

## Review Article

# Blood group association with SARS COVID-19

Nafeesa Arshad<sup>1</sup> , Saima Ashraf<sup>2</sup> , Samavia Sana<sup>2</sup> , Roeya Rehman<sup>2</sup> , Saqaina Anwar<sup>3</sup> ,Muhammad Asif<sup>3\*</sup> <sup>1</sup>Department of Applied Chemistry Government College University, Faisal Abad 38000, Pakistan<sup>2</sup>Department of Chemistry, The University of Lahore, Defense road Main Campus, Lahore, 54000, Pakistan<sup>3</sup>Institute of Energy and Environmental Engineering University of the Punjab, Lahore 54000, Pakistan**ARTICLE INFO**[DOI: 10.5281/zenodo.3988585](https://doi.org/10.5281/zenodo.3988585)

\* **Muhammad Asif:** Institute of Energy and Environmental Engineering University of the Punjab, Lahore 54000, Punjab, Pakistan, [03047092647asif@gmail.com](mailto:03047092647asif@gmail.com)  
**Phone No.** +923047092647.

**Received:** 31-07-2020**Accepted:** 17-08-2020**Keywords:** COVID-19, Blood group, Factor effecting, Limitations.

This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

**ABSTRACT**

*A pandemic disease Covid-19 spread all over the Globe. Asymptomatic, mild symptomatic or pre-symptomatic are types of corona virus. There is still no vaccine available in the market. In past many infections fever, pneumonia, HIV, are correlated with blood groups. Different blood groups have different antigens that can fight against viral disease. Blood group A is associated with Covid-19 and persons with A blood group are mostly affected than O because O blood group has anti-A-antibody but this effect is very less. In the O blood group, sugar is naturally absent that promote pathogens (a bacterium, virus, or other microorganisms that can cause disease) to attack. Behind this, different risk factors with Covid-19, some suggestion and usage of drug with some limitations are also discussed in this paper.*

**Cite this article:** Arshad N, Ashraf S, Sana S, Rehman R, Anwar S, Asif M. Blood group association with SARS COVID-19. *Alq J Med App Sci.* 2020;3(2):66-71.

**INTRODUCTION**

A Pandemic disease the Novel Coronavirus Covid-19 has been confirmed by WHO. It is related to Severe Acute Respiratory syndrome SARS-Cov-2 and Middle East Respiratory Syndrome (MERS) virus. Till April 5, 2020, this virus caused over 62000 deaths and 1,130000 confirmed cases. Firstly, SARS seemed in 2002. Officially, the name as Covid-19 in 2019 and this infection appeared in Wuhan, Hubei Province China

[1]. It is a transferable infection (viral) that affects the living cells. Its initial symptom is flue with continuous temperature and the patient feels dry cough, limb pain, muscular pain with inflamed lymph nodes. It also causes cold diseases of the upper respiratory tract, rarely infecting the lower airways, bronchitis and pneumonia [2]. Many cases have been testified in China and many other countries also. A large number of risk factors such as age, male sex, chronic medical conditions (Diabetes mellitus, hypertension,

cardiovascular disease, overweight) are major factors affecting on Covid-19 illness (Table 1).

**Table 1.** Risk factors with Concept IDs' are based on OMOP and CDM concept IDs'. N individuals is the numeral of individuals from our examined group, who had a single code included in the Phenotype classification.

| Risk Factor            | Concept ID | N Individuals |
|------------------------|------------|---------------|
| Hypertension           | 19829001   | 724           |
| Cardiovascular Disease | 134057     | 878           |
| Respiratory Disease    | 320136     | 848           |
| Diabetes Mellitus      | 201820     | 445           |
| Overweight status      | 437525     | 188           |

When a data analyzed from Wuhan and Shenzhen China with ABO blood groups and infection link, researchers have found that A blood group is more affected (37.7) % and O is less affected (25.8) when a comparison was performed with blood samplings of different peoples. Therefore, we will explore the ABO blood groups spreading with different threat factors [3]. The COVID-19 is spreading through cough (throws thousands of droplets), sneezing (40,000 droplets of saliva in one sneeze) and touching. A sneeze produces more droplets of saliva having greater speed than cough[4]. Asymptomatic (infection present in the host but don't have symptoms and will not develop them later), mild symptomatic (flue-like symptoms, mild fever and dry cough or maybe not), or pre-symptomatic people (infection present in host but have no symptoms yet) are three types of the virus[5, 6].

