



Corona virus lowers hemoglobin more in severe infection than mild COVID-19 infection.

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ABSTRACT... Objectives: To study the effect of corona virus on blood hemoglobin and the changes this virus causes on hemoglobin in COVID-19 infected patients. **Study Design:** Observational study. **Settings:** Rawal institute of Health Sciences and Pakistan Institute of Medical Sciences, Islamabad. **Period:** Feb 2021 to April 2021. **Material & Methods:** Total 100 adult patients were included all were suffering from corona virus infection. COVID-19 infected patients belonging to both genders with no other cause of anemia were selected and all adult patients in which anemia was due to diseases other than corona infection were excluded. The blood samples of COVID-19 infected patients was taken in 5cc syringe and was sent to the laboratory of Rawal Institute Of Health Sciences Islamabad for hemoglobin estimation. Blood hemoglobin (Hb) at the time of admission was recorded. Changes in their blood Hb was noted. Data was entered into SPSS version 23, normality of data was checked. For non-normally distributed data kruskal wallis and Mann whitney U test was applied and for normally distributed data Anova and post hoc was used. Spearman correlation was used to correlate non distributed data and Pearson's correlation was used for normally distributed data. **Results:** 100 adult patients were divided in two groups. Group I with mild symptoms of corona virus and group II with severe symptoms of corona virus. Patients with mild corona symptoms their blood hemoglobin level was 12.2 g/dl and those with severe corona symptoms their blood hemoglobin level was 10.0 g/dl. **Conclusion:** It was observed that patients suffering from severe disease of corona COVID-19 had reduced hemoglobin levels than those suffering from milder form of disease, thus confirming that corona virus effects the hemoglobin level and reduces its serum value causing anemia leading to complication of disease.

Key words: Corona Virus, Hemoglobin, Reduced, Severe Infection.

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INTRODUCTION

(COVID-19) corona virus disease a global pandemic related to respiratory tract infection, with symptoms like common cold, now causing multiple organ sepsis Patients with corona infection having low hemoglobin are immune compromised and can rapidly suffer from other infections. This study is conducted to see the changes in blood hemoglobin caused by corona virus. COVID-19 is transmitted by three main routes, droplets transmission, contact transmission, aerosol transmission.¹ Coronavirus after recognizing and binding to ACE2 host receptor, enters the host cell.² The mucosal cells in throat, conjunctiva, nasal cavity and mouth are infected by the virus for replicating, virus enters

the lungs causing fever, cough.² Corona virus a positive RNA strand produces cytokines and chemokines. causing fever, damage to lungs and cough.³ Hemoglobin is a red blood cell protein with two α - and β -subunits and embedded heme⁴ corona requires porphyrins for its replication and survival, in hemoglobin the porphyrin is present in excessive amount, corona attacks the hemoglobin to get porphyrin, it attacks beta -1 chain of hemoglobin and catches the porphyrin, damages hemoglobin and it losses its ability to carry and deliver oxygen.⁵ COVID-19 patients with anemia exhibit severe inflammation response. Including poorer lung function, more serious myocardial injury and renal dysfunction.⁶ Corona virus attacks the red blood cell hemoglobin

molecule, by interacting with receptors located on blood cell resulting in damage to hemoglobin, and produces hypoxia.⁷ Corona virus by blood reaches the sites where ACE2 receptors are present on heart, brain, kidney, vascular smooth muscle, and skeletal muscles. Damages the cell causing increased production of lactate which further effect the oxygen carrying ability of erythrocytes leading to tissue hypoxic. Therefore, the musculoskeletal system can also undergo infection and patients feel aches and pain in muscles and body.⁸ Reduced hemoglobin is seen more in severe form of disorder of disease and reduction in hemoglobin level is less in mild form of disorder of disease.⁹

MATERIAL & METHODS

This experimental study was carried out in Rawal Institute of Health Sciences Islamabad. In this we divided the patients into two groups. Group 1 with mild corona symptoms and Group II with severe corona symptoms. Blood was taken in 5 cc syringe and was send to laboratory for hemoglobin estimation. Serum hemoglobin value of both types of patients was noted. Data was entered in SPSS version 23 and result was recorded.

RESULT

Group-I: All patients with mild symptoms of corona virus, their blood hemoglobin was taken in 5cc syringe and recorded at the time of admission.

Group-II: All patients with severe symptoms of corona virus, their blood hemoglobin was taken in 5cc syringe and recorded at the time of admission.

Parameter	Mean SD Group I (n=50)	Mean SD Group II (n=50)	P-Value
Hb g/dl	12.2±1.3	10.0±1.6	0.00

Table-I. Mean and Standard deviation of group I and II.

