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# Risk of COVID-19 Infection and Severity of Clinical Outcomes And Its Association With Abo Blood Groups

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**Abstract: Objective:** To determine association of ABO blood groups with severity of COVID-19 symptoms among covid recovered patients of different blood type. **Methodology:** An observational/experimental study was conducted at department of physiology, Sindh university Jamshoro from April 2021 to December 2021.The sample size (n) was 732, data consist of male and female covid recovered participants of age group 18-30yrs. Self - structured questionnaire was used to evaluate intensity of symptoms of COVID 19 and for other characteristics such as gender and age. Blood was drawn for ABO blood typing. Statistical analysis was performed on SPSS- 21.
**Results:** Seven hundred thirty two was the total study population of COVID-19 recovered patients, out of which male population was 489 (66.9%) and female population was 243 (33.1%).The results reports that there is statistically significant association present between the A +ve blood type and susceptibility of COVID-19 infection, whereas AB +ve and A +ve shown higher percentage of severe infection. Blood group B +ve with (48%) with less severe symptoms. O +ve people shown mild symptoms that is 60% of entire O+ve population and 30% are presented with severe symptoms.
**Conclusion:** This study suggests that A +ve blood group is susceptible blood type with high chances to get infection. People having A +ve and AB +ve blood types are more susceptible towards severe COVID 19 infection in comparison to other blood types, O +ve blood shown rather protective effect.

**Keywords:** Economic losses, fungal diseases, grapes, fungicides, mechanism of action, broad spectrum fungicides

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## Introduction

COVID-19 was characterized initially by unidentified type of pneumonia reported earlier in Wuhan, China later declared as pandemic On January 7, 2020, The causative agent for the infection is novel coronavirus belongs to severe acute respiratory syndrome (SARS) family [1]. Transmission route of virus takes place through respiratory droplets and rapidly transmits through coughing sneezing breathing and talking [2] the incubation period ranges from 1-14 days but recent research reported incubation period more than 14 days [3],during incubation period the carrier persons are highly contagious , clinical presentation of COVID- 19 are fever, myalgia, sore throat, dry cough, with severity may lead to respiratory distress syndrome , sepsis also takes

place which leads person to death in most cases [4].Patients in their 70's and with pre-existing diseases like diabetes, cardiovascular disease, diabetes, and pulmonary disorders tends to show added vulnerability to severity of disease [5].The ABO blood system is the utmost significant amongst human blood groups. A genetically determined system was discovered by the Austrian pathologist Karl Landsteiner in 1901 [6].The ABO blood group antigens are defined by carbohydrate moieties on the extracellular surface of red blood cell membrane [7]. Blood group A and B antigens are of clinical importance being expressed on red blood cells (RBCs), and epithelial and endothelial cells, and extensively studied in clinical practices. Subsequently after the detection of the ABO blood group system, numerous researches investigating the relationship between the ABO blood group system and several ailments, a number of studies are conducted which shows strong association between viral and bacterial infections [8].For instance helicobacter pylori [9] norovirus [10], MERS-COV & SARS-COV [11].
This study was conducted to identify the association of blood type with severity of disease and presentation of symptoms, of COVID-19.

**Methodology**

Th study took place from April 2021 to December 2021 in Physiology department, university of Sindh Jamshoro, Random sampling technique was applied for sample collection, blood samples from completely COVID-19 recovered patients aged between 18-30 yrs., were collected from different areas of Hyderabad, Jamshoro and Kotri for blood group analysis. ABO Blood typing was done by using antisera method. Information about age, gender, COVID-19 symptoms, were collected through the questionnaire. Sample size n= is 732, comprises of participants of mixed age group. Participants with co-morbidities and very old age were excluded from the study only healthy covid recovered patients were included.
Intensity of symptoms was categorized into four broad categories, that are A-symptomatic: a person with PCR +ve for COVID -19 but not shown any symptoms, second is Mild : a person with very less symptoms usually involves upper respiratory tract which include sore throat and low grade fever ,third category is Moderate a person observed with inflammation in bronchioles usually presented with cough ,fever, myalgia, headache and the he/she becomes breathless after any physical activity, and the fourth category is Severe in which a person presented with pneumonia ,low oxygen saturation,( confirmed on pulse oximeter) and becomes breathless even at rest, or history of hospitalization. Severity of symptoms was confirmed with x-ray chest.

