COVID-19Pneumonia and its Mortality rates in Afghanistan; A Cross-sectional Study 2021-2022

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ABSTRACT

Corona virus is considered one of the dangerous viruses of the last decade, which has caused challenges to human life in different dimensions with its rapid spread. This virus causes an increase in the number of deaths among patients by causing pneumonia.

Aim and method: The aim of this study is to investigate the mortality rates of covid-19 patients with pneumonia, the required data of which was collected from the Afghan-Japan hospital in six months between 2021 and 2022.

Results: In this study, information was collected from 229 patients with COVID-19 pneumonia, of which 135 patients recovered but 94 patients died. Although the majority of variables studied in this research are similar between deceased and recovered patients, the blood oxygen level and breathing rate of deceased and recovered patients are different.

Conclusion: The presence of pneumonia in patients with COVID-19 causes the deterioration of the patient's condition and even causes the patient's death.

Keywords: Pneumonia COVID-19, Mortality rates and Kabul

1. Introduction

The latest and most persistent viral disease caused by the novel coronavirus has seriously threatened and affected public health around the world. In early December 2019, a cluster of pneumonia cases of unknown etiology was reported in Wuhan, Hubei province, China. The outbreak of this virus was first reported to the World Health Organization (WHO) on known as the COVID-19 on February 11, 2020 *(George et al., 2020)*.

The COVID-19 virus was declared a pandemic disease by the World Health Organization on March 11, 2020 *(Prasad et al., 2020)*. This virus was spreading all around the world and it`s epidemic was happened in all countries. As of December 31, 2020 more than 45 million people were infected with COVID-19, which caused the death of 1.2 million people in all countries. At the beginning, the incidence of this virus was very high in Italy; and between the months of Oct-Dec this country faced the second wave of this virus, which infected more than 1.8 million people

December 31, 2019. This virus refers to Severe Acute Respiratory Syndrome Coronavirus 19 SARS-CoV19 by the International Committee on Taxonomy of Viruses (ICTV). And later, due to the similarity with SARS-CoV2, it was excluded from SARS-CoV by this committee. On January 30, 2020 the World Health Organization declared the outbreak of this virus as an emergency situation, which was

and more than 50000 people died, this figure was doubled until Aug 2020.

The genome of SARS-CoV2 contains a single strand positive RNA, which is located inside a membrane cover with a diameter of 75-150 nm. It`s membrane is covered with glycoproteins spikes that give corona viruses a crown-like appearance. The genome of SARS-CoV2 has a length of about 30 K nucleotides. Almost 85% of this virus is similar to SARS-CoV. Four main structural proteins are encoded in SARS-CoV2 viral genome, namely, spike Surface Glycoprotein (S), Membrane protein (M), Envelop protein (E) and Nucleocapsid protein (N). Several other nonstructural proteins are also encoded by the viral genome (RNA polymerase, RdRp; Papain like protease, PLpro; Coronavirus main protease, 3CLpro. The replication of COVID-19, like any other virus, requires a host cell and usually includes, the following 6 steps: Attachment, Penetration, Uncoating, Replication, Assembly and Release. Spike glycoprotein that are located on the surface of COVID-19 binds to angiotensin-converting enzyme 2 (ACE2) receptor protein that is located on the host cell plasma membrane and facilitates the host cell invasion. Serine protease TMPRSS211 produced by the host cell also facilitate this process of invasion.

After endocytosis or entry of the virus into the host cell the virus genome releases its single strand positive RNA. Which is converted into viral polyproteins by using the host`s ribosome. Viral proteinases 3CLpro and PLpro convert viral polyproteins into effector proteins. RNA dependent RNA polymerase in turn synthesizes a full- length negative stranded RNA template which is used to make more genomic viral RNA. The viral genome was synthesized by genomic replication and later the main four structures of viral proteins (M, N, S, and E) is produced by transcription and translation. N protein binds genomic RNA while S, M, and E proteins are integrated into the membrane of endoplasmic reticulum (ER). ERGIC (endoplasmic reticulum-Golgi intermediate compartment) also known as (Vesicular Tubular Cluster). Assembled Nucleocapsid with helical RNA are twisted and encapsulated in the ER lumen, viral progeny by ERGIC is transferred to the plasma membrane of the host cells and finally new viruses are released by exocytosis *(George et al., 2020)*.