**Analysis**

Xiaobo Yang and colleagues examine 22% cerebrovascular disease and 22% diabetes mellitus 52 intensive care unit out of 32 are most distinctive comorbidities with novel coronavirus disease in 2019. In second study, there were 173 confirmed cases out of 1099 confirmed cases have severed conditions of Covid-19 it includes hypertension 23.7%, diabetes

mellitus 16.2%, cerebrovascular disease 2.3% and coronary heart disease 5.8% (Table 2) [7].

**Table 2.** All relations between risk factors and blood groups where logistic Regression

| Blood group | Term         | Coefficient | Standard error | P-value |
|-------------|--------------|-------------|----------------|---------|
| AB          | Age          | 0.014       | 0.006          | 0.027   |
| B           | Diabetes     | -0.434      | 0.195          | 0.026   |
| O           | Age          | -0.008      | 0.003          | 0.003   |
| O           | Diabetes     | 0.248       | 0.142          | 0.080   |
| A_neg       | Hypertension | - 0.895     | 0.511          | 0.080   |
| A_neg       | Diabetes     | 0.880       | 0.442          | 0.047   |
| A_neg       | CV diseases  | 0.852       | 0.507          | 0.093   |
| A_pos       | Age          | 0.009       | 0.003          | 0.001   |
| AB_pos      | Age          | 0.013       | 0.006          | 0.043   |
| B_neg       | Age          | 0.018       | 0.011          | 0.096   |
| B_pos       | diabetes     | -0.390      | 0.200          | 0.052   |
| O_neg       | Hypertension | 2.124       | 1.043          | 0.042   |
| O_neg       | Overweight   | -1.359      | 0.744          | 0.068   |
| O_pos       | age          | -0.007      | 0.003          | 0.006   |
| O_pos       | Diabetes     | 0.279       | 0.143          | 0.051   |
| O_pos       | Overweight   | 0.355       | 0.168          | 0.034   |

Co-efficient p-values were below 0.1. Full data on all co-efficient are presented on GitHub.

In the last analysis, a total of 140 patients have been reported who are infected with Covid-19, out of the 12% had diabetes mellitus and 30% have hypertension. Hypertension Patients are divided into three groups' as patients with fever and not pneumonia indications are below slight category indication in imaging. Patients with, respirational tract indications, fever, pneumonia, and the existence of respirational letdown are below moderate category demanding mechanical ventilation (artificial airway) [8]. Existence of shocks and further tissues letdown are under Critical situation demanding intensive care. When data is analyzed from Covid-19 infected persons through the department of infectious disease at University of Campania 'Luigi Vanvitelli' Naples and Italy between 10 February 2020 and 20 April 2020. They demonstrated that with non –O Blood groups are more affected than O. In all of the above studies with Covid-19 affected persons are treated with

angiotensin-converting enzyme (ACE) inhibitors. Although, in these studies, exact treatment is not measured yet. Angiotensin-converting enzyme 2 (ACE2) binds with human pathogenic coronaviruses as Severe Acute Respiratory Syndrome (SARS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV2) which is stated by epithelial cells, blood vessels, kidney and intestine. There are two types of Diabetes mellitus as type I and II respectively the expression of angiotensin-converting enzyme (ACE2) significantly increase in patients ACE inhibitors and Angiotensin receptor blockers (ARBs) both are using in this treatment. The same enzyme (ACE2) and (ARBs) are also using in hypertension treatment which might lead to increase ACE2 level. Thiazolidinedione's and Ibuprofen are also helpful for ACE2. So, through this data, we can easily examine that ACE inhibitors are useful for ACE2 expression in diabetes and hypertension patients but ARBs increase ACE2 that lead to increased risk for Covid-19 infection. Use of ACE2 direct severs and Fatal infection. There is conflict and this hypothesis is not confirmed because ACE2 is a potential new therapy for lungs provocative lung disease, hypertension, diabetes mellitus and cancer. Further, the study shows another responsible aspect as a genetic predisposition that may lead to an increase of severe acute respiratory syndrome [1].

### ***Blood group association with Covid-19***

Rh+ status was linked with lofty edges of testing positive (AOR: 1.23, CI: 1.003–1.50). Blood type was not correlated with the risk of cannulation or death in patients with COVID-19. Patients with blood group B and AB test positive while blood type O was less likely to test positive[9]. For example, for one, sugars are dictated on blood groups. In cattle's sugar is bind to surface protein, it is also shown that in blood group A, N-Acetyl Galactosamine is in the form of extra sugar is present that helps more pathogenic contact and can easily affect to own host. While in O blood group this sugar is naturally absent [10]. On a ventilator, blood

type did not affect [11]. It is not linked with higher peak levels of inflammatory markers. So, we can say that Rh+ sufferer was more likely to test positive[9].

