

Investigate the Association between Blood Types and COVID-19 Infection and their Outcome

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Abstract

The acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is the virus that causes COVID-19. The virus was first reported in Wuhan China in December 2019 [1]. The Covid-19 diseases caused by the SARS-COV-2 which triggers what physicians call the respiratory tract infections. Doctors say the disease affects the upper respiratory tract which is the nose, sinuses and throat or the lower respiratory tract which are the lungs and windpipes. Since December 2019 the virus has infected and killed millions of people around the globe. Samples of 634 patients infected with COVID-19 from Dyjala governorate in Iraq were included in this study. sex, age, blood groups, need for hospital admission and mortalities and comorbidities of the patients were analyzed retrospectively. All the data collected in the study was analyzed statistically by a statical package known as the social science version 22. The Fishers and chi square exact test were applied to analyze the categorical data which is suitable. The level of significance which is the p value was checked statistically and found significant if it were 0.05 or less. The studies found out that COVID-19 can affect any age group, but those over 60 years are more vulnerable to the disease.

Keywords: Blood groups, Rh, COVID-19, Infection, Outcome

The introduction and objectives

The coronavirus is a single stranded Ribonucleic Acid virus which is responsible for Covid-19 around the world. The virus was first reported in Wuhan China in December 2019 [1]. The Covid-19 diseases caused by the SARS-COV-2 which triggers what physicians call the respiratory tract infections. Doctors say the disease affects the upper respiratory tract which is the nose, sinuses and throat or the lower respiratory tract which are the lungs and windpipes. Since December 2019 the virus has infected and killed millions of people around the globe. According to studies [2,3] the COVID-19 has no biological marker which has been demonstrated to predict the disease. Numerous studies conducted by researchers have found the connection between the Norwalk virus and hepatitis B is linked or connected with the blood groups. Studies on SARS-COV-1 show there is a relationship between blood types and virus infections, and that Blood group O is protective against the SARES-COV-2 and the different types of Blood groups. Other studies show that Blood group O people have a negative and predictive effect, while those with Blood group A have a sever pulmonary damage [2]. This variable helplessness to extreme intense respiratory disorder COVID-19 2 SARS-CoV-2 contamination could be connected to flow against A antibodies, which could meddle or even repress the infection cell grip measure. The objective of the study was the predistortion of SARS-CoV-2 with ABO blood groups and to investigate the relation between blood types and disease outcome.

Material and Methods

Samples of 634 patients infected with COVID-19 from Dyjala governorate in Iraq were included in this study. sex, age, blood groups, need for hospital admission and mortality-

ties and comorbidities of the patients were analyzed retrospectively. About 10 ml of the sample was collected from each participant for blood analysis.

Statistical analysis.

All the data collected in the study was analyzed statistically by a statistical package known as the social science version 22. The Fishers and chi square exact test were applied to analyze the categorical data which is suitable. The level of significance which is the p value was checked statistically and found significant if it were 0.05 or less.

Results

The study had 634 COVID-19 patients with mean age of 41.6 years and range of 8 months to 90 years). 1.9% of the patients were in age group <20 years, 24.9% of patients were in age group 20>29 years, 24.6% of patients were in age group 30-39 years, 17.4% of patients were in age group 40-49 years, 14.2% of patients were in age group 50-59 years, 10.3% of patients were in age group 60-69 years, 5% of patients were in age group 70-79 years and 1.7% of patients were in age group of 80 years and more. Male gender represented 54.9% of studied patients and female gender represented 45.1% of them (Table 1 and figure 1).

Table 1: Demographic characteristics of COVID-19 patients

Variable	No.	%
Age		
<20	12	1.9
20>29	158	24.9
30>39	156	24.6
40>49	110	17.4
50>59	90	14.2
60>69	65	10.3
70>79	32	5.0
≥80 years	11	1.7
Gender		
Male	348	54.9
Female	286	45.1
Total	634	100.0

