

Long Coronavirus Disease Symptoms and their Association with Different Risk Factors

Rasha A. F. Jasim

Department of Clinical Laboratory Sciences, College of Pharmacy, University of Babylon, Hilla, Iraq

Abstract

Background: Although there are some studies trying to detect various long or post coronavirus disease (COVID-19) symptoms and some risk factors, long COVID-19 symptoms and their association with some possible risk factors such as age, sex, blood group, and oxygen level are still not well understood and required more studies worldwide. **Objective:** Therefore, this study included 206 patients. My questionnaire has different questions for the participants such as the type of symptoms they had post COVID-19 infection, to determine the most prevalence long symptoms. **Materials and Methods:** Moreover, to determine the association of post-acute sequelae of COVID-19 with some risk factors, the questionnaire included questions about the participant's age, gender, blood group, and oxygen rate during the infection. **Results:** My results showed that fatigue and muscle pain are the most prevalent long or post COVID-19 symptoms followed by forgetfulness and depression, chest pain and cough, loss of smell and taste, diarrhea, and abdominal pain. Also the results found that female patients, and persons with age from 19 to 29, as well as positive Rh blood group except AB+ are more susceptible to long symptoms. Moreover, the results showed that there is an association between oxygen rate reduction and the long COVID-19 symptoms. **Conclusion:** Some corona virus patients develop post disease symptoms, and it looks like that variable factors influence that. So understanding the correlation between appearance of the long COVID-symptoms and these the risk factors presents valuable insights, the conclusions warrant justification through larger clinical trials.

Keywords: Age, blood group, COVID-19, gender, long symptoms, oxygen level

INTRODUCTION

Coronavirus disease (COVID-19) is a pandemic outbreak started in the capital city of China, at the beginning of December 2019, and it rapidly spread around the world leading to a global pandemic.^[1,2] Corona virus SARS-CoV-2 is the main causative agent of this novel disease. The common symptoms of COVID-19 involved fever, chills, and sore throat. However, there are other symptoms called long COVID-19 symptoms or post COVID-19 affected some people.^[3] Some of these symptoms related to the skeletal system include muscle aches, severe fatigue, heavy arms and legs, numbness, and tingling, whereas other symptoms related to the respiratory system are runny or blocked nose, sneezing, persistent cough, tight or chest pain, shortness of breath, and loss of smell. The digestive system is also involved and their related symptoms are including nausea, vomiting, abdominal

pain, diarrhea, appetite loss, loss or change of sense of taste. Other symptoms related to the nervous system are headache, dizziness, sleeping difficulty, forget fullness, and depression.^[4,5]

According to the World Health Organization (WHO), long or post COVID-19 symptoms mean the presence or developing of new symptoms after healing from and continuing three months after initiation of SARS-CoV-2 infection some time without any clear reasons.^[6] While, long or post symptoms are mostly healing, other are continuing for 6 month or year especially those related

Address for correspondence: Dr. Rasha A. F. Jasim,
Department of Clinical Laboratory Sciences, College of Pharmacy,
University of Babylon, Hilla, Babil, Iraq.
E-mail: rasha.197822@gmail.com

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to nervous system.^[7] Lastly, it was observed there is a high increase in the occurrence of long COVID-19 in the United Nations (UN) about 30.2%.^[8]

There are some risk factors that are associated with the long COVID-19 symptoms such as age, sex, ABO blood groups, oxygen rate, taking medication that can inhibit immune system, some health problems, and smoking.^[9]

Although there are some studies tried to determine the type of long symptoms, there is still a gap in the information around the risk factors associated to post COVID-19 symptoms. And there is still a limitation in the number of studies that follow or highlighted the long or post COVID-19 symptoms around the world. Post health COVID-19 complications are different from patient to patient and from region to region. Therefore, this analytical study came to highlight some of the important post health COVID-19 complications. In addition to detection of some risk factors that are associated with the long symptoms in Hilla city.

MATERIALS AND METHODS

Data collection

The data were collected from 206 patients (18% male, 82% female), using questionnaire form. The patient's age ranged from 19 to up to 50. The data were collected from October 2022 to May 2023 in Babylon city. To maintain a higher degree of confidentiality, all the data of patients including their names and addresses were hidden. The questions were formulated considering potential biases, and in a manner that allows the participant to feel accepted, no matter what the answer is.

