Original Research Paper

Relationship between Outcomes of COVID19, its Susceptibility and Blood Groups

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Abstract: COVID-19, a viral infection spread across the world affecting many people around the world. In ABO blood type, certain types are more prone to infections and causes severe symptoms. Relationship between ABO blood type and COVID -19 still needs to be found out. A prospective cohort study was conducted to evaluate a relationship between ABO blood type and COVID-19. Data was collected from 148 patients who presented for COVID testing through PCR or nasal swab tests. COVID positive patient's blood test was performed to find out ABO blood group/type and their symptoms with which they presented. The blood group distributions, age and gender of these patients were recorded. It was seen that there is a statistically significant association between COVID and blood group A+, A-, B+ with p-value of 0.01, 0.03 and 0.01 respectively and no statistical significance was found between B-, O+, O-, AB+ and AB- with P-value of 0.06, 0.1, 0.9, 0.7 and 0.8 respectively. Multi variate analysis performed showed age, blood group and ICU stay to be significantly associated with COVID with p-value of <0.01, 0.05, <0.01 and gender to be non-significantly associated with COVID with p-value of 0.7. Blood group A+, A- and B+ are more prone to contract COVID virus with more severe symptoms. Fever and cough have been to be positively associated with COVID cases and found to be affecting patient's health. Age is also found be affecting patient's life, with a higher chance of contracting COVID-19 as the increases.

Keywords: ABO Blood Group, COVID-19, Corona Virus

Introduction

Coronavirus disease (officially abbreviated as COVID-19), which mainly targets the respiratory system of the body, causing symptoms ranging from fever, sore throat, body aches, headache, dyspnea, chest pain and in severe cases, hypoxia and can lead to death (Covid, 2021). This viral outbreak across the world not only paralyzed the healthcare system of nearly every country but increased the rate of mortality and morbidity. COVID-19 has equally affected developing and developing nations; however, the developing countries have faced more serious consequences with fragile healthcare systems (Nishiura *et al*., 2020).

COVID-19 has affected not only developed countries but also low and middle class countries and all continents of world including Asia, in which countries like Pakistan, India and Bangladesh not only suffered from health care emergency due to global pandemic but also economic loss due decline in global economy and lock down (Covid and Team, 2020). Strategies for prevention of coronavirus spread included social distancing, travel restrictions, partial lock down, suspension of public transport, setup of quarantine centers and diagnostic laboratories. Despite these measures, the numbers are continuously amplifying (Lodigiani *et al*., 2020).

COVID- 19 spreads through human exposure and human serves as contagion for spread of this virus (Covid *et al*., 2020a). Person may suffer from severe consequences such as pneumonia, respiratory failure and even death. It is tested using a swab culture from nose or throat and Polymerase Chain Reaction (PCR) laboratory testing is used as gold standard for detection of COVID-19 infection (Donders *et al*., 2020).

ABO blood group is found to have important role in determining susceptibility and severity of viral infections, Evidence from previous literature shows that AB and O blood group are less susceptible to viral infections because of anti-A antibodies which antagonizes interaction between host cell receptors and COVID virus (Covid *et al*., 2020b). Blood groups are found to have

association with viral diseases and affecting patients health and some groups are more susceptible to virus leading to more serious consequences (Bastard *et al.*, 2020). Previously it is found that blood group B and O have found to have serious consequences and higher mortality rate in patients with viral diseases such as hepatitis.

Previous literature shows that viral infection is linked or correlated to older age and chronic diseases (Kniffin *et al.*, 2021; Howard *et al.*, 2021). However, COVID-19 infections relation with blood group is still under question and needs to be studied about. Study aims to determine the relationship of clinical outcomes of COVID-19, its susceptibility and blood groups.

Methodology

Our study was a prospective cohort study. The study included 148 participants who presented at North West General Hospital and Research Center Peshawar, Pakistan. The study was conducted for duration of six months. Data was collected using consecutive sampling technique with the help of questionnaire and laboratory findings. Blood test were performed to find out ABO blood group/type and their symptoms with which they presented in participants who were COVID positive. All collected data about blood group was categorized into A, B, O and AB group, according to different ABO blood types. Clinical data including age, gender and symptoms with which they presented like fever, cough, sputum production, sore throat, chest pain and their severity of symptoms was analyzed on basis of ICU stay and mortality. Data was analyzed using SPSS. Mean age and frequency in terms of numbers and percentages were calculated for fever, cough, sputum production, dyspnea, myalgia, headache sore throat, chest pain, ICU stay and mortality. Multivariate analysis was performed between age, gender, ICU stay and COVID keeping confidence interval at 95%. Chi square test was used to find association between blood groups, COVID symptoms and ICU stay and mortality. P-Value ≤0.05 was considered significant. All ethical considerations were taken in account. Ethical approval was taken from patients and hospital research committee Fig. 1 and 2.