COVID-19 disease is defined as a disease caused by SARS-Cov2. Symptoms and signs are different from patient to patient. But the most common symptoms include fever, fatigue, cough, sputum, anorexia, shortness of breath. In addition to these, less common symptoms such as sore throat, headache, confusion, chest tightness and minor symptoms such as nausea, vomiting, diarrhea and gastrointestinal complications have also been reported.

These symptoms are the same in children and adults, but milder in young people. There are many treatment mechanisms, which one of them is Antiviral Vaccines. Vaccines are ready-made biological substance and when it injected into a person, they cause stimulation and production of antibodies. Vaccines may be prepared from the underlying agent of a patient or products or synthetic substitute that is specifically prepared to act as an antigen without causing disease. Vaccines strengthen the immune system and made a kind of memory that allows a person to respond faster and faster than the first response to a disease. Most proteins, nucleic acid (DNA, RNA) or even whole organisms can be used for vaccination in combination with adjuvants. Which leads to an increase in their power. Unlike most therapeutic drugs, vaccines are more used to prevent from disease and infections, and strengthen the immune system. The mechanism of vaccines includes several steps: 1- Glycosylated spike protein is a major inducer of host immune system response after infection of lung epithelial cells, which binds to ACE2 receptor 2- Endocytosis 3- Viral RNA activates endosmal and cytoplasmic sensors (TLR3/7, MAVS) 4- These receptors cause the activation of Interferon regulatory factors and NFKB (nuclear factor Kappa B) 5- Inflammatory cytokines are activated 6- Include Interferon, Dendritic Cells (DC) sample antigens and forward them to lymphoid organs for adaptive response. CD8 T cells recognize these antigens on DC or infected cells 7- CD8 T cells cause apoptosis of affected lung epithelial cells *(George et al., 2020)*.

The pathogenic mechanism of COVID-19is not fully understood. However, cases of pneumonia caused by COVID-19are similar to those observed in SARS-CoV and MERS-CoV *(Majumder et al., 2021)*. In general, coronaviruses use different receptors to enter cells. One of these receptors is the enzyme (ACE2) that SARS-COV2 uses like COV-SARS. (ACE2) is an enzyme that plays a role in the renin-angiotensin-aldosterone system. The positive relationship between the expression of the enzyme (ACE2) and the severity of SARS-COV2 pathogenicity can determine the susceptibility, symptoms, and complications of SARS-COV2 disease. In this case, targeting the expression level of the ACE2 enzyme may be effective in the initial control of the disease of COVID-19. In the first stage of the disease, the virus may infect the epithelial cells of the nasal cavity and start multiplying. During the next few days, the upper airways are infected and can be detected in the patient's sputum sample. At this time, the immune system of the patient's body is stimulated, the infected epithelial cells become the main source of interferons, and CXCL10 is produced in response to the production of interferons. CXCL10 is an important defensive factor in SARS and influenza. The main cause of severe lung damage may be attributed to the increased expression of the AEC2 enzyme in the body. It has also been reported that type ll epithelial cells in the lungs are more sensitive in SARS-COV2 disease and the infected cells undergo apoptosis. These cells are the main cause of surfactant secretion, and the reduction of surfactant levels in alveoli due to the destruction of pneumocytes causes the destruction of alveoli, which later leads to pneumonia and acute respiratory distress syndrome in severe cases. Lung damage from COVID-19 may be directly related to the destruction of alveolar and bronchial epithelial cells or excessive production of cytokines. Thus, inflammatory reactions against cytokines cause alveolar damage and endothelium, as well as progressive micro vesicular pulmonary thrombosis in the lung, which, as a result, disrupts microcirculation. Currently, there is no pathologic information about COVID-19 pneumonia based on biopsy results and tests. In general, the main histological tests of the lungs show segmental necrosis, hyaline membrane formation, and pneumocystis type II hyperplasia, which causes diffuse alveolar damage, pulmonary congestion, and alveolar edema *(Gattinoni et al., 2021)*.