Ethical approval

All participants were informed about the details of the study. Participation in the study was voluntary, and students could withdraw from the study without any consequences. The anonymity of participants was guaranteed. Only researchers had access to research data.

RESULTS

Long COVID-19 symptoms

According to the observation and analyzing the data that collected from patients suffering from long symptoms after corona infections. We conducted a research on post COVID-19 symptoms or complication. The number of people who filled out the questionnaire was 206. The results are illustrated in figures bellow. The results showed that 79% of patients have COVID-19 complications, whereas only the 21% of patients did not suffer from any symptoms after healing from COVID-19 infection [Figure 1].

Figure 1 shows the number of participants who were infected with Corona virus and suffer from complications. It appears that the ratio of patient who have complicated

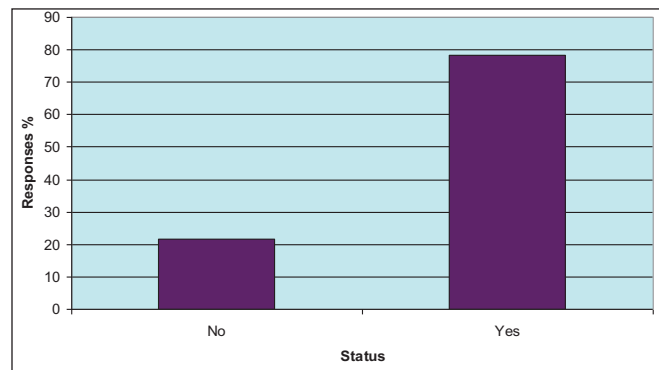


Figure 1: The ratio of patients who have long COVID-19 symptoms

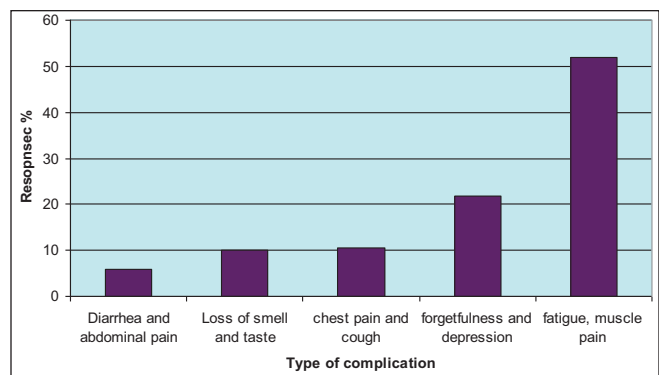


Figure 2: Type of long COVID-19 symptoms

after COVID-19 are high compare to those who did not suffer from any complications after infected with the Corona virus.

To detect the type and the most prevalent complication, the study form had a question about the type of complications or long COVID symptoms. The results showed that 52% of patients suffered from muscle pain and fatigue, and 21% of people suffered from symptoms in the central nervous system such as forgetfulness and depression together with the fear that this could return to these patients who have less ability to clear SARS-CoV-2 RNA within 28 days of infection.^[10] Also there were 10% of people who suffered from chest pain and cough and loss of smell and taste, whereas 6% of people who suffered from diarrhea and abdominal pain [Figure 2].

Figure 2 showed that fatigue and muscle pain are the most prevalent complications after COVID-19 followed by forgetfulness and depression, chest pain and cough, loss of smell and taste, diarrhea, and abdominal pain with a ratio 52%, 21%, 10%, 10%, and 6% respectively.

Possible factors or reasons behind complications

Now it is obvious that the next questions come to mind is why some patients have complications while others not? Or what is the common thing between them? To understand this puzzle and answer these difficult questions, our form