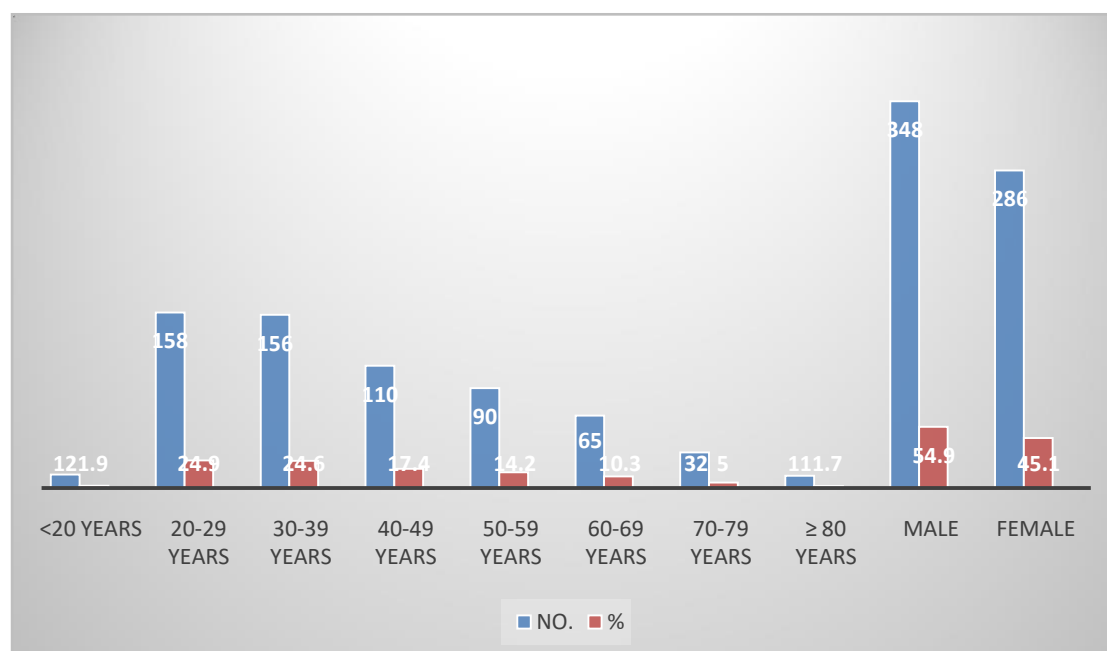


Figure 1: Demographic characteristics of COVID-19 patients

The blood groups of patients that infected with COVID-19 were showed commonly group A+ve (28.7%), group O+ve (26.5%), group B+ve (23.5%) and less likely group AB+ve (10.1%), group O-ve (4.9%), group B-ve (3%), group A-ve (2.1%) and group AB-ve (1.2%). On another hand, blood Rh +ve represented 88.8% of COVID-19 patients, while Rh-ve represented 12.2% of them (Table 2 and Figure 2).

Table 2: Blood groups of COVID-19 patients

Variable	No.	%
Blood groups		
A+ve	182	28.7
B+ve	149	23.5
O+ve	168	26.5
AB+ve	64	10.1
A-ve	13	2.1
B-ve	19	3.0
O-ve	31	4.9
AB-ve	8	1.2
Blood Group		
Blood Rh		
Positive	563	88.8
Negative	71	11.2
Total	634	100.0

