



# The Relationship Between Blood Groups and COVID-19 Patients

Mustafa Çakır

## ABSTRACT

**Objective:** The present research aims to evaluate the relationship between blood groups and COVID-19 patients.

**Materials and Methods:** This is a descriptive study, and data of 256 patients with COVID-19 positive were evaluated. In the analysis, the level of statistical significance was accepted as  $p < 0.05$ .

**Results:** In this research, 62.1% of the patients examined were male, 75.4% were married; 34.8% were in the 30–39 age group, 23.8% were in the 40–49 age group, and the mean age was  $37.0 \pm 12.2$ . 33.3% of the patients were high school graduates, 32.9% were primary school graduates, 44.1% had blood group A Rh+, and 21.5% had blood group O Rh+. In this research, the findings showed that 85.9% of the patients had symptoms, 49.6% had malaise, 48.0% had joint pain, 32.0% had a history of a positive family member or a positive relative before themselves, and 42.2% had a history of positive case at the workplace before themselves.

**Conclusion:** In this research, the frequency of the blood group A Rh+ was high and the frequency of the blood group O Rh+ was low in COVID-19 patients. The mean age of the patients was 37, and number of the patients who needed intensive care was low. There was no difference between the symptom states, according to blood groups. It is recommended that people with blood type A behave more sensitively in terms of following the protection measures.

**Keywords:** Coronavirus, communicable diseases, chronic disease

## INTRODUCTION

COVID-19 is an infectious disease that arises from the most recently detected coronavirus, which caused an epidemic in Wuhan, China, on December 19, 2019. The time between exposure to COVID-19 and the appearance of symptoms is usually 5–6 days but may vary from 1 to 14 days (1). The severity of the disease may range from mild respiratory symptoms to severe acute respiratory distress syndrome (ARDS) (2). The relationship between blood groups and diseases is more than a causal relationship. Blood groups may affect disease progression and results (3). Susceptibility to viral infections has been previously found to be associated with the blood group ABO. For example, blood group susceptibility of Norwalk virus and Hepatitis B is obvious (4, 5). In addition, individuals with blood group O have been reported to be less likely to become infected with the SARS coronavirus (6). There are few studies showing the relationship between blood groups and COVID-19, and there is a need for further studies. In this research, we aimed to evaluate the relationship between blood groups and COVID-19 patients.

## MATERIALS and METHODS

This research is a retrospective and descriptive study. Two hundred fifty-six patients with blood groups obtained from the Public Health Management System and district health records among PCR+ patients between March and May 2020 in Çayirova district of Kocaeli were included in this research. Ethical approval was obtained from the Ministry of Health and Health Sciences University Kocaeli Derince Training and Research Hospital Clinical Research Ethics Committee (2020/89).

The research data were evaluated using SPSS 22.0 program. The descriptive statistics were presented as mean  $\pm$  standard deviation, frequency distribution and percentage. Chi-square test was used to compare the categorical variables. In the analysis, the level of statistical significance was accepted as  $p < 0.05$ .

## RESULTS

Within the scope of this research, 256 patients were examined. In this research, 62.1% (n=159) of the patients examined were male; 75.4% (n=193) were married; 34.8% (n=89) were in the 30–39 age group, 23.8% (61)

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Çayirova District Health Directorate, Kocaeli, Turkey

The current affiliation of the author: Department of Public Health, İstanbul Medeniyet University Faculty of Medicine, İstanbul, Turkey

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### Correspondence

Mustafa Çakır,  
Çayirova District Health Directorate, Kocaeli, Turkey  
Phone: +90 541 812 86 61  
e-mail:  
mustafa-5355@hotmail.com