Results

Seventy-four participants were COVID positive were found after testing 148 participants for COVID-19, of which 49 (66%) were males and 25 (34%) were females. Mean age of participants was 47.8 and standard deviation was 18. Mean age of controls was 58 and standard deviation was 8. Distribution of blood group in COVID positive cases showed 7 (9.5%) A+ blood group patients and 5 (6.8%) A- blood group patients, 19 (25.7%) B+ blood group patients and 10 (13.5%) B- patients, 4 (5.4%) O+ patients and 7 (9.5%) O- patients, 12 (26.2%) AB + patients and 10 (13.5%) AB- patients. Distribution of blood group in control cases showed 5 (6.8%) A+ blood group patients and 16 (21.6%) A- blood group patients, 22 (29.7%) B+ blood group patients and B- patients were 9 (12.2%), 3 (4.1%) O+ patients and 4 (5.4%) O- patients, 10 (13.5%) AB + and 5(6.8%) AB - as shown in Table 2.

Symptom presentation of cough was found in 53 (71.6%), sputum was found in 61 (82.4%), fever in 61 (82.4%), sore throat also presented in 61 (82.4%), chest pain in 38 (51.4%), ICU stay was found in 23 (31.1%). Mortality occurred in 4 (5.4%) as shown in Table 1.

Multi variate analysis performed showed age, blood and ICU stay to be significantly associated with COVID with p-value of <0.01, 0.05, <0.01 and gender to be non-significantly associated with COVID with p-value of 0.7 and regression analysis showed positive correlation between age and COVID with p-value of 0.314.

Table 1: Frequency of symptom in COVID cases

Symptoms	Frequency	Percentage	(P- value) association with ABO blood type
Cough	53	71.6	0.03
Sputum	61	82.4	0.90
Fever	61	82.4	0.04
Sore throat	61	82.4	0.06
Chest Pain	38	51.4	0.10
ICU Saty	23	31.1	0.07
Mortality	4	5.4	0.90

Table 2: Association of COVID with Blood groups (Chi square)

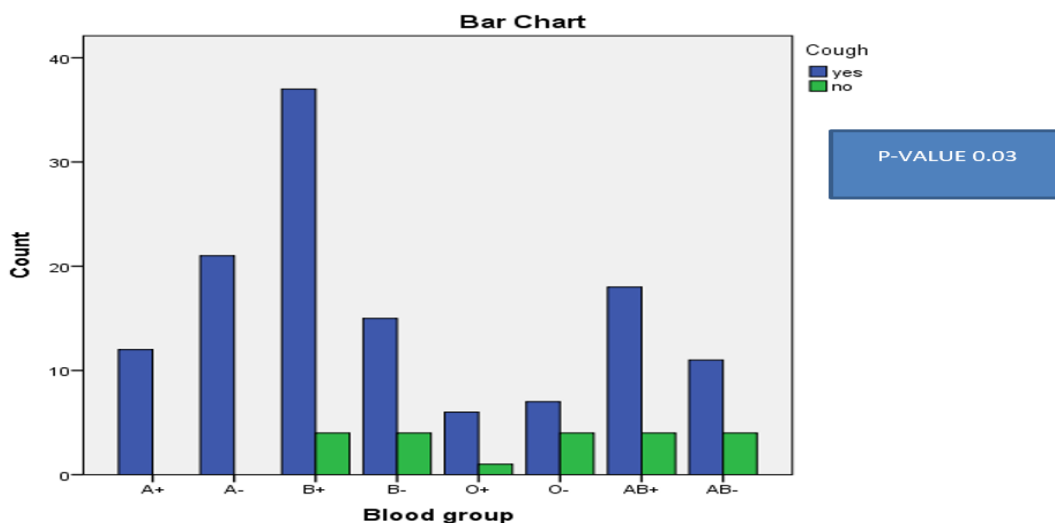| Blood group	P-value
A+	0.01
A-	0.03
B+	0.01
B-	0.06
O+	0.10
O-	0.90
AB+	0.70
AB-	0.80

