

Prevalence and prognosis of ABO blood groups among COVID-19 patients at KAUH, Jeddah

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Abstract

Background: COVID-19 has spread rapidly across the globe and has generated over 1,130,000 confirmed infections worldwide as on fifth of April 2020. There is limited research about ABO blood group and COVID 19 prevalence and prognosis in the Middle East region.

Objectives: The aim of this study was to assess the prevalence and prognosis of ABO blood groups in (COVID-19) patients at King Abdulaziz University Hospital in Jeddah.

Methods: This is a retrospective study analyzing 122 inpatients' medical records of patients above 18 years who were COVID-19 positive at King Abdulaziz university hospital, Jeddah, Saudi Arabia, between March to June 2020, prognosis of the disease studied by the patient's situation and the need for intubation or ICU admission.

Results: From a total of 790 patients, 122 met the study criteria. The most frequent ABO group was O blood group with a percentage of 40.2% followed by A blood group 35.2%. Hypertension and diabetes mellitus were common medical comorbidities 42.6%, 41%, respectively. 80.3% of patients were alive with no significant relation between Blood group and ICU admission $p=0.705$ or intubation $p=0.702$.

Conclusion: O blood group was frequently seen among COVID-19 patients followed by A blood group, with a non-significant relationship between blood groups and ICU admission or intubation. Future multicentric studies are recommended, including larger samples.

Key words: prevalence, prognosis, ABO, blood, COVID-19, KAUH

Introduction

The 2019 novel coronavirus (COVID-19) caused by severe acute respiratory syndrome coronavirus (SARS-CoV-2) was first identified as an epidemic of respiratory tract infection in Wuhan City, China (1), then spread all over the world. The rapid evolution of the outbreak had distressing consequences for healthcare systems and communities worldwide. Then the World Health Organization announced on March 11, 2020, that the Coronavirus disease-2019 (COVID-19) is a pandemic (2). It has rapidly spread globally and had generated over 1,130,000 confirmed infections and over 62,000 deaths worldwide as of April 5, 2020 (3).

Recently, COVID-19 has affected over 200 countries, and the mortality rate has reached as high as 8% in Italy (4). By measures of social distancing and the socioeconomic impact of the pandemic, billions of citizens are affected (5). Since the discovery of COVID-19, there has been an increasing interest in this virus's risk factors. There are many risk factors associated with Severity and Mortality in COVID-19 (Older age, underlying hypertension, diabetes mellitus, COPD, high cytokine levels (IL-2R, IL-6, IL-10, and TNF- α), and elevated lactate dehydrogenase level, d-dimer levels greater than 1 $\mu\text{g/mL}$, and higher SOFA score on admission) (6,7,8,9).

Many researchers have shown the impact of ABO blood groups and the host susceptibility to many infections such as norovirus, HIV, SARS, and hepatitis B virus (10). A previous study on COVID-19 patients in Wuhan and Shenzhen, China discovered associations between ABO blood types and infection; the result showed Blood Group A has a higher risk of death compared with B, AB, O groups (11).

On the contrary, another two studies done in New York on April 11, 2020, and in Changsha, China in June both showed that group A has a higher risk for COVID 19 which so far is consistent with the Wuhan study (3,12). Regarding research that has been reviewed, very little discussed this issue in the Middle East, especially in Saudi Arabia. This study should encourage further investigation of the relationship between the ABO blood group and COVID-19 susceptibility so we aimed to explore the distribution of ABO blood groups related to (COVID-19) infection and the prognosis of the disease in all individuals at King Abdulaziz University Hospital in Jeddah.

Methodology

A retrospective study was done at KAUH in Jeddah, Saudi Arabia from March to June, on all inpatients' records who had Nasopharyngeal swab for COVID-19. Patients ≥ 18 years old who tested positive for COVID-19 were included in the study and classified according to their ABO blood group. The comorbidities that were assessed in those patients have (DM, HTN, Cardiovascular diseases, Pulmonary diseases, and Tumors) and the prognosis of the disease was studied according to the patient's situation (alive or deceased) (need for intubation or ICU admission). Also, age, gender, and BMI play an essential role in determining prognosis. Data was entered using an online Google drive form then exported to Microsoft Excel. Statistical analysis was achieved by using the Statistical Package for the Social Sciences (SPSS) version 21. The Mean and the standard deviation were calculated to describe continuous variables, while numbers and percentages were used for categorical variables. Student t-test and chi-square test were used to evaluate the association between continuous and categorical variables, respectively. A p-value <0.05 was considered significant. The ethics committee approved this study at KAUH (Reference No. 371-20).

Results

During the study period, a total of 790 patients underwent laboratory tests for COVID-19. Patients who had negative results or positive results without a cross-match test were excluded from our study. 122 patients had a positive COVID-19 result and had a cross-match test. The mean age of presentation was 49.12 ± 16.859 . More than half, (51.6%), were male. Common presenting BMI was Obese 36.1% and Overweight 32.8%. HTN and DM were found in most of the patients, with a percentage of 42.6%, 41%, respectively. All of them had nasal swabs (Table 1).

O blood group was frequently seen with a percentage of 40.2%, followed by A blood group of 35.2%. Most of the patients were alive 80.3%. There was no significant relation between Blood group and ICU admission $p=0.705$ or intubation $p=0.702$ (Table 2).

