



## Correlation of hemoglobin with recovery time in COVID 19 infected patients.

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### Article received on:

03/07/2021

### Accepted for publication:

10/09/2021

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**ABSTRACT... Objectives:** To study the correlation between recovery time and hemoglobin level in COVID-19 infected patients. **Study Design:** Observational study. **Setting:** Rawal Institute of Health Sciences Islamabad, Pakistan Institute of Medical Sciences Islamabad. **Period:** February 2021 to June 2021. **Material & Methods:** Data was analyzed using SPSS version 27. Mann Whitney U test was used to compare the duration of recovery among the groups and spearman's correlation was applied for correlating the duration of recovery with the Hb levels of COVID-19 patients. **Result:** Group 1 patients recovered within 14 days and group 2 patients recovered after 14 days. COVID-19 infected Patients with low hemoglobin level took more than 14-20 days to recover from disease and those with high hemoglobin recovered within 8-14 days. **Conclusion.** Recovery from disease was prolonged in corona virus infected patients with less hemoglobin as compared to patients with high levels of hemoglobin levels.

**Key words:** Corona Virus, Correlation, Hemoglobin, Recovery Time, Reduction, Symptoms.

**Article Citation:** Chaudhry ZR, Rashid E, Rasheed S, Aslam H, Shakir S, Rasheed F. Correlation of hemoglobin with recovery time in COVID 19 infected patients. Professional Med J 2021; 28(12):1692-1695.  
<https://doi.org/10.29309/TPMJ/2021.28.12.6694>

## INTRODUCTION

Coronavirus disease (COVID-19) an infectious disease has not only caused physical stress but also social and mental stress. The symptoms of corona virus infected patients vary from mild to severe form. Transfer of this virus to others is through droplets contaminated with corona virus. These heavy droplets cannot hang in the air and rapidly fall on surfaces. This virus is enveloped positive-sense RNA viruses, has club-like spikes and large RNA genome.<sup>1</sup> COVID-19 infected patients after the onset of disease present with cough, low grade fever, myalgia, fatigue, sore throat and symptoms of viral pneumonia.<sup>2</sup> WHO recommended recovery time for mild cases is about two weeks, while critical cases can take more than forty days.

Latest research suggest that 2 weeks are required for a body to recover from mild COVID-19 infection and severely infected critical cases can take more than six weeks to recover. The recovery time varies for different people, depending on their

age, immunity and health.<sup>3</sup> In our study we have taken the disappearance of fever and cough as the recovery symptoms. In a study it was seen that 99% of patients have fever, the average duration of fever was about twelve days. Dry cough was present in fifty percent of patients, the average duration of cough was 19 days. Difficulty in breathing and shortness of breath was present in thirty three percent of patients. Fatigue was present in 50% patients and 33% complained of muscle pain. About 85% suffered from mild form of disease.<sup>4</sup> There is reduction of hemoglobin in covid 19 infected patients, it was seen anemia was present in 51.97 % patients, due to difficulty in breathing and limited functions of lungs there is reduction in oxygen delivery leading to decreased level of mean cell hemoglobin concentration and hemoglobin level.<sup>5</sup>

Normal hemoglobin counts are 14 to 17 gm/dL (grams per deciliter) for men and 12 to 15 gm/dL for women, hemoglobin is a protein in the red blood cells carrying oxygen to different tissues

and transports carbon dioxide back to lungs. With normal hemoglobin we are able to work and perform normal activities of life. Low hemoglobin level causes weakness, tiredness, dizziness, headache, shortness of breath and pale skin.<sup>6</sup> A patient with anemia if infected by corona virus all the signs and symptoms caused by reduced hemoglobin are exaggerated because the corona virus causes further reduction in hemoglobin by attacking the beta -1 chain of hemoglobin, leading to damaged hemoglobin which is unable to deliver oxygen to the tissues.<sup>7</sup> Decreased oxygen supply causes further damage to tissues leading to increased lactate production which causes aches and pain in muscles.<sup>8</sup> Corona virus infected patient with preexisting anemia takes a longer time in recovering from disease than those with normal hemoglobin.