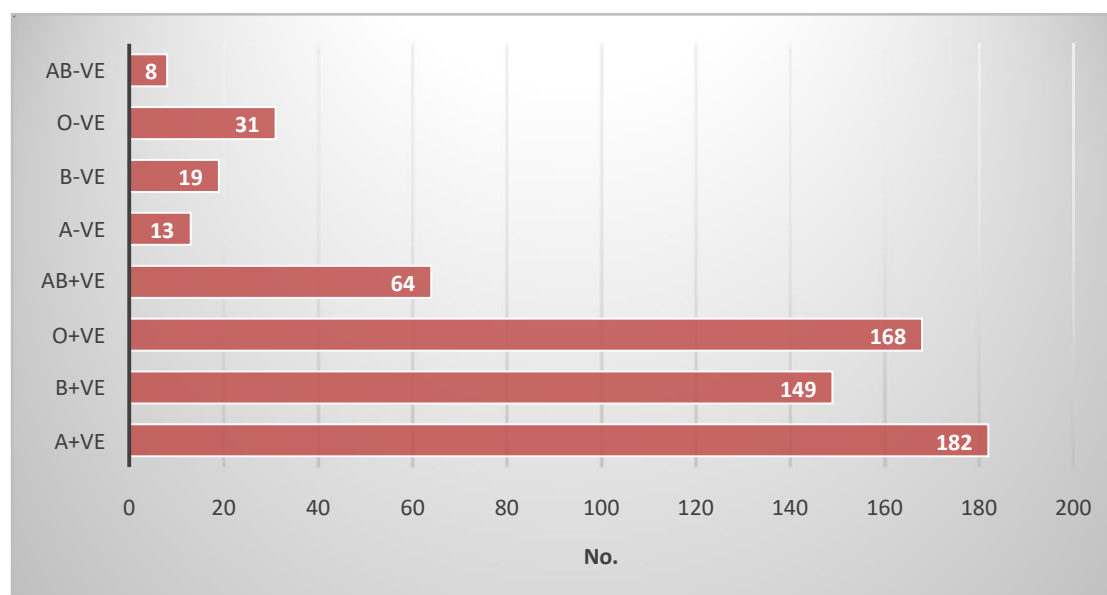


Figure 2: Blood groups of COVID-19 patients showing the O+ve and A+ve with highest rates.

A highly significant association was observed between increased age of COVID-19 patients and death outcome ($p < 0.001$), 60.1% of dead COVID-19 patients were 60 years age and more. No significant differences were observed between COVID-19 patients with alive outcome and COVID-19 patients with death outcome regarding gender ($p = 0.17$) (Table 3).

Table 3: Distribution of COVID-19 patient's demographic characteristics according to outcome

Variable	Outcome				P
	Alive		Death		
	No.	%	No.	%	
Age					<0.001 ^S
<20	12	2.1	0	-	
20>29	154	26.6	4	7.3	
30>39	154	26.6	2	3.6	
40>49	105	18.1	5	9.1	
50>59	79	13.6	11	20.0	
60>69	55	9.5	10	18.2	
70>79	18	3.1	14	25.5	
≥80	2	0.3	9	16.4	
Gender					0.17 ^{NS}
Male	313	54.1	35	63.6	
Female	266	45.9	20	36.4	

NS=Not significant, S=Significant.

There were no differences seen between COVID-19 patients with alive outcome and COVID-19 patients with death outcome regarding blood groups ($p=0.86$) and blood Rh ($p=0.6$), however, higher proportions of blood groups with death outcome were groups B+ve and O+ve with percentage of 29.1% and 29.15 respectively (Table 4).

Table 4: Distribution of COVID-19 patient's blood groups according to outcome

Variable	Outcome				P
	Alive		Death		
	No.	%	No.	%	
Blood groups					0.79 ^{NS}
A+ve	169	29.2	13	23.6	
B+ve	133	23.0	16	29.1	
O+ve	152	26.3	16	29.1	
AB+ve	59	10.2	5	9.1	
A-ve	11	1.9	2	3.6	
B-ve	18	3.1	1	1.8	
O-ve	30	5.2	1	1.8	
AB-ve	7	1.2	1	1.8	
Blood Rh					0.6 ^{NS}
Positive	513	88.6	50	90.9	
Negative	66	11.4	5	9.1	

NS=Not significant.

Discussion

Numerous studies show that Blood type distribution, age and gender are related to the Covid-19 diseases outcome and susceptibility. Studies show the elderly especially male patients, are likely to suffer more when they get the diseases [3]. Reports show patients with blood group O have a very low risk of getting the SARS-COV-2 infection, while those with blood group A have a very high chance of acquiring the infection [4]. The plausible relationship between the ABO blood agents and infectious agents depends mainly on the sugar moieties on the Red blood cells surface. Studies show that the surface acts as a receptor for parasites, viruses and bacteria which eventually mediates their entrance. Reports show that some viruses cannot bind to the Red blood cells which may lack other blood group antigens which are very crucial structures for adherence. Reports shows the Norwalk Virus (NV) infection mostly infects people with blood type O while those with type B are resistant to the virus. The resistance is as a result of the expression of the ABH carbohydrates antigens. The terminal α -galactose modifies the Norwalk virus ligand then eventually hides for Norwalk virus binding and blocks the binding site. Studies show that lack of the ABH antigens in Blood Group O leads to susceptibility of the individuals to different infections which take place after exposure to the virus [5]. On the other hand, Covid-19 infections, the SARS-CoV-2 virus RNA replication and translation causes the formation of complex glycans groups which are added and expressed to new types of viruses. The complex Glycans are formed in the cells

that co-express the ACE2. In the new virus glycans formed in the process, the Blood group-A or B-specific and ABO (H) play a crucial role, for instance when the subject has anti-B and anti-A antibodies and is of Blood group O then the antibodies may block the entry and attachment of the virus which is similar to the SARS-COV spike protein. It means that people with Blood Group O have a very lower chance of being infected, and this depended on the type of; anti-A, anti-a Gal or anti-B antibodies as the studies report [6].

