

Analysis Of The Relationship Between ABO Blood Group With Corona Virus Infection And Symptoms Severity

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Abstract: Background: The relationship between the infectivity and severity of corona virus infection according blood group was not studied among Palestinian society. Aims: we aimed to study the association between Corona virus infection and severity and blood group and other sociodemographic variables. Material And Methods: For a subgroup of the study, COVID infection was assessed using PCR and blood group was measured using slide slip method. Demographic Variables were obtained. For another subgroup all information were obtained from Palestinian Ministry of Health Records. Data was analyzed using IBM SPSS 21. Result: A total of 324 Palestinian were included in this study Age (32 ± 13.2 y), 20.2% were males, 33.9% were infected with corona virus. The blood groups were (A 42.8%, B 17.5%, AB 9% and O 30.7%). In addition, 9.6% had negative rhesus blood group. The highest rate of COVID infection was among participants with blood group A. In multiple regression models, blood ABO blood group and gender were significantly related to the infectivity of Covid, whereas having. A group was related to severe or moderate infection. Also, males were more likely to have severe or moderate infection. Conclusion: Blood group and being males is associated with higher and severe form of COVID infection. [Kharraz L Natl J Integr Res Med, 2021; 12(6): 14-19]

Key Words: Blood Group, Corona, Infection, Severity, Pandemic

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Introduction: In March, The world Health Organization declared a novel pandemic disease known as coronavirus disease 2019 (Covid-19). The disease arises for the first time in Wuhan in December 2019. The infected patient suffered from severe acute respiratory syndrome, characterized by dry cough, dyspnea, fever, and bilateral lung infiltrate upon imaging. Later on, the virus which was found to be responsible for this syndrome was named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The mortality and morbidity rate from SARS-CoV-2 all over the world was very high. Millions of illness and deaths recorded worldwide. In Palestine, according to state of Palestine COVID-19 Data Hub, the updated cases in Palestine on January are: 174413 confirmed cases, 162640 recovered, 8926 active cases and 1951 deaths.

Several studies arise to find out the possible risk factors for infection with Covid 19 such as age, gender, and chronic disease. The ABO blood group system might be a risk factor for infection with SARS-Cov-2. Several studies show the relation between ABO blood group system and many different diseases as hepatitis, H. pylori infection, tumor and others¹. Statistically,

epidemiological studies reported association between the ABO blood group system and infection with SARS-CoV-2 and also survival after infection¹. It is well known that ABO antibodies play an important role in defense mechanism against pathological microorganisms, but the difference in ABO blood group from person to person may increase or decrease the susceptibility of individual to the infectious pathogen. SARS-CoV--2 might be one of the pathogens that influenced by ABO blood group².

A study on a medical staff in one of Hong kong hospital reported that people with O blood group have reduced susceptibility to SARS infection after exposure to the virus³. A similar study conducted between February and March in 2020 in Wuhan central hospital and another two hospitals in Whuan, China. The study reported that the proportion of blood group A was significantly high in SARS-2 infected patient while the proportion of blood group O was significantly low in SARS-2 infected patient compared to healthy control⁴. Globally, blood group O is the most common, then group A, then group B, and finally group AB⁵. Regarding Rh(D) antigen and infection with SARS-CoV- 2, a study shows that

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Rh(D) positive individuals are more likely to infect with SARS-Cov-2 than Rh(D) negative individuals⁶. A study in Sudan had found that the subjects with O-positive blood group are at lower risk of developing severe symptoms when infecting with SARS-CoV-2, while the subjects with A-positive blood group will suffer from severe symptoms when exposed to the virus⁷.

Other risk factors for severe infection with corona virus include older age, having chronic disease and being male⁸. The aim of this work is to find the association between corona virus infection and severity with ABO and Rhesus blood group. Also, to identify if severe and moderate symptoms infection is related to ABO and Rhesus blood group among a group of Palestinian participants.

Material & Methods: A total of 384 patients who were diagnosed with Covid 19 by Real Time RT-PCR system were enrolled in this study. The data related to SARS-2 infected patients will be collected in collaboration with the Ministry of health. Blood test for ABO grouping was collected from the document or done by classic slide method. A blood sample was collected from each participant by finger prick. Then the test was done according to manufacture instructions. On a labelled slide, a drop of anti A, anti B, and anti D was placed and a drop of blood from the patient will be added and mixed with each antibodies.

The blood group for each patient was recorded depending on where agglutination takes place. A demographic data and general health information were collected from the participants by asking them to fill a questionnaire. Statistical analysis was done for the collected data to find out the most susceptible people to SARS-2 infection based on their blood group.

The study was approved by institution Research Board IRB at Najah National University. Oral informed consent was obtained from all participants. The ABO blood group from 384 healthy controls was tested, with a distribution of A, B, AB, and O being 32.16%, 24.90%, 9.10%, and 33.84%, respectively. In addition, blood groups of a total of 1775 persons infected with COVID-19 showed a distribution of 25.80%, 10.03%, 26.42%, and 37.75% for O, AB, B, and A, respectively. Some of analysis was performed on 183 based on available data. Statistics: Data was analyzed using IBM SPSS 21.