Fig. 1: Patients of different blood groups with symptoms of cough
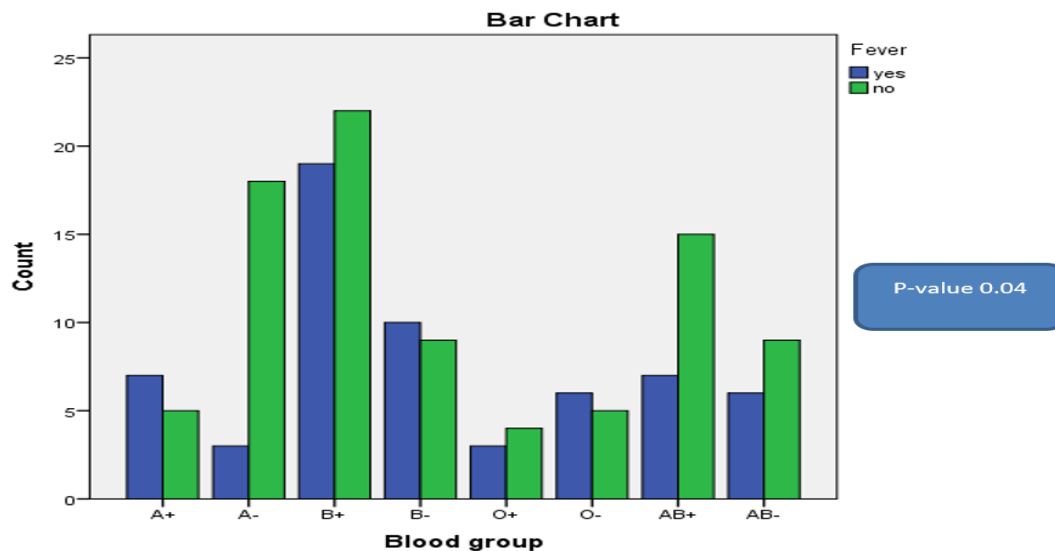

Fig. 2: Patients of different blood groups with symptoms of fever

Chi square test shows that statistically significant relation between COVID and blood group A+, A-, B+ with P-value of 0.01,0.03 and 0.01 respectively and no statistical significance was found between B-, O+, O-, AB+ and AB- with P-value of 0.06, 0.1, 0.9, 0.7 and 0.8 respectively. Fever and cough have been to be positively associated with blood group in COVID cases with p-value of 0.04 and 0.03 respectively as shown in Table 1.

Discussion

Results of our study showed that sore throat, fever and sputum presented in 82% COVID-19 positive patients was prevalent, cough was present in almost 71.6% patient. Blood group A+, A- and B+ were found to have statistically significant relationship with COVID-19

susceptibility. A study conducted by Göker *et al.* (2020) in 2020, a relationship of blood group with COVID-19 showed that blood group A was detected in 57% COVID-19 patients, followed by O blood group (Göker *et al.*, 2020) the blood group types did not affect the clinical outcomes.

A study done by Wu *et al.* (2020) showed a correlation of type A blood group with COVID-19 patients, while the correlation of type O blood group with COVID-19 was significantly lower. Patients with O blood group had a lower risk of COVID-19, as they are less prone to viral infections.

Study showed percentage of blood group A in patients with COVID-19 was considerably upper with significant p-value (P<0.001) and lower percentage or frequency of blood group O in positive COVID-19 patients was significantly lower than that in normal people with P-value of <0.001 (Beigel *et al.*, 2020). These results agreed to a

significantly increased risk of blood group A for COVID-19, blood group O was found to be associated with lower risk of mortality compared with non-O groups, with an OR of 0.660 (Zhao *et al.*, 2020).

A study conducted by Fan *et al.* (2020) showed out of one hundred fifty COVID-19 positive patients, among which mean age of fifty-five males and fifty female patients was 56 and blood types A, B, AB and O were found to be 42.8, 8.57, 26.7 and 21.9%, respectively. P-value less than 0.05 showed that which was statistically significant for blood type A, but not type B, AB and *O* (Fan *et al.*, 2020).

Our study showed clinical outcomes were measured in terms of symptoms, ICU stay and mortality. One of the limitations of our study was the small study population. Further studies can be conducted on a larger population size to find out outcomes of COVID-19 on a larger scale and its association with blood group.

Conclusion

Blood group A+, A- and B+ are more prone to contract COVID virus with more severe symptoms. Fever and cough have been to be positively associated with COVID cases and found to be affecting patient's health. Age is also found be affecting patient's life, more the age more will be chances of contracting COVID virus.

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Author's Contributions

Palwasha Khan: Study design, data collection and analysis, literature review and manuscript writing.

Hamza Zahid Ullah Muhammadzai: Literature review, manuscript writing and corrections.

Salman Zahid: Figures and manuscript writing.

Muhammad Shan Ul Abedin, Rahat Ahmed Memon and Ali Raza Shaikh: Manuscript writing.

Ethics

This article is original and contains unpublished material. The corresponding author confirms that all of the other authors have read and approved the manuscript and no ethical issues involved

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