2. Aim And Method

The purpose of this study is to know the mortality rates of pneumonia caused by COVID-19among patients who refer to Afghan-Japan Hospital in Kabul city from December 2021 to August 2022, which retrospectively, using the information of COVID-19patients who refer to the emergency departments of this hospital, A descriptive, cross-sectional study has been made.

3. Data Analysis

By using the data registered in the hospital, and analyzing it by Excel and SPSS 27.0 programs, the results were presented in the relevant tables.

4. Results

Gender: According to the study we have done in the Afghan-Japan hospital on 229 patients with COVID-19, 135 patients (58.95%) of them survived in which, 81 patients (60%) were men and 54 patients (40%) were women. 94 patients (41.04%) of all patients died because of COVID-19 in which 58 people (43%) of them were men and 36 people (26.7%) of them were women. The relationship between Gender in survived and non-survived patients is (p- value <0.001).

Age: Among the all 229 patients, 58.92% of them survived in which 17% were younger than 40 years old, 19.3% were 40 -60 years old, 23% were 61-80 years old, and 40.7% were older than 80 years old. Among the 41.04% non-survived patients, 7.45% were younger than 40 years old, 14.1% were between 41 and 60 years old, 15.6% were between 61 and 80 years old, and 32.6% were older than 80 years old. Most of effected people with COVID-19 were older than 80 years old. The relationship between the age in survived and non-survived patients is <0.001 (p-value < 0.001).

Comorbid: Among the 58.9% of survived patients, 60.75 of them had Hypertension, 19.3% had Diabetes, 4.4% had COPD, 10.45 had Asthma, and 5. 2% had other underlying disease. And also, among the 41.04% of non-survived patients, 13.35 had Hypertension, 22.6% had Diabetes, 3.7% had COPD, 12.6% had Asthma, and 10.4% had other underlying disease. The relationship between the Comorbid in survived and non-survived patients is <0.001 (p-value < 0.001).

Symptoms: From the 135 survived people, 38.5% of them had Fever, 20% had cough, 11.9% had Headache, 5.25 had Dyspnea, 5.95 had Diarrhea, 5.2% had Chills, 4.4% had Vomiting, 7.4% had Abdominal pain, and 1.5% had other symptoms. And from the whole 94 non-survived patients, 34.85 had Fever, 5.2% had Cough, 5.2% had Headache, 4.4% had Dyspnea, 3% had Diarrhea, 3% had Chills, 5.2% had vomiting, 5.2% had Abdominal pain, and 3.7% indicated other symptoms. The relationship between the Symptoms in survived and non-survived patients is <0.001 (p-value < 0.001).

Respiratory rates: Among the whole 135 survived patients, the respiratory rate of 51.1% patients was less than 18time/min, 23.7% was 19-24 times/min, 1.5% was 25-29 times/min, and 3.7% was 30-35 times/min. and from the 94 patients who died, the respiratory rate of 3% of patients was less than 18time/min, 10.45% was 19-24 times/min, 16.3% was 25-29 times/min, and 40% was 30-35 times/min. The relationship between the Respiratory rate in survived and non-survived patients is <0.001 (p-value < 0.001).