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**Table 1.** Distribution of socio-demographic characteristics of the participants

|                        | n   | %*   |
|------------------------|-----|------|
| Age group              |     |      |
| 9 years and below      | 3   | 1.2  |
| 10–19                  | 11  | 4.3  |
| 20–29                  | 55  | 21.5 |
| 30–39                  | 89  | 34.8 |
| 40–49                  | 61  | 23.8 |
| 50–59                  | 29  | 11.3 |
| 60 years and above     | 8   | 3.1  |
| Gender                 |     |      |
| Male                   | 159 | 62.1 |
| Female                 | 97  | 37.9 |
| Marital status         |     |      |
| Single                 | 63  | 24.6 |
| Married                | 193 | 75.4 |
| Educational background |     |      |
| Primary school         | 82  | 32.9 |
| Secondary school       | 46  | 18.5 |
| High school            | 83  | 33.3 |
| College/university     | 38  | 15.3 |
| Blood group            |     |      |
| A Rh (+)               | 113 | 44.1 |
| A Rh (-)               | 13  | 5.1  |
| B Rh (+)               | 29  | 11.3 |
| B Rh (-)               | 5   | 2.0  |
| AB Rh (+)              | 24  | 9.4  |
| AB Rh (-)              | 3   | 1.2  |
| O Rh (+)               | 55  | 21.5 |
| O Rh (-)               | 14  | 5.5  |

\*: Column percentage

were in the 40–49 age group, the mean age was  $37.0 \pm 12.2$ , and the median age was 36 (min: 1; max: 75). 33.3% (n=83) of the patients were high school graduates, 32.9% (n=82) were primary school graduates, 44.1% (n=113) had blood group A Rh+ and 21.5% (n=55) had blood group O Rh+ (Table 1).

The findings showed that 18.0% (n=46) of the participants had chronic disease, 7.4% (n=19) had hypertension and 5.9% (n=15) had diabetes; 13.3% (n=34) had one chronic disease, 2.7% (n=7) had two chronic diseases, 20.7% (n=53) used drugs regularly and 18.8% (n=48) smoked currently (Table 2). In this study, 1.2% of the patients (n=3) were transferred to intensive care unit during the illness.

The findings indicated that 85.9% (n=220) of the patients had symptoms, 49.6% (n=127) had malaise, 48.0% (n=123) had joint pain, 32.0% (n=82) had a history of a positive family member or a positive relative before themselves and 42.2%

**Table 2.** Distribution of disease, drug use and smoking status of the participants in this research

|                            | n   | %*   |
|----------------------------|-----|------|
| Chronic disease status     |     |      |
| Yes                        | 46  | 18.0 |
| No                         | 210 | 82.0 |
| Chronic diseases           |     |      |
| Hypertension               | 19  | 7.4  |
| Diabetes mellitus          | 15  | 5.9  |
| Asthma                     | 13  | 5.1  |
| Cardiac disease            | 9   | 3.5  |
| COPD                       | 7   | 2.7  |
| Number of chronic diseases |     |      |
| 1                          | 34  | 13.3 |
| 2                          | 7   | 2.7  |
| 3                          | 5   | 2.0  |
| Regular medication use     |     |      |
| Yes                        | 53  | 20.7 |
| No                         | 203 | 79.3 |
| Smoking status             |     |      |
| Never smoked               | 140 | 54.7 |
| Smoked, but quit           | 68  | 26.6 |
| Still smoking              | 48  | 18.8 |

COPD: Chronic obstructive pulmonary disease; \*: Column percentage

(n=108) had a history of positive case at the workplace before themselves (Table 3).

There was no statistically significant difference between the symptom states, symptoms other than cough and chronic disease states of the participants according to the blood groups ( $p > 0.05$ ). 40.7% of A Rh+ patients (n=46), 46.2% of A Rh- patients (n=6), 27.6% of B Rh+ patients (n=8), 20.0% (n=1) of B Rh- patients, 25.0% (n=6) of AB Rh+ patients, 33.3% of AB Rh- patients, 21.8% of O Rh+ patients (n=12), 78.6% of O Rh- patients (n=11) and 35.5% (n=91) of all patients were found to have the symptom of cough. A statistically significant difference was found concerning the symptom of cough according to the blood groups of the patients ( $p = 0.005$ ) (Table 4).

