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Correlation Study Between Shortness of Breath, Fever, Severe Cough, and Hypoxemia in Corona Patients

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Abstract:

Our current research includes a study of the correlation between some of the most important symptoms associated with infection with the corona virus, and hypoxia in the blood, especially after its attachment to the wall of the epithelial lining of the pulmonary alveoli sacs directly, and the completion of the incubation cycle in the lungs as well. And it is known that infection with the corona virus leads to poor performance and function of the lungs in the required manner before infection, due to the exposure of the wall of the pulmonary alveoli to inflammation through a significant increase in its thickness. The number of patients indicated for each month, and the total number for the year, which is about (8999) patients , through which we can determine whether there is a significant difference between them or not, in addition to that we can show through the percentage of each type of symptoms that appear on corona patients (fever, sever coughing, shortness of breath: 75 %, 68 %, 34 %) respectively, the relationship between them and oxygen level in the blood.

Objective: Observing the most important symptoms that lead to hypoxia in the blood, and controlling them, which leads to a gradual improvement in the patient's condition, and this study gives a qualitative clarification in the possibility of controlling the infection.

Methods: Collecting statistical data from a group of specialized medical clinics in Karbala Governorate and documenting them for a full year according to the months of the year for the period from 7/2021 to 7/2022.

Results: Samples collected from a group of outpatient medical clinics from different regions of the city of Karbala, for the period from July 2021 to July 2022, corresponding to the data of World Health Organization (WHO). The study of the correlation between the symptoms represented by fever, shortness of breath, severe cough, and hypoxemia is done on the third stage in particular.

Conclusion: We conclude from our current study that there are no significant differences between the number of patients and the three stages type that recorded through this periodic time, even if there is a difference in age and gender.

Introduction.

The symptoms of infection with the corona virus are many, including those that are easy to treat and avoid at home, such as fever, coughing, and so on, while others are difficult to treat except by going to the hospital, such as shortness of breath, which is supposed to result from a lack of oxygen in the blood, which may lead to respiratory failure that cannot be treated at all because it quickly leads the patient to death, and shortness of breath may be considered a symptom of infection with the corona virus, so attention must be paid to it. Mostly patients with COVID-19 present with severe hypoxia without observing any commensurate features of respiratory distress, which is defined as silent or apathetic hypoxia [1,2]. Certainly, there is a correlation between shortness of breath for coronavirus patients and hypoxia in the blood, but sometimes COVID-19 patients suffer from acute hypoxemia. Without noting the relative characteristics of respiratory distress, a condition known as silent hypoxia [3, 4]. Mostly the Corona virus spreads between people during direct and close contact between them, that small droplets of droplets that are produced by coughing and sneezing or by talking with infected people are the reason for the spread of the disease among people, since these droplets usually may fall on the ground or on the surfaces that members of the community constantly touch. There are some cases that are the least common, in which the disease is spread among people indirectly, by touching surfaces contaminated with corona virus, and then touching their faces. The corona virus is most contagious after symptoms appear during the first three days of infection, although infection may occur before any symptoms appear from infected people who do not show symptoms of the disease. Therefore, the use of a face covering is always recommended for those who suspect they may have contracted the virus, as well as the people who provide care for them. Fever, cough, and shortness of breath are among the most common symptoms of coronavirus disease [5]. As for muscle pain, sputum secretions, and sore throat, they cannot be considered common symptoms. Some infections may follow a simple path with few symptoms, but most of them may develop into more serious forms that lead to severe pneumonia and multiple organic disorders [6]. The term Covid-19 is the name given by the World Health Organization to the Corona virus, as it is the virus that causes severe acute respiratory syndrome, and it is the disease that affects people in a different and distinctive way, as some cases of it show mild symptoms, while other cases show symptoms. Severe, which may quickly lead to loss of life, and about 20% of the injured need medical care in hospitals in all countries of the world.

Patients and method:

When samples are collected from a group of outpatient medical clinics from different regions of the city of Karbala, for the period from July 2021 to July 2022, the number of coronavirus infections according to the months of the year is as follows: (709, 627, 801, 682, 837, 781, 679, 804, 787, 659, 762, 871) respectively, 85% of symptoms are fever, 62% are severe cough, and 19% are shortness of breath, statistically; the disease follows three main paths when infected:

1. First stage: The disease has passed through the stage of common mild disease of the upper respiratory tract.
2. Second stage: The disease descends to the lower part of the respiratory system.
3. Third stage: It represents the most serious condition, in which the disease progresses remarkably quickly to turn into acute respiratory syndrome.

The study of the correlation between the symptoms represented by fever, shortness of breath, severe cough, and hypoxemia is done in the third stage in particular.