The study shows that patients with Blood group A have a high chance of getting infected with COVID-19 virus, while patients with Blood Group O have a very low chance of getting infected. According to Arend et al [7] the synthesis of Blood group AB brings about the synthesis of Blood group Ab which enable the strongest contact with molecularly and pathogen precluding any isoagglutinin activities which make the group with the smallest and least protected in the ABO (H) blood groups. Studies have shown that people with Blood Group O (H) are vulnerable to many infections, especially to cholera. Cholera is among the historical pandemics that have hit the world and many have survived the diseases due to immunological balance with many bacteria and is known as the largest Blood groups around the world. People with Blood group A/B rarely develop severe diseases due to their blood group [7,8]. The findings of the study show that infections that occurred had no significant effect on the ABO blood groups, the results are coincided by Göker [8], and Zietz et al [9] stud. However, the study does not identify any serious relationships between intubation or death and Blood group due to the Corona virus. The study showed that any person of any age group can easily get infected by the virus. however, the increase in age, the death risk becomes high and rises to almost 60% of dead patients who are over 60 years of age. According to Caramelo [10], and Palaodimos et al [11] there is no significant affection of patient's gender on disease outcome that contradict and studies found that males are more likely to die from COVID-19.

Conclusion

In conclusion, COVID-19 disease is responsible for the death and infection for millions of people around the world. Studies show that COVID-19 can affect any age group, but by increase the age risk of death from infection is rising. Studies show that people with Blood group O have a lower risk of contracting the virus while those with Blood group A have a higher chance of contracting the SARS-COV-2. Older adults especially those over the age of 60 have a higher risk of severe complications due to the infection of the virus.

References

- 1- Zhou, Peng, et al. "A pneumonia outbreak associated with a new coronavirus of probable bat origin." *nature* 579.7798 (2020): 270-273.
- 2- .Göker,Hakan, et al. "The effects of blood group types on the risk of COVID-19 infection and its clinical outcome." *Turkish journal of medical sciences* 50.4 (2020): 679-683.
- 3- Arachchillage, Deepa RJ, and Mike Laffan. "Abnormal coagulation parameters are associated with poor prognosis in patients with novel coronavirus pneumonia." *Journal of Thrombosis and Haemostasis* 18.5 (2020): 1233-1234.
- 4- Wu, Yuqin, et al. "Relationship between ABO blood group distribution and clinical characteristics in patients with COVID-19." *Clinica Chimica Acta* 509 (2020): 220-223.

- 5- Amjadi, Omolbanin, et al. "Blood groups: in health and diseases." *Research in Molecular Medicine* 3.4 (2015): 1-9.
- 6- _Mayoral, Eduardo Pérez-Campos, et al. "Factors related to asymptomatic or severe COVID-19 infection." *Medical Hypotheses* (2020): 110296.
- 7- _Arend, Peter. "How Blood Group A Might Be a Risk and Blood Group O Be Protected from SARS-CoV-2 (COVID-19) Infections (How the Virus Invades the Human Body via ABO (H) Blood Group Carbohydrates)." *Preprints* (2020).
- 8- _Göker, Hakan, et al. "The effects of blood group types on the risk of COVID-19 infection and its clinical outcome." *Turkish journal of medical sciences* 50.4 (2020): 679-683.
- 9- Zietz, Michael, and Nicholas P. Tatonetti. "Testing the association between blood type and COVID-19 infection, intubation, and death." *MedRxiv* (2020).
- 10- Caramelo, Francisco, Nuno Ferreira, and Barbara Oliveiros. "Estimation of risk factors for COVID-19 mortality-preliminary results." *MedRxiv* (2020).
- 11- Palaiodimos, Leonidas, et al. "Severe obesity, increasing age and male sex are independently associated with worse in-hospital outcomes, and higher in-hospital mortality, in a cohort of patients with COVID-19 in the Bronx, New York." *Metabolism* 108 (2020): 154262.