## DISCUSSION

In this research, 44% of COVID-19 positive patients were found have A Rh+ blood group. In a study conducted by Cekdemir et al. (7) in a tertiary hospital with donor/patients, 38% had the blood group A Rh+ . In a study conducted by Wu et al. (8) with COVID-19 patients, 36% of the patients had blood group A. In a study conducted by Zhao et al. (9), 37% of COVID-19 patients had blood group A. The frequency of blood group A in COVID-19 patients was significantly higher compared to the non-COVID-19 group. In a study conducted by Zeng et al. (10), 35% of the patients with mild pneumonia and 39% of the patients with severe pneumonia

**Table 3.** Distribution of symptom status of the participants in this research

|                                                              | n   | %*   |
|--------------------------------------------------------------|-----|------|
| Symptom status                                               |     |      |
| Yes                                                          | 220 | 85.9 |
| No                                                           | 36  | 14.1 |
| Symptoms                                                     |     |      |
| Malaise                                                      | 127 | 49.6 |
| Joint pain                                                   | 123 | 48.0 |
| Headache                                                     | 110 | 43.0 |
| Cough                                                        | 91  | 35.5 |
| Loss of taste and smell                                      | 74  | 28.9 |
| Fever (over 37.8°)                                           | 70  | 27.3 |
| Diarrhea                                                     | 61  | 23.8 |
| Dyspnea                                                      | 41  | 16.0 |
| Positive case status in your family and relatives before you |     |      |
| Yes                                                          | 82  | 32.0 |
| No                                                           | 174 | 68.0 |
| Positive case at your workplace before you                   |     |      |
| Yes                                                          | 108 | 42.2 |
| No                                                           | 148 | 57.8 |

\*: Column percentage

had blood group A. These patients had a higher frequency of blood group A compared to the general population. In a study conducted by Li et al. (11), 39% of the COVID-19 positive patients had blood

group A, and the frequency of blood group A was higher compared to the control group. In our study, the frequency of blood group A was higher similar to other studies. The genetic basis of this should be enlightened by further studies.

In this study, 21% of the patients had blood group 0 Rh+. In the study conducted by Cekdemir et al. (7), 30% of the patients had blood group 0 Rh+. In the study conducted by Wu et al. (8), blood group A was found in 21% of the patients. In the study conducted by Zhao et al. (9), 25% of the patients had blood group 0, and the frequency of blood group 0 was significantly lower compared to the non-COVID-19 group. In the study conducted by Zeng et al. (10), blood group 0 was found in 32% of the patients with mild pneumonia, in 33% of the Chinese population and in 26% of patients with severe pneumonia. In the study conducted by Li et al. (11), 25% of the patients had blood group 0, and the frequency of blood group 0 was found to be lower compared to the control group. The results of these studies are similar. There is a need for studies on the protection of the genetic features of blood group 0.

In this research, 3% of patients were aged 60 years and older. Their mean age was 37, and the median age was 36. In the study conducted by Zeng et al. (10), the median age of the patients with mild pneumonia was 52, 36% of these patients were aged 60 years and older; the median age of the patients with severe pneumonia was 67, and 73% were aged 60 years and older. The mean age of the patients in our study is significantly lower compared to the other study. This may account for the low need for intensive care in the patients in our study.

In this study, 62% of the patients were male. In the study conducted by Zeng et al. (10), 56% of the patients were male. Studies show that the disease is more common in males.