**Statistical Analysis:**

Statistical analysis was performed on SPSS- 21, for comparison of blood groups and symptoms among population, Chi-squared ($X^2$) test was used, p. value of $< 0.05$ was considered significant.

**Ethical Approval**

The study was conducted after approval from the ethics committee of department of physiology, university of Sindh, Jamshoro.

**Results**

Seven hundred thirty two was the total study population of COVID-19 recovered patients, out of which male population was 489 (66.9%) and female population was 243 (33.1%), as shown in table .1. Intensity of symptoms is assessed,18(3.6%) males and 3(1.2%) females were asymptomatic, while 150(30.7%) males and 63 (25.9%) females shown mild symptoms,96(19.6%) males and 72(29.6%) females presented with moderate symptoms, but a large number i.e., 225(46%) males and 105(43.2%) females had severe symptoms.

**Table 1:** Distribution of covid population according to gender and intensity of symptoms.

| **Intensity of symptoms** | **Males(n=489)** | **Females(n=243)** | $X^2$ | *p*. value |
|---|---|---|---|---|
| **Asymptomatic** | 18 (3.6%) | 03 (1.2%) | 11.99 | 0.007 |
| **Mild** | 150 (30.7%) | 63 (25.9%) | | |
| **Moderate** | 96 (19.6%) | 72 (29.6%) | | |
| **Severe** | 225 (46%) | 105 (43.2%) | | |

Distribution pattern of ABO blood type among the participants is shown in table 2; patients with O blood group 177(24.1) of the total study population out of which (O Rhesus positive (+ve) 19.2%, O Rhesus-negative (–ve) 4.9%); A blood group 240 patients (32,7%) out of which (A +ve 31.9%, A –ve 0.8%); 243 patients (33.1%) had B blood group (B +ve 30.7%, B –ve 2.4%), and lastly 72 (9.8%) had AB blood group (AB +ve 9%, AB –ve 0.8%).Among RH +ve group AB +ve shown highest percentage of severe cases that is 42 (63.6%) The severity of infection in A +ve population is (50%) ,which is then followed by B +ve with (48%) with severe symptoms. In Rh-ve group B-ve has shown higher percentage of severe patients that is 12 (66.6%) followed by O-ve and AB-ve that is (50 %) however patients with a-ve shown 0% severe cases.

**Table 2:** Distribution of covid population acoording to intensity ofsymptoms and blood groups.

| | **n=732** | **Asymptomatic** | **Mild** | **Moderate** | **Severe** |
|---|---|---|---|---|---|
| **O +ve** | 141 (19.2%) | 03 (2.1%) | 60 ((42.5%) | 48 (34%) | 30 (21.2%) |
| **o-ve** | 36(4.9%) | 00 (0%) | 06 (16.6%) | 12 (33.3%) | 18 (50%) |
| **A +ve** | 234(31.9%) | 15 (6.4%) | 57 (24.3%) | 45 (19.2%) | 117 (50%) |
| **A-ve** | 06(0.8%) | 00 (0%) | 00 (0) | 06 (100%) | 00 (0%) |
| **B+ve** | 225(30.7%) | 03 (1.3%) | 81 (36%) | 33 (14.6%) | 108 (48%) |
| **B-ve** | 18(2.4%) | 00 (0%) | 00 (0%) | 06 (33.3%) | 12 (66.6%) |
| **AB+ve** | 66(9%) | 00 (0%) | 09 (13.6%) | 15 (22.7%) | 42 (63.6%) |
| **AB-ve** | 06(0.8%) | 00(0%) | 00(0%) | 03(50%) | 03(50%) |
| | 732 | 21 | 213 | 168 | 330 |

In table 3, the population is divided according to blood groups, and further categorized according to their gender, the A +ve blood group, that shows severity of infection includes 129 (55.1%) males and 105 (44.9) females, the second blood group that shows higher incidence of severity of symptoms, i.e., B +ve have153 (68 %) males and 72 (32%) females.