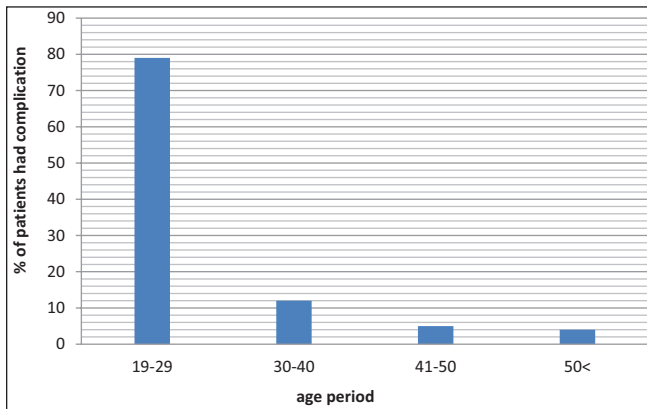


Figure 3: Association of age with long COVID-19 symptoms

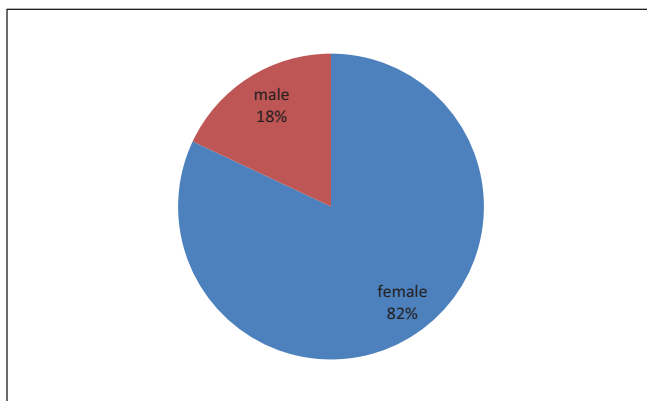


Figure 4: Association of gender with long COVID-19 symptoms

had different questions for participants that may be related to these complications such as age, sex, bloods type, and oxygen level.

With regard to ages, Figure 3 shows that the ages of the participants ranged from 19 to 60 years. However, the ages experienced complications in a large proportion were from their 19 to 29 with a ratio 77% compare to other ages.

This figure showed that the highest percentage of complications, that is, 79% occurred among people with ages ranging from 19 to 29. In contrast, the percentages of COVID-19 complications among patients with ages ranging 30–40, 41–50, and more than 50 are low with a ratio 12%, 5%, and 4%, respectively.

According to the sex, the results showed that the ratio of COVID-19 complication 82% among women is more than the ratio of COVID-19 complication among men 18% [Figure 4].

This figure showed that the percentage of COVID-19 complications among female patents is high compare to male patients with a ratio 83% and 17%, respectively.

Another aspect that might be contributed to the reasons causing adverse effect of COVID-19 is the type of blood. Therefore, the patients with COVID-19 complications

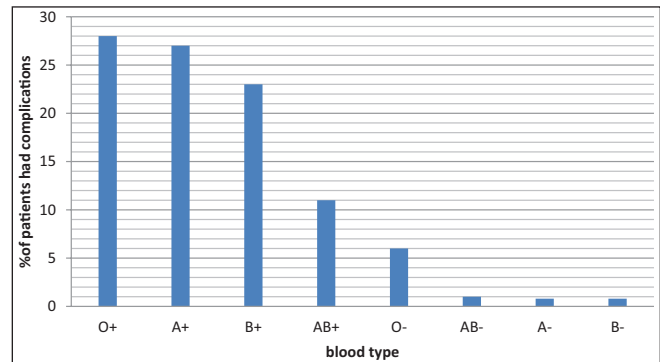


Figure 5: Association of Rh and ABO blood groups with long COVID-19 symptoms

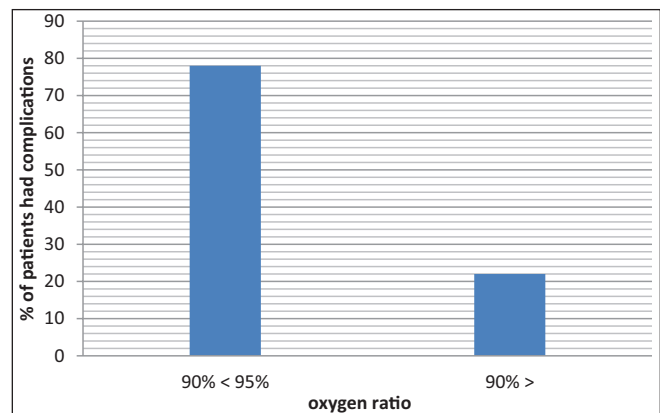


Figure 6: Association of oxygen level with long COVID-19 symptoms

were asked about their blood type. The results showed that the patients with RH+ are more susceptible to develop complications than patients with RH-. Also Figure 5 appeared that percentage of patients with blood type O+, A+, and B+ are higher than other blood groups [Figure 5].

The figure showed that patients with blood group with Rh+ are more susceptible to the COVID-19 complications than Rh-. Also presented that the highest ratio of COVID-19 complication 28% occurred in the patients with blood group O+ followed by A+ and B+ with a ratio 27% and 23% respectively, whereas, the lowest percentage of COVID-19 complications appeared in blood groups AB+, O-, AB-, A-, and B- with a ratio 11%, 6%, 1%, 0.8%, and 0.8%, respectively.