In the study, 18% of the patients had chronic diseases. It was deter-

**Table 4.** Distribution of the symptom status according to blood groups of the participants

|                         | A+  |      | A- |      | B+ |      | B- |      | AB+ |      | AB- |      | 0+ |      | 0- |      | Total |      | p            |
|-------------------------|-----|------|----|------|----|------|----|------|-----|------|-----|------|----|------|----|------|-------|------|--------------|
|                         | n   | %    | n  | %    | n  | %    | n  | %    | n   | %    | n   | %    | n  | %    | n  | %    | n     | %    |              |
| Symptom status          |     |      |    |      |    |      |    |      |     |      |     |      |    |      |    |      |       |      |              |
| Yes                     | 100 | 88.5 | 12 | 92.3 | 25 | 86.2 | 5  | 100  | 20  | 83.3 | 3   | 100  | 43 | 78.2 | 12 | 85.7 | 220   | 85.9 | 0.632        |
| Symptoms                |     |      |    |      |    |      |    |      |     |      |     |      |    |      |    |      |       |      |              |
| Malaise                 | 57  | 50.4 | 8  | 61.5 | 12 | 41.4 | 3  | 60.0 | 10  | 41.7 | 2   | 66.7 | 26 | 47.3 | 9  | 64.3 | 127   | 49.6 | 0.773        |
| Joint pain              | 54  | 47.8 | 5  | 38.5 | 9  | 31.0 | 3  | 60.0 | 12  | 50.0 | 2   | 66.7 | 28 | 50.9 | 10 | 71.4 | 123   | 48.0 | 0.348        |
| Headache                | 53  | 46.9 | 3  | 23.1 | 11 | 37.9 | 2  | 40.0 | 12  | 50.0 | 1   | 33.3 | 21 | 38.2 | 7  | 50.0 | 110   | 43.0 | 0.718        |
| Cough                   | 46  | 40.7 | 6  | 46.2 | 8  | 27.6 | 1  | 20.0 | 6   | 25.0 | 1   | 33.3 | 12 | 21.8 | 11 | 78.6 | 91    | 35.5 | <b>0.005</b> |
| Loss of taste and smell | 35  | 31.0 | 3  | 23.1 | 4  | 13.8 | 3  | 60.0 | 7   | 29.2 | 1   | 33.3 | 14 | 25.5 | 7  | 50.0 | 74    | 28.9 | 0.225        |
| Fever                   | 31  | 27.4 | 4  | 30.8 | 4  | 13.8 | 2  | 40.0 | 11  | 45.8 | 1   | 33.3 | 12 | 21.8 | 5  | 35.7 | 70    | 27.3 | 0.276        |
| Diarrhea                | 26  | 23.0 | 2  | 15.4 | 8  | 27.6 | 2  | 40.0 | 8   | 33.3 | 2   | 66.7 | 8  | 14.5 | 5  | 35.7 | 61    | 23.8 | 0.223        |
| Dyspnea                 | 21  | 18.6 | 2  | 15.4 | 3  | 10.3 | –  | –    | 4   | 16.7 | 1   | 33.3 | 5  | 9.1  | 5  | 35.7 | 41    | 16.0 | 0.261        |
| Chronic disease status  |     |      |    |      |    |      |    |      |     |      |     |      |    |      |    |      |       |      |              |
| Yes                     | 20  | 17.7 | 3  | 23.1 | 4  | 13.8 | 1  | 20.0 | 5   | 20.8 | –   | –    | 10 | 18.2 | 3  | 21.4 | 46    | 18.0 | 0.982        |

\*: Column percentage

mined that 7% of the patients had hypertension, 5% had diabetes and asthma, and 3% had heart disease. In the study conducted by Zeng et al. (10), 9% of the patients with mild pneumonia had diabetes and 16% had hypertension; it was found that 26% of the patients with severe pneumonia had diabetes, 48% had hypertension, 8% had chronic kidney disease, 30% had cardiovascular disease, and 8% had chronic lung disease. The low level of chronic disease in our study may have resulted from the low mean age. It was observed that patients with poor clinical condition had a high frequency of chronic diseases.

The limitations of our study included that the number of patients remained incomplete and this study did not encompass all the patients in the district because only the patients whose blood groups were recorded, were included in this study. In addition, the absence of treatments and detailed clinical findings is also among the limitations of the study. However, we should note that there are very few studies on the blood group and the results of this study will contribute significantly to the literature.

In this study, the frequency of blood group A Rh+ was high and the frequency of blood group O Rh+ was low in COVID-19 patients. It was found that the mean age of the patients was 37, and the number of patients who needed intensive care was low. There was no difference between the symptom states according to blood groups. It is recommended that people with blood type A behave more sensitively in terms of following the protection measures.

**Ethics Committee Approval:** Ethical approval was obtained from the Ministry of Health and Health Sciences University Kocaeli Derince Training and Research Hospital Clinical Research Ethics Committee (2020/89).

**Informed Consent:** Written informed consent was obtained from patients who participated in this study.

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** The author have no conflict of interest to declare.

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