**Table #3:** Distribution of covid population acoording to blood groups.&gender**.**

| | **n=732** | **Female 243** | **Male 489** |
|---|---|---|---|
| **O +ve** | 141 | 48(34%) | 93(65.9%) |
| **O -ve** | 36 | 09(25%) | 27 (75%) |
| **A +ve** | 234 | 105 (44.9) | 129 (55.1%) |
| **A -ve** | 06 | 03(50%) | 03(50%) |
| **B +ve** | 225 | 72 (32%) | 153 (68 %) |
| **B -ve** | 18 | 00(0%) | 18 (100%) |
| **AB +ve** | 66 | 06(9%) | 60 (90%) |
| **AB -ve** | 06 | 00 (0%) | 06 (100%) |

**Discussion**

To estimate the trends of current pandemic of SARS-CoV-2 infection by associating symptoms with blood type, this study was planned and carried out. The results of this study manifest that a significant connection present between the A +ve patient of COVID-19, and susceptibility and

severity of the infection as reported earlier [12] and showed that a big number of people with A +ve reaches the severity of infection that is 117(50%) however people with A-ve blood group shows severe symptoms 0%, another study also shows similar results with increased incidence of covid along with severity of disease in A blood group [13].In contrast another study suggest decreased risk of covid in A blood group [14] it is studied that Angiotensin-converting enzyme 2 (ACE2) is the chief receptor for covid, which helps the access of infection to body, [15] another study reveals that anti-A antibodies prevent the interface among receptor the COVID- 19, as a resultant protecting population with anti A- antibodies against infection, This is in agreement with our study, showing blood type A is more at risk of getting covid infection [16] O+ve blood group shows protective effect as reported by other researches, [17] A number of O+ve people shown mild symptoms that is 60% of entire O+ve population and 30% are presented with severe symptoms. Research done in Spain suggested low incidence infection in O group [18] the defensive result is facilitated by natural anti-A and anti-B antibodies or by a lesser proficiency of furin breakdown in blood group "O" patients [19, 20].

Blood group AB +ve shown higher percentage of severe cases that is 42 (63.6%), it is further supported by the study [21] which reveals that along with A +ve , AB +ve blood type are exhibiting greater infection severity than other blood types

In blood type B people with Rh -ve shows highest percentage of severe symptoms 66.6%. Similar results observed in another studies, showing higher incidence of infection in B group[22, 23], another study in contrast shows blood group B or AB not associated with worse outcome of disease [24].The differences in ABO blood group incidences among people is because of diverse geographical backgrounds.

**Conclusion:**

This study suggests that A +ve blood group is susceptible blood type with high chances to get infection. People having blood type A+ve and AB +ve are more susceptible to severe COVID -19 infection in comparison to other blood types, O +ve blood shown rather protective effect. In gender distribution pattern males are more prone than females in catching infection as well as in developing severe symptomology. However, more research is required to approve these results in a greater population, and different ethnicities.

**ETHICS APPROVAL AND CONSENT TO PARTICIPATE**

Not applicable.

**HUMAN AND ANIMAL RIGHTS**

No animals were used in this study. The study on humans was conducted in accordance with the ethical rules of the Helsinki Declaration and Good Clinical Practice.

**CONSENT FOR PUBLICATION**

Not applicable.

**AVAILABILITY OF DATA AND MATERIALS**

None.

**FUNDING**

None.

**CONFLICT OF INTEREST**

The authors declare no conflict of interest, financial or otherwise.

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