Saturated O2 (SPO2): Among the 135 survived patients, Spo2 of 8.9% of them was less than 80%, 16.35% was 81-85%, 12.65% was 86-90%, 96% was 91-96%, 52.6% was more than 97%. And from the whole 94 non-survived patients, 25.25% was more than 80%, 21.5% was 81-85%, 13.3% was 86-90%, 5.2% was 91-96%, 4.4% was more than 97%. The relationship between the SPO2 in survived and non-survived patients is (p-value < 0.001). In the tables (1 and 2), the rates of the results of study are presented.

5. Disscution

According to the study we have done in the Afghan-Japan hospital on 229 patients with COVID-19, 135 patients (58.95%) of them survived in which, 81 patients (60%) were men and 54 patients (40%) were women. 94 patients (41.04%) of all patients died because of COVID-19 in which 58 people (43%) of them were men and 36 people (26.7%) of them were women. From the 1377 patients with COVID-19 in Mexico, 87.6% of survived patients and 12.30% of dead patients were male *(López-Pérez et al., 2023)*. According the research was done on 157 patients in Tanzania, 90% of recovered and 78% of dead patients were male while 10% of survived and 22% of non-survived patients were female *(Kassam et al., 2021)*. And also, from the 663 patients with COVID-19, 48% of recovered patients and 60% of non-survived patients were male while 52% of survived and 40% of non-survived patients were female *(Zhang et al., 2020)*. From 1537 patients with COVID-19 in Peru 68.4% of them was Male *(Mas-Ubillus et al., 2022)*, from 13.26% patients in Italy, 71% of them was Male *(Novelli et al., 2023)*, from 12529 patients in China 49% of them was male *(Yin et al., 2021)*, and according worldwide research, 52% of patients with COVID-19 was male *(Gattinoni et al., 2020)*.

Among the all 229 patients, 58.92% of them survived in which 17% were younger than 40 years old, 19.3% were 40 -60 years old, 23% were 61-80 years old, and 40.7% were older than 80 years old. Among the 41.04% non-survived patients, 7.45% were younger than 40 years old, 14.1% were between 41 and 60 years old, 15.6% were between 61 and 80 years old, and 32.6% were older than 80 years old. Most of effected people with COVID-19 were older than 80 years old. According the research was done in Mexico on 1377 patients with COVID-19, median age of recovered patients was 54.4 years and non-survived was 68.3 years old *(López-Pérez et al., 2023)*. From 663 patients in China, median age of survived patients was 59.1 years and non-survived was 67.1 years old *(Zhang et al., 2020)*. From 157 patients in Tanzania, the median age was 52 years old *(Kassam et al., 2021)*, from 1537

patients in Peru, the median age was 60.1 years old *(Mas-Ubillus et al., 2022)*, from 1472 patients in Italy, the median age was 70 years old *(George et al., 2020)*, and in worldwide research, the median age of patients with COVID-19 was 61 years old *(Mas-Ubillus et al., 2022)*.

Among the 58.9% of survived patients, 60.7% of them had Hypertension, 19.3% had Diabetes, 4.4% had COPD, 10.45 had Asthma, and 5. 2% had other underlying disease. And also, among the 41.04% of non-survived patients, 13.35 had Hypertension, 22.6% had Diabetes, 3.7% had COPD, 12.6% had Asthma, and 10.4% had other underlying disease. According the research in Mexico on 1377 patients with COVID-19, 31.7% of survived patients and 49.15 of non-survived had Hypertension, 19.8% of recovered and 32.7% of dead patients had Diabetes, 2% of survived and 7.3% of non-survived had COPD, 2.3% of survived and 1.25 of non-survives had Asthma *(López-Pérez et al., 2023)*. From 157 patients in Tanzania, 8.4% of survived and 6% of non-survived patients had Hypertension, 14% of survived and 6% of non-survived patients had Diabetes, 2.8% of survives and 12% of non-survived patients had COPD *(Kassam et al., 2021)*. From 1326 patients in Italy, 44.8% of survived and 6.7% of non-survived patients had Hypertension, 15.4% of survived and 26.8% of non- survived had Diabetes, 5% of survived and 8.8% of non-survived patients had COPD *(Novelli et al., 2023)*. From 1537 patients with COVID-19 in Peru, 26.3% of them had Hypertension and 18.75 of them had Diabetes *(Mas-Ubillus et al., 2022)*, and from 12529 patients in China 195 vs 23% of them had Hypertension and 9% vs 10.9% of them had Diabetes *(Yin et al., 2021)*.