Finally, we asked the patients about the oxygen level during the COVID-19 infection, the results showed that 78% of patients have COVID-19 with oxygen level more than 90 and less than 95%, while only 22% of patients have post COVID-19 complications with oxygen level less than 90% [Figure 6].

DISCUSSION

This analytical study provides insight into long-COVID-19 symptoms and some risk factors that

might be linked to. This will allow us to fill the gap of understanding the connection between long post-acute sequelae of COVID-19 and some factors that might be affecting them such as age, gender, blood group, smoking, and oxygen level. However, it could be limited because it was based on the app contributors rather than an illustrative population sample. The author(s) used the data collected by the online questionnaire form (September 2022–April 2023). The total number of participants in the questionnaire is 206, and all of them are infected with COVID-19 at least once. The results showed that 165 of patients suffer from post-acute sequelae of COVID-19 also called long-COVID-19 symptoms [Figure 1]. And the most prevalent long COVID-19 symptoms are fatigue and muscles pain followed by forgetfulness, depression, chest pain and cough, loss of smell and taste, diarrhea, and abdominal pain) that are shown in Figure 2. These results agree with references^[11-13] who found that fatigue, dry cough, and muscle/joint pain are the most common long COVID-19 symptoms, whereas, another one study mentioned also sore throat and sleep problems as common long-COVID-19 symptoms, which our study did not observe.^[11,14,15]

To understanding the connection between the long symptoms and gender, our study analyzed the data of participant's gender. The result observed that the rate of post-acute sequelae of COVID-19 was high in women compare to men [Figure 4]. Those results agreed with references^[11,16,17] who found that there is a connection between gender and persistence of sever long-COVID-19 symptoms.

Considering the age, there are various and different factors associated with long symptoms and age. For example, references^[16,18] found there is a linkage between long symptoms and age, whereas references^[19,20] did not concur. This study's results showed there is an association between age and long symptoms. Moreover, the high rate of persistence symptoms are noted in age group between 19 and 29 followed by medium age 30–40, 41–50, and >50, respectively [Figure 3]. This could be ascribed to the differences in the study region, or different life style and whether between study areas. Anyway, the connection between age and long symptoms required more researches.

The association of possibility between persistence symptoms and ABO and Rh blood groups was also studied. First our results showed that Rh positive patients are more susceptible to long COVID-19 symptoms than Rh negative for all ABO blood groups. Those results agreed with reference^[21] who found that the ratio of Rh+ infected with corona virus is higher than Rh- in Delhi, India. Contrarily, references^[22,23] observed there are no significant differences between Rh blood groups.

Also similar to our results, reference^[21] found that AB is associated with lower risk of coronavirus disease 2019 compared with A+ or B+ agreed with Zhao *et al.* However, in opposite to their results, our results showed that O+ patients have high risk ratio to long symptoms as groups A+ and B+ agreed with reference^[24] who suggest there are no significant differences in the susceptibility of blood group types A+, O+, and B+ to the long COVID-19 symptoms. The connection between blood group and severity post COVID-19 symptoms does not require more evidence.

Finally the association between oxygen level and long COVID-19 symptoms has been studied. SpO₂ on a pulse oximeter is used for measuring the oxygen level in patients' blood in hospital, clinic, or even at home. The normal SpO₂ reading is ≥95%. The data of participant's SpO₂ reading were analyzed. Our results showed that most patients with long symptoms have oxygen level 90% < 95%, and other with oxygen level less than 90% [Figure 6]. Our result agreed with the study published in the news of Waterloo University at March 1, 2023 which is the first study that examined the association between oxygen changes and long COVID-19.^[25]

CONCLUSION

Fatigue and muscle pain are the most prevalence of long or post COVID-19 symptoms followed by forgetfulness and depression, chest pain and cough, loss of smell and taste, diarrhea and abdominal pain. Also the results found that female, and the age from 19 to 29 are more susceptible to long symptoms. Negative Rh blood group and AB+ are less vulnerable to post-acute sequelae. There is no significant difference in the susceptibility of O+, A+, and B+. Moreover there is a reduction in the oxygen rate less than 95% in all patients with long COVID-19 symptoms.

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Conflicts of interest

There are no conflicts of interest.

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