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Results:

Table no. 1: The total number of patients with corona virus disease, for 12 months: -

Months	Number of patients
July	709
August	627
September	801
October	682
November	837
December	781
January	679
February	804
March	787
April	659
May	762
June	871
Total number of cases	**8999**

Table no. 2: The percentages of symptom types: -

Symptom Types	Percentages %
Fever	75 %
Sever coughing	68 %
Shortness of breath	34 %

Table no. 3: The normality test of total patients' number through 12 months (there is no significant differences between them): -

One-Sample Test						
	Test Value = 12					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
patients	33.265	11	0	737.9167	689.0916	786.7417

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Table no. 4: symptoms (fever, cough, shortness of breath) in each month respectively: -

Months	symptoms		
	fever	cough	Shortness of breath
July	602	439	135
August	532	387	119
September	681	496	152
October	579	422	129
November	711	518	159
December	663	484	148
January	577	420	129
February	683	498	153
March	668	487	149
April	560	408	125
May	647	472	145
June	740	540	165

Discussion.

The incubation period when infected with the Corona virus ranges between two days and two weeks, and the average of this period is estimated at about five to six days, according to the statistics of the World Health Organization. The approximate period from the onset of disease symptoms to the onset of clinical improvement is two weeks, and may reach (3-6 weeks) in most severe and critical cases. Preliminary evidence has indicated that the time period from the onset of symptoms to the severe development of the disease leading to hypoxia is estimated to be exactly one week. While the time period between the onset of symptoms until death is (2-8 weeks) [8]. Naturally, the breathing process takes place through the lungs. This is when the alveoli are filled with air, then they expand in order to excrete carbon dioxide gas, and they contract to enter the oxygen gas that passes with the blood and supplies the cells and various organs with the oxygen and nutrition necessary to carry out their vital functions. Since the corona virus infects the lungs, therefore, it causes the lungs to be exposed to inflammation, which leads to an increase in the thickness of the wall of the pulmonary alveoli, so they are filled with secretions that impede the entry and exit of gases from the body through them, thus a disorder occurs in the gases, and the percentage of oxygen decreases, this leads to confusion in the job performance of the rest of the members. Usually, a patient infected with COVID-19 suffers from a group of symptoms, the most important of which is fever and a defect in the respiratory system, leading to coughing, sputum production, and shortness of breath, in addition to sore throat and somewhat nasal congestion [9]. According to the patients number that shown in **figure no.1**, there is no significant differences between them, as statistical data in **table no. 3,** that shown the normality test of total patients number through 12 months.

The spread of the corona virus all over the world and the infection of a large number of people is a dangerous indicator that threatens human life, especially as it began to develop into different strains, each of which has different characteristics from the other, and also possesses resistance that enables it to get rid of the discovered treatment and vaccines, which It has led to a global increase in the rate of reported infection and death [10, 11, 12].

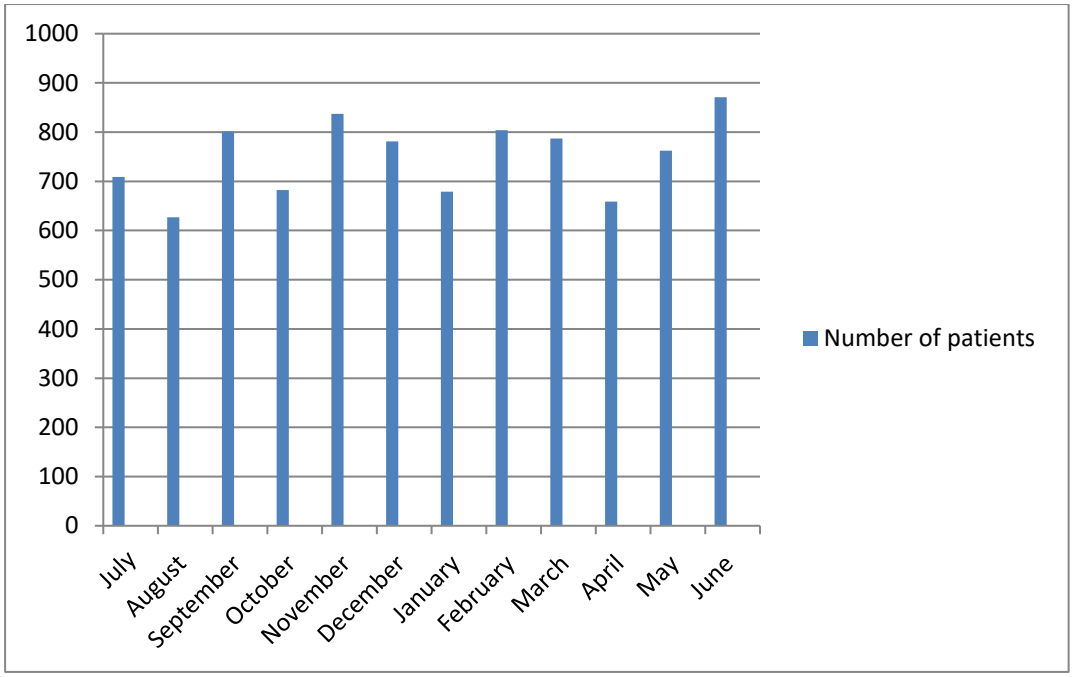

Figure no.1: Patients number with coronavirus disease monthly.