Present study is conducted to observe the time duration taken by Covid-19 infected patients with pre-existing anemia to recover from the signs and symptoms of disease. The correlation of recovery time with serum hemoglobin level is observed in this study.

**MATERIAL & METHODS**

This cross sectional study was conducted at Rawal Institute of Health Sciences from Feb 2021 to June 2021. Total 100 adult patients suffering from COVID-19 infection were selected. Patients from both genders with anemia other than blood disease were included, children and patients below the age of 18 years with anemia due to blood disorder were excluded. Blood hemoglobin (Hb) of all the COVID-19 infected patients was noted from the record in the laboratory of Rawal institute of health sciences and Pakistan institute of medical sciences Islamabad. Patients were followed for their recovery time. Disappearance of fever and reduction in cough was taken as recovery symptom. Patients were divided into two groups according to their recovery days, those who recovered within 14 days were included in group 1 and group 2 included those who took more than 14 days to recover. Correlation of hemoglobin with the recovery time was noted.

**Statistical Analysis**

Data was analyzed using SPSS version 27. Data was checked for normality by using Shapiro wilk test. Data came out to be non-normally distributed. Mann Whitney U test was used to compare the duration of recovery among the groups and spearman’s correlation was applied for correlating the duration of recovery with the Hb levels of Covid-19 patients.

**RESULT**

	Group 1	Group 2	P-Value
Days of Recovery	10.0 ± 2.11 10(8-12)	21.9±3.50 21(19-25)	0.00

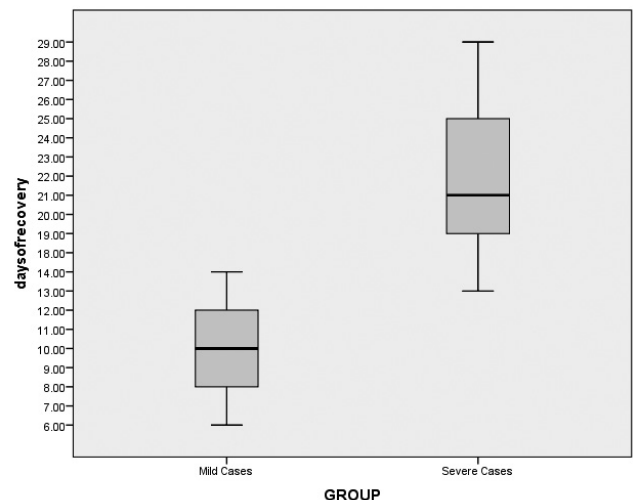
**Table-I Comparison of days of recovery among the groups.**

Groups	Mean Hb ± SD
Group 1	12.28 ± 1.37
Group 2	10.09 ± 1.61

Mean Hemoglobin g/dl in both groups.

Parameter	RHO	P-Value
Hb		
Days Of recovery	-0.497	0.00

**Table-II Correlation of Hemoglobin with days of recovery.**



From the above result it is seen that patients belonging to group 1 with mean serum hemoglobin levels of 12.28 ± 1.37 g/dl took 8-12 days to recover from disease while those belonging to group 2 with mean serum hemoglobin level of 10.09 ± 1.61 g/dl took 19-25 days to recover from

disease. RHO-0.497 indicate that there is negative correlation with the recovery time, increase hemoglobin level decreases the recovery days. We can say there is a difference of 2.2g/dl in hemoglobin leading to delayed recovery time and a difference of 07 days in the recovery from diseases.