### ***SARS-COVID-19 Inhibition Mechanism***

We found less Covid-19 affecting patients with O blood group and A blood groups patients are at high risk. But the effect is very small that people shouldn't count on it. A genomic data collected from over 8 million single-nucleotide polymorphisms from 1980 patients with severe COVID-19 in Italy and Spain shows: individuals with blood group A have a higher odds of severe COVID-19 (odds ratio, 1.45; 95% C.I., 1.20-1.75;  $P=1.48 \times 10^{-4}$ ) as contrast to other blood groups while, blood group O protects against severe disease compared to other blood groups (odds ratio, 0.65; 95% C.I., 0.53-0.79;  $P=1.06 \times 10^{-5}$ ) [12]. People infected with the COV-19 produce immune molecules called antibodies, which provide protection. These antibodies may stay in the human body about two to three months only [11]. Anyway, it is suggested by others that SARS-COVID-19 could also be linked to an anti-A antibody which is responsible for virus spreading and on the other hand it can also act as inhibition through circulation of blood [13]. The A and B antigens and their resultant antibodies are mostly comprised of ABO blood group system. On chromosome 9q34.1-34.2, the antigens encoding gene is situated. There are a total of 4 genetic phenotypes (A, B, O, and AB blood types) are existing that contains A, B, and O multiple alleles [14, 15]. At ACE2, expressing cell lines the expressing cells protein linkage SARS-CoV-19 S repressed precisely by the anti-A antibodies Patrice et al. Binding connection between SARS-CoV-19 and SARS-CoV-2 is given by nucleic acid sequence and receptor angiotensin-converting enzyme 2 (ACE2). Particularly, that shows the higher vulnerability of blood group A for Covid-19 and lower vulnerability of blood group O is related to antibodies especially anti A- Antibody in the blood. But this study will need more explanation to

prove it [3]. So, we can say this hypothesis might be insignificant but in past we can't deny blood groups correlation with other infections. So, with the time more data is collected. For that purpose, blood group of every infected person should be registered on large scale. Through international collaboration, we can easily examine ABO linkage with Covid-19. Thus, indicating that the ABO blood type is a biomarker for the differential vulnerability of COVID-19. SARS-COV-2 has spike protein that has an association with ACE-2 protein and later protein as cellular adhesion. In past, it has shown that because of Spike protein relation to ACE-2 can increase infection in host cell but those who have anti A-anti-body are less affected than those without anti-an antibody. Blood group O contain both an antibody and B antibodies.[16]

### **Suggestions**

There is no any exact vaccine discovered for COVID-19 so we can, only save us by following suggestion. First, a person should test for Covid-19 when he feels any of given symptoms as difficulty in respiratory mellitus, fever, cough etc. Second, a better precaution is social distancing and should remain to keep away from infected persons. A patient should take organic fruits that are very important for the development of strong immune system to fight against virus and bacteria ( Apple ,Orange , Citrus fruits) and vegetables including, Carotenoids (mostly present in carrot) ,Vitamin C enriched as (Spinach ,Cabbage, Turnip greens, and other Leafy greens)[10, 17, 18].Third, stress reduction, moderate exercise, avoid toxins and inflammation reduction also help to fight against COV-19[19].Fourth, the use of convalescent plasma for Covid-19 patience is another suggestion.[20] Casadevall and Pirofski implicit that Convalescent sera from recovered Covid-19 patience is also an option for treating Covid-19 it is also helpful for prophylaxis infected person those who are at high risk of covid-19. Fifth, another drug also investigated and approved by FDA named

as an emergency investigational convalescent new drug (eIND).[21] But convalescent plasma is a blossomed drug for COVID-19 affected persons. Both these drugs required full attention to preparing it on large scale. About 60 clinical trials are registered ABO compatibility must be pointed out in any protocol as such [22].

### **Limitations**

There are many limitations are present as 1st, the patience registered in Hospital of Wuhan and Shenzhen are not sufficient as required for exact ABO blood group association diagnosis for COVID-19.2nd, least number of O blood groups persons as compared to A, B, ABO. But with negative blood groups as O- are less than as compared to O.3rd, Multivariate analysis on subject age and sex has lacked information in ABO blood group different age and sex groups of infected persons is similar to previously nominated population.4th, Because of Partial information the effect of the status of long-lasting medical situations, such as (blood -vessel related), Diabetes mellitus (a disease where blood sugar widely) and COPD could not be changed to fit new situations through a multivariate analysis, which could perhaps partiality the ends result of the present study since these factors may affect the risky severity of COVID-19 [3]

