the presence of inflammation, as is used as a biomarker for different

inflammatory and infections conditions. Also elevated CRP levels are directly correlated with level of inflammation (Jin, et al, 2020; Velavan and Meyer, 2020). As for the D-dimer values, we note that in severe cases of corona virus patients, higher values were recorded than in mild cases, and this is a clear evidence of the

thromboembolism (Soni, et al, 2021). where the level of D-dimer rises in severe cases, and this rise is useful in predicting the presence of pulmonary complications, in addition to being useful for identifying people who suffer from severity (Garcia-Olivé, et al, 2020).

The results in table 3: also showed that there is an increase in CRP, ferritin and d-dimer with increasing age for both sexes, and the reason for this may be due to the important role played by the sex hormones estrogen and progesterone in preventing infections and maintaining the immune system, and this explains the difficult complications and severity of disease that elderly people of both sexes are exposed to, this is due to the decrease in sex hormones with age (Dhindsa, et al, 2021).

CONCLUSIONS

We concluded from this study that gender has an effect on infection for corona virus, and that males are more susceptible to infection with the coronavirus and its complications than females, and that the severity of infection increases with age.

ETHICAL CONSIDERATIONS COMPLIANCE WITH ETHICAL GUIDELINES

A written informed, voluntary participation consent was obtained from laboratory and patients.

FUNDING

The study was conducted by self-financing by researcher.

AUTHOR'S CONTRIBUTIONS

Study concept: Dr. Bayda A. Yahya; Writing the original draft: Bayda A. Yahya and Doha N. Saad; Data collection: Doha N. Saad and Shahad H. Ali; Reviewing the final edition: All Authors.

DISCLOSURE STATEMENT:

They are no conflict of interest for the authors.

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