From the 135 survived people, 38.5% of them had Fever, 20% had cough, 11.9% had Headache, 5.25 had Dyspnea, 5.95 had Diarrhea, 5.2% had Chills, 4.4% had Vomiting, 7.4% had Abdominal pain, and 1.5% had other symptoms. And from the whole 94 non-survived patients, 34.85 had Fever, 5.2% had Cough, 5.2% had Headache, 4.4% had Dyspnea, 3% had Diarrhea, 3% had Chills, 5.2% had vomiting, 5.2% had Abdominal pain, and 3.7% indicated other symptoms. According the research in Mexico on 1377 patients with COVID-19, 60.2% of survived and 59.4% of non-survived patients had Fever, 66.4% of survived and 67.9% of non-survived had Cough, 43.7% of survived and 36.4% of non-survived patients had Headache, 81.6% of survived and 90.3% of non-survived patients had Dyspnea, 20.5% of survived and 17% of non-survived patients had Diarrhea, 7.6% of survived and 6.1% of non-survived patients had Vomiting *(López-Pérez et al., 2023)*. From 157 patients in Tanzania, 70% of survived and 66% of non-survived patients had Fever, 69% of survived and 46% of non-survived patients had Cough, 16% of survived and 0% of non-survived patients had Headache *(Kassam et al., 2021)*. From 663 patients in China, 61.8% of survived and 64% of non-survived had Cough, 23.5% of survived and 44% of non-survived patients had Dyspnea, 9.6% of survived and 0% of non-survived patients had Diarrhea, 79.6% of survived and 76% of non-survived patients had Fever, 2.5% of survived and 4% of non-survived patients had Vomiting, 3.1% of survived and 0% of non-survived patients had Headache. From 1537 patients in Peru, 48.4% of them had Fever, 67.9% had Cough, 85.1% had Dyspnea, 7.7% had Headache, 2.7% had Vomiting, and 2.8% had Diarrhea *(Mas-Ubillus et al., 2022)* and as worldwide research 47.2% of Patients with COVID-19 had Cough, 50% had Fever, 34% had Dyspnea, 5% had Diarrhea, and 3.5% had Vomiting *(Gattinoni et al., 2020)*.

Among the whole 135 survived patients, the respiratory rate of 51.1% patients was less than 18 times/min, 23.7% was 19-24 times/min, 1.5% was 25-29 times/min, and 3.7% was 30-35 times/min. and from the 94 patients who died, the respiratory rate of 3% of patients was less than 18 times/min, 10.45% was 19-24 times/min, 16.3% was 25-29 times/min, and 40% was 30-35 times/min. According the research was done in Tanzania on 157 patients with COVID-19, Respiratory rate of survived patients was 23 breath/min and non-survived was 28 breath /min *(Kassam et al., 2021)* and from 1326 patients with COVID-19 in Italy, Respiratory rate of survived patients was 18-23 breath/min and non-survived was 20-30 breath/min. Among the

135 survived patients, SPO2 of 8.9% of them was less than 80%, 16.35% was 81-85%, 12.65% was 86-90%, 96% was 91-96%, 52.6% was more than 97%. And from the whole 94 non-survived patients, 25.25% was more than 80%, 21.5% was 81-85%, 13.3% was 86-90%, 5.2% was 91-96%, 4.4% was more than 97%. According the research in Mexico on 1377 patients with COVID-19, SPO2 of survived patients was 83.4% and non-survived was 745 *(López-Pérez et al., 2023)*. From 157 patients in Tanzania, SPO2 of survived patients was 94% and non-survived was 88% *(Kassam et al., 2021)*. From 1326 patients in Italy, SPO2 of survived patients was 90-95% and non-survived was 86-94.5%