## DISCUSSION

Corona virus is causing physiological, psychological and pathological changes in the body. From the above results it is seen that patients belonging to group 1 with hemoglobin level of 12.2 g/dl suffering from Covid-19 infection took average of 10 days to recover from disease than those with hemoglobin 10.0 g/dl and belonging to group 2 took average of 21 days to recover from the disease. On finding the correlation of hemoglobin with recovery days it is seen that increased hemoglobin there is reduction in recovery days Hemoglobin provides oxygen to different tissues of body and keeps tissues healthy helps in rapid recovery from disease. Anderson HL.et.al 2018 in one of his study said that Red blood cells act as modulators of the innate immune response. Erythrocytes causes' reduction in inflammation by scavenging and binding to pathogens, chemokines and nucleic acids in circulation.<sup>9</sup> Increased in the amount of RBC, with increased hemoglobin leads to early recovery as there is reduced inflammation. Fukushima T et.al 2019 in one of his study said that low hemoglobin level causes reduction in strength of muscle and brings about changes in body mass and fat, effect walking all these lead to more fatigue, depression and anxiety.<sup>10</sup> Fever is due to immune response of body to infection. The range of fever in covid -19 infected patients is between low to medium grade. Nash AA et.al 2015 said pyrexia occurs when cytokines. IL-6 and IL-1 disturbs the thermoregulatory centre of hypothalamus and elevate the set point.<sup>11</sup> In our research we have seen that patients with good Hb level recovered earlier than those with less Hb.

Gwozdziński K et.al 2021 in one of his study suggested that reactive oxygen species (ROS) are produced by red blood cells because they are continuously exposed to oxygen and hemoglobin

also act as catalyst for free radical reactions.<sup>12</sup> Paiva CN, et.al 2014 in his research said that reactive oxygen species directly by oxidative damage and indirectly by non-oxidative mechanism kills the pathogens. It causes damage to biomedical compounds, causes autophagy and disturbance in pattern recognition receptor signaling.<sup>13</sup> From above discussion we can say that patients with normal hemoglobin level recovered earlier from disease than with low hemoglobin because there is adequate production of oxygen and nutrients to all tissues, more production of ROS which rapidly killed the microorganism. Since hemoglobin binds with cytokines so there is earlier reduction of fever. COVID-19 infected patients also suffer from cough, patients with low hemoglobin their cough persisted for longer time and they took more than 14 days to recover from disease. heme in hemoglobin contain iron which binds to oxygen, each hemoglobin binds four oxygen.<sup>14</sup> Stepan D et.al 2018 in one of his research concluded that when there is reduced iron in the body there is more respiratory tract problem and abnormality in immune response.<sup>15</sup> Adequate iron has a role in the reduction of upper respiratory tract infection because it regulates the immune response by producing pro-inflammatory cytokines which decreases inflammation.<sup>16</sup> Kathryn W .2018 in one of her study said for hemoglobin production iron has a very beneficial role, tranferin binds to iron which helps in the transport of iron and production of red blood cells.<sup>17</sup>

We can say patients with low hemoglobin level showed delayed recovery from disease because their iron stores were not adequate to provide sufficient oxygen to tissues, there was reduced production of ROS, there was reduced production of pro-inflammatory cytokines and reduced binding of hemoglobin with cytokines all these caused delayed recovery from disease.

## CONCLUSION

From the above study we conclude that patients with normal levels of hemoglobin recovered earlier from Covid -19 infection than those with low hemoglobin, this is because there is more oxygen supply to tissues more nutrients provided, more production of reactive oxygen species killing viral






cells and early repair of tissues leading to rapid recovery from corona virus disease.

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**AUTHORSHIP AND CONTRIBUTION DECLARATION**

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2	Erum Rashid	Drafting the work, Statistical analysis, interpretation of data of work.	
3	Sana Rasheed	Design, analysis and drafting the work.	
4	Hina Aslam	Analysis, design of work, interpretation of data.	
5	Sabeen Shakir	Drafting and design of work, critical evaluation.	
6	Faiza Rasheed	Design and drafting the work.	