Patients with mild corona symptoms their blood hemoglobin level is 12.2 g/dl and those with severe corona symptoms their blood hemoglobin level is 10.0 g/dl. There is 2. 2 g/dl difference in

the hemoglobin of severely infected patients.

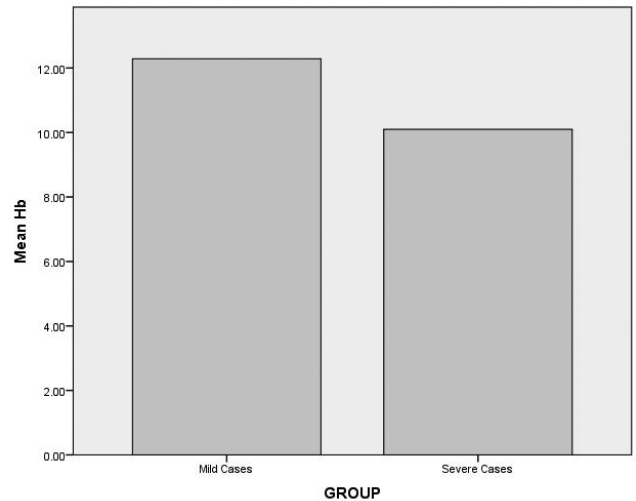


Figure-1. Bar graph of Group I (mild case) and II (severe case) with Hb value.

DISCUSSION

In our study we have seen that all the patients with severe symptoms of corona virus including fever, flu, cough, pneumonia, vomiting, diarrhea, loss of taste and smell their hemoglobin level was less as compared to patients with mild symptoms. We have seen that patients with severe corona infection their blood hemoglobin is 2.2 g/dl less than those with mild infection. We can say there is 4.4 % reduction in blood Hb level of patients with severe corona infections. Anai M 2021 conducted the research on hemoglobin level on COVID-19 infected patients and concluded that there is low hemoglobin level after severe corona infection and after pneumonia, this decrease hemoglobin further worsen the respiratory infection in corona patients⁹ Nobrega F et. al 2020 suggested that new coronavirus has ability to act on the hemoglobin beta chain and has potential to code proteins, this causes oxygen transport capacity of hemoglobin to be lowered contributing to hypoxia thus worsening the condition.¹⁰ In hemoglobin considering the structure of heme, is a combination of porphyrin with iron, porphyrin is ring like organic compound to which iron is attached. This iron atom attaches with oxygen reversibly and delivers oxygen. Liu W 2020. Conducted the research on Corona virus and concluded that this virus binds to hemoglobin beta -1 chain through surface glycoprotein. It

inhibits heme metabolism by separating the iron component from porphyrin leading to formation of porphyrin alone. Iron accumulate in body in excessive amount causing inflammation and increase in C-reactive protein.¹¹ This causes further stress on corona patients. Virus attacks more to deoxyhemoglobin, interferes with normal heme anabolic pathway, lowers the level of hemoglobin carrying oxygen, producing coagulation reaction and symptoms of respiratory distress.¹¹

John Paul Graff, in 2020 in a case study said that corona virus acts on the bone marrow. Lab result showed Most of RBCs were of normal shape and size but in reduced number representing (normocytic anemia), few immature RBCs (nucleated), some with different sizes (anisocytosis) were seen, tear-drop shaped cells dacrocytes were rarely seen.¹² In severe corona infection there is more severe anemia, this corona virus acts on the bone marrow stromal cells and the blood cells by production of auto antibodies and induction of immune complexes.¹³ Hariyanto TI et.al 2020 said that identification of risk factors and its relation with severe disease is important for health. One such risk factor is anemia and it was seen that patient with anemia have the higher incidence of getting infected with corona virus.¹⁴ In our research we have seen that corona virus damages the red blood cells and lowers the hemoglobin. Lippi G 2019 suggested that there was great reduction in the hemoglobin levels of COVID-19 patients suffering from the worst form of disease than with those with less severe disease.¹⁵ These studies were conducted outside Pakistan. We have conducted this study in Pakistan and came to the conclusion that corona virus lowers the hemoglobin level in human irrespective of the place and environment.

CONCLUSION

Patients with severe corona infection have lower hemoglobin than those with mild COVID-19 infection. Corona attacks and damages the RBCs, effects the cells in bone marrow leading to damaged red blood cells and reduced hemoglobin level.






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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author(s) Full Name	Contribution to the paper	Author(s) Signature
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2	Sana Rasheed	Drafting the work, Statistical analysis, Interpretation of data of work.	
3	Sabeen Shakir	Design, analysis and drafting the work.	
4	Erum Rashid	Analysis, design of work interpretation of data.	
5	Maliha Ansari	Drafting and design of work, critical evaluation.	
6	Faiza Rasheed	Design and drafting the work.	