The symptoms of Corona virus patients vary according to their type each month, as shown in **table no. 2**, as the difference between them is clear for patients, and this indicates that the physiological condition of patients will differ completely when exposed to the Corona virus, which makes the body accept many diseases. Which manifests itself in the form of various symptoms, the most important of which are fever, cough, and shortness of breath, as shown in **figure no. 2**, all of which are closely linked to the patient's immunity, making there a reflection of the disease, represented by a lack of oxygen in the blood, which increases the severity of the patient's condition and may lead to his death in many cases.

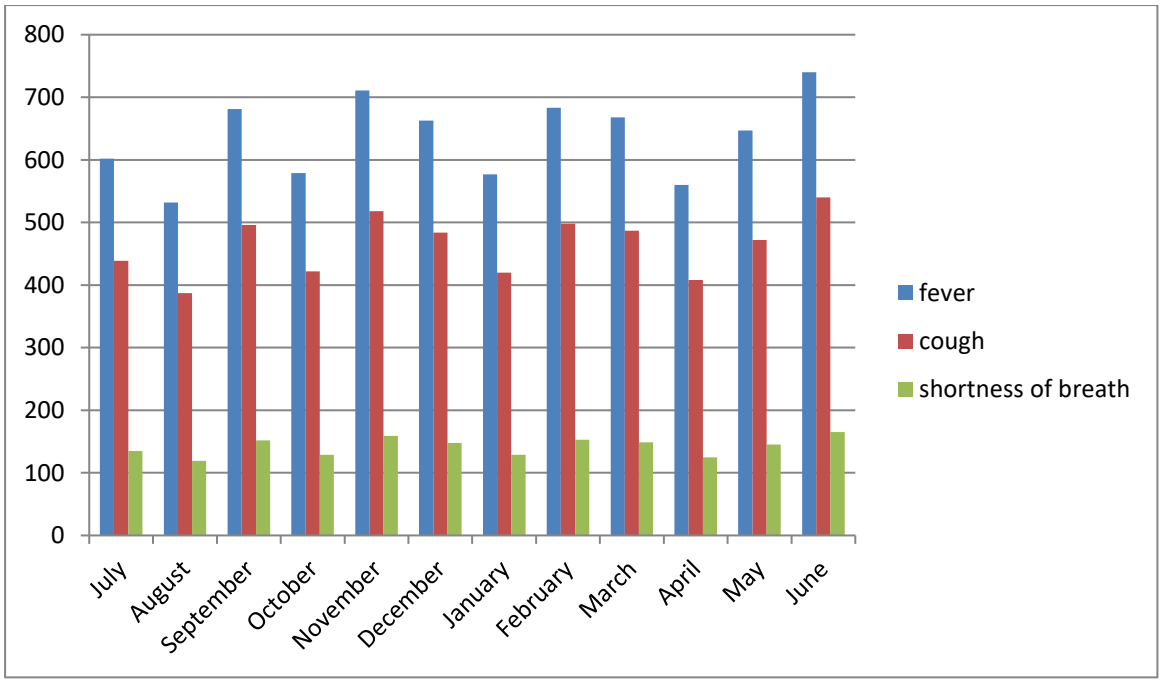

Figure no.2: Differences between symptoms (fever, cough, shortness of breath) monthly.

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It is obvious and natural that when any foreign body enters the human body, there will be an immune reaction, such as irritation of immune and defensive cells against that foreign body that invaded the body, whether it is a microscopic organism or any inanimate matter. The invasion of microbes in general into the body leads to a reverse reaction represented by the occurrence of fever and inflammation in the lungs, and a change in the human position so that there is difficulty in breathing and a severe cough. So almost number of the patients with COVID-19 possess a particularly reduced pulse oxymetry readings without signs of respiratory distress , this is known as hypoxia [13, 14]. The percentage of oxygen in the blood is easily measured using simple machines known, it is normal that the oxygen saturation in the bloodstream of healthy people exceeds 95%, or in the case of infection with Covid-19 disease, patients will have a gradual, significant decrease and it may be dangerous at rates up to some cases to less than 40%.

Conclusion:

We conclude from our current study that there are no significant differences between the number of patients and the three stages type that recorded through this periodic time, even if there is a difference in age and gender. Corona virus infection, especially the first days of the disease, must be monitored and presented to the specialist doctor in order to take the necessary measures and treatment, in addition to following the correct steps and appropriate healthy food that raises the immune system. Periodic examinations must be performed and caution should be taken when silent hypoxia occurs, which is defined as a pathological condition in which oxygen levels in human blood are lower than the normal and average range, since the patient does not feel any symptoms indicating that, so the patient may not pay attention or suffer from any trouble except after the disease develops and thus severe damage occurs in the lungs.

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