6. Conclusion

According to the received rates among the patients infected with COVID-19 in this study, this infectious disease causes an increase in the mortality rate among the patients

7. Limitation

The lack of a complete database in health centers in Afghanistan and the difference in the diagnostic criteria of patients

8. Conflict Of Interest

No conflict of interest

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Table (1): Survivor Patients

	Frequency / Percent	Mean	Std. Error of Mean	Std. Deviation	Variance	P-value
Gender		1.40	0.042	0.492	0.242	<0.001
Male	81/ 60.0%					
Female	54 / 40%					
Age (years)		2.87	0.097	1.129	1.275	<0.001
<40	23 / 17.0%					
41-60	26 / 19.3%					
61-80	31 / 23.0%					
>80	55 / 40.7%					
Symptoms		2.99	0.204	2.374	5.634	<0.001
Fever	52 / 38.5%					
Cough	27 / 20.0%					
Headache	16 / 11.9%					
Dyspnea	7 / 5.2%					
Diarrhea	8 / 5.9%					
Chills	7 / 5.2%					
Vomiting	6 / 4.4%					
Abdominal pain	10 / 7.4%					
Others	2 / 1.5%					
Comorbidities		1.80	0.196	1.227	1.504	<0.001
Hypertension	82 /60.7%					

Diabetes	26 / 19.3%					
COPD	6 / 4.4%					
Asthma	14 / 10.4%					
Others	7 / 5.2%					
SPO2		3.81	0.124	1.443	2.082	<0.001
80>	12/ 8.9%					
81-85	22 / 16.35					
86-90	17 / 12.65%					
91-96	13 /9.6%					
97<	71 / 52.6%					
Respiratory rates	Breaths/ min	1.78	0.078	0.912	0.831	<0.001
18>	69 / 51.1%					
19 - 24	32 / 23.7%					
25-29	29 / 21.5%					
30 - 35	5 / 3.7%					

Table (2) deceased patients

	Frequency / Percent	Mean	Std. Error of Mean	Std. Deviation	Variance	P-value
Gender		1.38	0.050	0.489	0.239	<0.001
Male	58 – 43.0%					
Female	36 – 26.7%					
Age (years)			0.108	1.051	1.105	<0.001
<40	10 – 7.45					
41-60	19 – 14.1%					
61-80	21 – 15.6%					
>80	44 – 32.6%					
Symptoms		3.19	0.286	2.776	7.705	<0.001

Fever	47 – 34.8%					
Cough	7 – 5.2%					
Headache	7 – 5.2%					
Dyspnea	6 – 4.4%					
Diarrhea	4 – 3.0%					
Chills	4 – 3.0%					
Vomiting	7 – 5.2%					
Abdominal pain	7 – 5.2%					
Others	5 – 3.7%					
Comorbidities		2.67	0.141	1.371	1.879	<0.001
Hypertension	18 – 13.3%					
Diabetes	40 – 29.6%					
COPD	5 – 3.7%					
Asthma	17 – 12.6%					
Others	14 – 10.4%					
	41 – 30.4%					
SPO2 (%)		2.17	0,123	1.188	1.412	<0.001
80>	34 – 25.25%					
81 - 85	29 – 21.5%					
86 - 90	18 – 13.3%					
91 - 96	7 – 5.2%					
97 <	6 – 4.4%					
Respiratory rates	Breaths/ min	3.34	0.091	0.887	0.786	<0.001
18>	4 – 3.0%					
19 - 24	14 – 10.45					
25 - 29	22 – 16.3%					
30 - 35	54 – 40.0%					