Descriptive statistics included means for continuous variables and proportions for categorical variables. The relationship between ABO and resus blood groups and COVID infection were calculated using chi-square test or logistic regression test. The relationship of study variables with study categories of severity were estimated using Chi-Square.

Results: In total, the study included 183 participants, with almost third of them were infected with corona virus. Table 1 provides description of the study sample. Our study group were mainly females. The prevalence of chronic diseases including diabetes mellitus 2, hypertension, cardiovascular diseases, cancer, and kidney diseases was very low in this study sample and hence analysis based on disease status was not performed. A blood group was the most common in our study group, followed by O blood group. Less than 10% had negative rhesus blood group. 68% of study participants have no symptoms, 14% had mild symptoms and 18% had mild symptoms.

Table1: Descriptive Statistics Of Study Variables (N=183)

Variable	Percentages
Covid Test	
Positive	121 (66.1%)
Negative	62 (33.9%)
Gender	
Female	146 (79.8%)
Male	37 (20.2%)
Diabetes	
No	177 (96.7%)
Yes	6 (3.3%)
Hypertension	
No	169 (92.3%)
Yes	14 (7.7%)
Smoker	
No	162 (88.5%)
Yes	21 (11.5%)
Cardiac Diseases	
No	178 (97.3%)
Yes	4 (2.2%)
Cancer	
Yes	182 (99.5%)
No	1 (0.5%)
Kidney Disease	
Yes	182 (99.5%)
NO	1 (0.5%)
Symptoms	
Non	122 (66.7%)

Mild	25 (13.6%)
Moderate	33 (18%)
Severe	3 (1.6%)
Anti-Coagulant	
No	166 (91.7%)
Yes	15 (8.3%)
Anti-Hypertensive	
No	170 (93.9%)
Yes	11 (6.1%)
Anti-Dyslipidemia	
No	171 (94.5%)
Yes	10 (5.5%)
Blood Group	
A	71 (42.8%)
B	29 (17.5%)
AB	15 (9%)
O	51 (30.7%)
Rhesus	
Negative	16 (9.6%)
Positive	150 (90.4%)

Graph 1 describes age distribution in study group (3 y to 70 y). BMI was available for only 32 participants.

Graph 1: Histogram Showing Distribution Of Age In Our Study Group

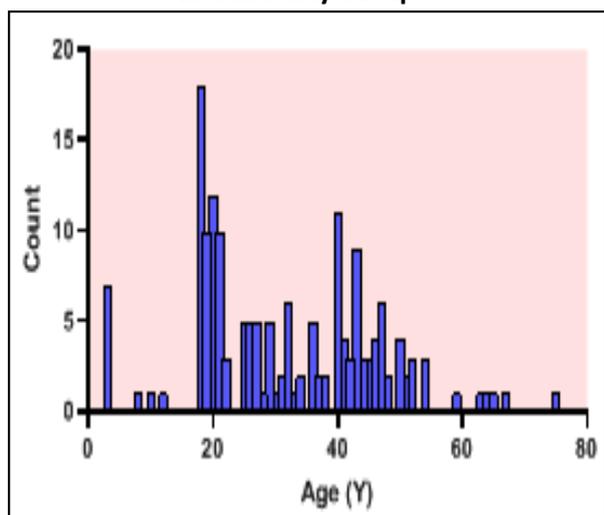


Table 2 describes the distribution of COVID infection according to blood group, it was found that COVID infection was most common in A group and least common in group AB (p=0.06).

There was no significant difference according to Rhesus category. However when we included other observations to analysis the relationship was no more present.

In table 4, there was a significant association between blood group with blood groups AB and B causing 3 times less Corona infection relative to O

blood group. Being male increased the risk by three times in multiple logistic regression.

Table 2: Analysis For Relationship Between COVID Infection And Blood Group As Found In Reports (N=183)

Variable	Covid Infection		Chi-Square	P-Value
	Negative	Positive		
Blood Group				
A	40 (36.8%)	31 (54.4%)	9.0	0.03
Ab	13 (11.9%)	2 (3.5%)		
B	17 (15.6%)	12 (21.1%)		
O	39 (35.8%)	12 (21.1%)		
Rhesus				
Negative	11 (10.1%)	5 (8.8%)	0.1	0.78
Positive	98 (89.9%)	52 (91.2%)		

Table 3: Analysis For Relationship Between COVID Infection And Blood Group As Was Measured By Researcher And Found In Reports (N=324)

Variable	Covid Infection		Chi-Square	p-value
	Negative	Positive		
Blood Group				
A	81 (38.6%)	113 (42.4%)	1.13	0.77
AB	16 (7.6%)	19 (7.1%)		
B	30 (14.3%)	41 (15.4%)		
O	83 (39.5%)	94 (35.2%)		
Rhesus				
Negative	20 (9.5%)	24 (9.0%)	0.84	0.48
Positive	190 (90.5%)	243 (91%)		

In table 5 provides description according to severity of symptoms. Moderate and severe symptoms were more common in participants with blood group A and least common in groups AB and O. Adults with mild and moderate symptoms were older than adults with no symptoms, In addition severe and moderate symptoms were more common in males relative to females. Whereas BMI and smoking status were not related to symptoms.