### **CONCLUSION**

In this review, we concluded that "A" is mostly affected than the O blood group on COV-19 but the effect is so small that people shouldn't count on it. Angiotensin-converting enzyme (ACE) and Angiotensin receptor blockers (ARBS) are using for hypertension and diabetes mellitus suffered from Covid-19. But this hypothesis also showed conflicts. On cattle surface, N-Acetyl Galactosamine is present on A- blood group that is why it affected more than O. In past, it has shown that because of Spike protein relation to ACE-2 can increase infection in the host cell. Plasma therapy and emergency investigational

convalescent new drug (approved by FDA). These drugs required attention to preparing it on a large scale. Behind this, stress reduction, exercise and proper sleep also very important. Some limiting factors as the least number of Blood samples especially O, multivariate analysis, and the status of long-lasting medical situations may affect the Covid-19 analysis. In summary, this article is helpful for the association of blood groups with COVID-19 to find out some drugs and risk factor also.

### *Acknowledgement*

The Authors would like to acknowledge the Institute of Energy and Environmental Engineering, University of the Punjab, Lahore, Pakistan. The authors are also greatly thankful to Mr. Ata ul Muonium and Abdul Manan Khan for their countless technical assistance during the designing of this article.

### *Authors Contribution*

All authors contributed equally in designing, data collection, assimilation and writing of this manuscript and the final version was read and approved by all authors.

### *Disclaimer*

The article has not been previously presented or published, and is not part of a thesis project.

### *Conflict of Interest*

There are no financial, personal, or professional conflicts of interest to declare.

## REFERENCE

- [1] Wan, Y., et al., Receptor recognition by the novel coronavirus from Wuhan: an analysis based on decade-long structural studies of SARS coronavirus. *Journal of virology*, 2020. 94(7).
- [2] Paraskevis, D., et al., Full-genome evolutionary analysis of the novel corona virus (2019-nCoV) rejects the hypothesis of emergence as a result of a

recent recombination event. *Infection, Genetics and Evolution*, 2020. 79: p. 104212.

- [3] Zhao, J., et al., Relationship between the ABO Blood Group and the COVID-19 Susceptibility. *medRxiv*, 2020.
- [4] data, P.k., Spread of coronavirus infection and science of cough and sneeze. 26 march 2020.
- [5] Meller, M., The asymptomatic and pre-symptomatic spread of COVID-19. 2019.
- [6] Lowth, D.M., Coronavirus: what are asymptomatic and mild COVID-19? 2020.
- [7] Yang, X., et al., Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. *The Lancet Respiratory Medicine*, 2020.
- [8] Guan, W.-j., et al., Clinical characteristics of coronavirus disease 2019 in China. *New England journal of medicine*, 2020. 382(18): p. 1708-1720.
- [9] Latz, C.A., et al., Blood type and outcomes in patients with COVID-19. *Annals of Hematology*, 2020: p. 1-6.
- [10] Cooling, L., Blood groups in infection and host susceptibility. *Clinical microbiology reviews*, 2015. 28(3): p. 801-870.
- [11] zimmer, c., Covid-19 Risk Doesn't Depend (Much) on Blood Type, *New Studies Find*. 2020.
- [12] ABO Blood Group Associated with COVID-19 Severity. 2020.
- [13] AL-Khikani, F.H.O., The role of blood group in COVID-19 infection: More information is needed. *Journal of Nature and Science of Medicine*, 2020. 3(3): p. 225.
- [14] Sardu, C., et al., Implications of AB0 blood group in hypertensive patients with covid-19. 2020.
- [15] Amundadottir, L., et al., Genome-wide association study identifies variants in the ABO locus associated with susceptibility to pancreatic cancer. *Nature genetics*, 2009. 41(9): p. 986-990.
- [16] Guillon, P., et al., Inhibition of the interaction between the SARS-CoV spike protein and its cellular receptor by anti-histo-blood group antibodies. *Glycobiology*, 2008. 18(12): p. 1085-1093.

- [17] Jones, W.b.T., 7 Healthy Foods That Are High in Vitamin D. December 18, 2019.
- [18] Davis, C.P., Food That Boost and Improve Your Immune System. 2020.
- [19] Shen, K., et al., Diagnosis, treatment, and prevention of 2019 novel coronavirus infection in children: experts' consensus statement. World Journal of Pediatrics, 2020: p. 1-9.
- [20] Casadevall, A. and L.-a. Pirofski, The convalescent sera option for containing COVID-19. The Journal of clinical investigation, 2020. 130(4): p. 1545-1548.
- [21] Food, U. and D. Administration, Investigational COVID-19 Convalescent Plasma-Emergency INDs. Accessed on April, 2020. 8.
- [22] Zaidi, F.Z., et al., COVID-19 and the ABO blood group connection. Transfusion and Apheresis Science, 2020.