Table 1. Characteristics of COVID 19 patients

Demographic Data		N (%), Mean \pm SD	P-value
Age		49.12 \pm 16.859	
Gender	Male	59 (48.4)	
	female	63 (51.6)	
BMI categories	Underweight	3(2.5)	0.98
	Ideal	34(28.6)	
	Overweight	39(32.8)	
	Obese	43(36.1)	
Chronic disease	DM	50(41)	0.886
	HTN	52(42.6)	0.807
	Pulmonary disease	12(9.8)	0.175
	Cardiovascular disease	30(24.6)	0.551
	Tumor	9 (7.4)	0.789
Swab type	Nasal swab	122 (100)	
ABO group	A	43(35.2)	
	B	20(16.4)	
	O	49(40.2)	
	AB	10(8.2)	
Rh	Positive	115(94.3)	
	Negative	7(5.7)	
Patient situation			0.359
	Alive	98(80.3)	
	Deceased	24(19.7)	
Patient prognosis	ICU admission	42(34.4)	0.705
	Intubation	26(21.3)	0.702

Table 2. Blood group comparison

Characteristic /ABO group		A,43(35.2) N (%)	B, 20(16.4) N (%)	O, 49(40.2) N (%)	AB, 10(8.2) N (%)
Gender	Male	17(39.5)	10(50)	27(55.1)	5(50)
	Female	26(60.5)	10(50)	22(44.9)	5(50)
BMI categories	Underweight	1(2.4)	1(5.3)	1(2)	0(0)
	Ideal	13(31.7)	5(26.3)	14(28.6)	2(20)
	Overweight	13(31.7)	7(36.8)	16(32.7)	3(30)
	Obese	14(34.1)	6(31.6)	18(36.7)	5(50)
Chronic disease	DM	18(41.9)	7(35)	20(40.8)	5(50)
	HTN	20(46.5)	8(40)	21(42.9)	3(30)
	Pulmonary disease	2(4.7)	4(20)	4(8.2)	2(20)
	Cardiovascular disease	10(23.3)	3(15)	15(30.6)	2(20)
	Tumor	3(7)	2(10)	4(8.2)	0(0)
Rh	Positive	41(95.3)	19(95)	45(91.8)	10(100)
	Negative	2(4.7)	1(5)	4(8.2)	0(0)
Patient situation	Alive	38(88.4)	16(80)	36(73.5)	8(80)
	Deceased	5(11.6)	4(20)	13(26.5)	2(20)
Patient prognosis	ICU admission	14(32.6)	5(25)	19(38.8)	4(40)
	Intubation	7(16.3)	4(20)	12(24.5)	3(30)

Discussion

The aim of this study was to assess prevalence and prognosis of ABO group in COVID-19 patients at King Abdulaziz University Hospital in Jeddah. Generally, the predominant blood group in the western region of Saudi Arabia is O, followed by A, B, AB, respectively (13). In our study, we found that O group has a higher incidence with COVID-19 infection, and the least incidence was AB blood group. On the contrary, A blood group has the highest incidence in Wuhan, Changsha and New York studies (3,11,12,13,14,15). In our study, all hospitalized patients were diagnosed by Nasopharyngeal swab; this type of swab is recommended by Interim Guidelines for Collecting, Handling, and Testing Clinical Specimens for COVID-19 although oropharyngeal swab is acceptable (16,17). There are 60 confirmed risk factors identified for COVID-19 severity. Increasing in age is classified as one of the highest consistency risk factors for Covid-19 severity in a brief review done on first of June 2020 (18).

Patients with pre-existing comorbid conditions showed a high association for COVID-19 infection in this study, and the most distinctive was hypertension, followed by diabetes mellitus. That was similar to two different studies done in China (19,20). Hypertension carries a nearly 2.5 fold increased risk of severe COVID-19 and higher mortality (21). Now worldwide it is recognized, that having at least one such comorbidity is an unfavorable prognostic factor in patients with pneumonia of various etiologies (22). However, the strength of the association between these comorbidities and an increased risk of COVID-19 severity has not been established yet. Obesity is considered the chief risk factor for the comorbidities discussed before. We found the highest percentage from the sample was obese, similar to a previous study that found almost half of the patients were obese, and the majority of them required mechanical ventilation (23). Previous studies showed a good prognosis for most COVID-19 patients and a small percentage of them had severe or critical manifestations (14,15). This result agrees with our findings where more than half of the patients didn't intubate or were admitted to ICU.

O blood group has the worst prognosis in our study as it was associated with more ICU admission and risk of intubation compared to non-O blood groups. Moreover, most of the deceased cases were in O blood group; this could be due to a higher incidence of hypertension among them. Blood group A is associated with a lower recorded number of deaths. A different distribution pattern was shown in the Wuhan study: Where blood group A has a higher proportion of death (11). In contrast, a meta-analysis study done in New York showed AB blood group has a higher association with intubation and death among COVID-19 patients (3).

Limitations

One of the limitations of this study was it being conducted in one hospital with a limited population of 122 patients. Also, many patients didn't have a cross match test for their blood group.

Conclusion

The present study assessed the relation between COVID-19 infection and ABO blood groups among 790 patients. The mean age of the participants was 49.12 ± 16.859 and it was found that O blood group was frequently seen among patients with a percentage of 40.2%, followed by A blood group of 35.2%. A non-significant relationship was found between blood groups and ICU admission or intubation. As the first study to assess this relationship, it is recommended to conduct similar future multicentric studies including larger samples to represent the population accurately.

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