Table 4: Logistic Regression On Association Between COVID Infection And Blood Group (N=324)

	95% CI		
Age	0.002±0.01	0.83	1.0 (0.98, 1.02)
Gender (Females Versus Males)	0.61±0.28	0.03	1.8(1.10, 3.18)
Bld GP A	0.72±1.75	0.68	2.1(0.07, 64.8)
Bld GP B	0.90±0.33	0.007	2.46 (1.30, 4.72)
Bld GP AB	0.88±0.42	0.04	2.40(1.05, 5.52)
Bld GP O	Ref		
Rhesus Positive	-0.17±1.77	0.93	0.85(0.03, 26.9)
Rhesus 2	-0.23±0.54	0.67	0.79 (0.28, 2.28)

Table 5: Comparison Of Study Variables According To Severity Of COVID Infection (N=183)

Variable	No Symptoms	Mild	Moderate Or Severe	
BMI (Kg/M2)	25.4±3.34 (n=6)	28.1±5.1 (n=12)	25.6±3.4 (n=14)	F=1.44, p=0.25
Age (Y)	30.8±11.4 (n=119)	36.2±18.3 (n=25)	34.6±14.5 (n=32)	F=2.37, p=0.09
Blood Group				
A (N=71)	40/56%	10/14%	21/30%	Exact=16.2
AB (N=15)	13/87%	2/13%	0/0	p-value=0.07
B (N=29)	17/59%	6/20.7%	6/20.7%	
O (N=51)	40/78.4%	6/11.8%	5/9.8%	
Gender				
Male (N=37)	17 (45.9%)	9 (24.3%)	11 (30.6%)	Chi=9.2
Female (N=146)	105 (71.9%)	16 (11.0%)	25 (17.1%)	p-value=0.01
Smoking				
Yes	109 (67.3%)	22 (13.6%)	31 (19.1%)	NS
No	13 (61.9%)	3 (14.3%)	5 (23.8%)	

Discussion: In Occupied Palestinian Territories, the screening and testing for Corona virus infection is performed in Palestinian Ministry of Health. In total we included 183 participants, but some data were missing for some variables. The number of severe cases was very few so we combined moderate and severe cases. Unlike what is expected from previous studies, group A was the most common among study participants followed by O blood group⁸. In our study the O blood group was associated with more common corona infection which is like what other studies presented^{8,9}. Similarly, in multiple logistic regression this blood group was not significantly related to corona infection, but rather blood group AB and B showed protection from corona virus infection. Other study, showed that group AB is the risk group for corona virus infection.

This difference could reflect variation among different ethnic groups and can't be extrapolated to other populations given the small number of participants in this study.

In Univariate analysis we show older age, being male and some blood group as important factors in increasing the severity of symptoms of Corona

virus infection. Group O and AB had the lowest numbers of sever corona virus infection. It is consistent that age is important factor that increase the severity. It is important to notice that although we included participants over 60 they were very few (graph 1) which may indicate why the relationship between corona virus infection and severity was not strong. The relationship between aging and corona virus infection could be related to the fact that older adults had altered immune response to corona infection which could be associated with lack of control of viral replication and increase in pro-inflammatory response.

For gender, our study group indicated that males had more corona infection and severity of infection, which contradicts what was previously found^{8,10}.

It was shown before that ABO blood group and presence of chronic diseases such as DM2, cardiovascular disease, hypertension are associated with increased disease severity¹¹. In our study group the number of study participants did not allow comparison based on disease condition probably due to young age of study

participants. In Univariate analysis we show some variation in severity, but other studies showed that blood group was not related to corona virus infection severity including admission to ICU, intubation and death from corona infection¹²⁻¹⁴.

This could be related to that ABO antibodies are not effective against corona virus antigen. It is important to consider that different ABO blood groups could exhibit unique patterns of risk factors that could contribute to corona virus infection severity. It is known that blood group A is associated with more risk for coronary heart disease, venous deep thromboembolism, fever, cough, dyspnea, sore throat and other risk factors^{13,15,16}. A previous study indicated that anti-A antibody inhibit the association between S protein and ACE2 receptor which matches with inhibition of virus attachment to its receptor¹⁷. This study is not without limitation including its cross sectional design, the small number of participants and small number of available data on BMI and obesity among studied participants and finally the higher representation of younger age group in comparison to adults over 50.

Conclusion: To deduce, Smoking is an imminent health hazard. At least half of all lifelong smokers die earlier than non-smokers. The findings from the present study suggest that with increase in duration and frequency of smoking, the WBC count, total platelet count and coagulation parameters (PT, APTT) are adversely affected. Thus, new and effective strategies are urgently needed to curb and discourage adolescent smoking as its toxic effects are reversible if discontinued at an early age. Extensive rehabilitation measures should be promoted and smokers should be provided with nicotinic substitutes for primordial prevention of major non-communicable diseases like CAD, malignancies, thromboembolic events and its complications.

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