



A comprehensive analysis of clinical symptoms present in patients' post-recovery from Covid-19, conducted at Mayo Hospital Lahore

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Abstract:

Objectives: Following the recuperation from Covid-19, certain Symptoms and illnesses were detected in patients. The aim of this investigation is to assess those after covid manifestations in individuals who have recovered from the coronavirus

Materials & Methods: Study was conducted on 300 individuals who recovered from the coronavirus to collect information about the post-COVID-19 symptoms experienced by patients. The study utilized a questionnaire divided into multiple parts to gather demographic data, COVID-19 status, and information about post-COVID-19 manifestations, including symptoms, investigations and symptoms recovery.

Results: About 10% patients experienced no symptoms. Most common disease which was experienced by almost 72% individuals was Fatigue. About 65% individuals lost their sense of smell and taste, however it recovered within 3-6 weeks. Persistent Headache was a common complaint which also affected the daily routine of sufferer. And it was noted in 35.8% individuals. Anxiety happened in 25.5% individuals and Symptoms of Mild Fever after recovering from COVID-19 took happened in only 2% individuals in those patients who were also suffering from fatigue

Conclusion: After recovery from the coronavirus, symptoms still present varying from mild headache and fatigue to life threatening pulmonary fibrosis, stroke and Arrhythmias. All the patients after covid must be evaluated for any persistent symptoms and should be treated to make the life of patients more comfortable.

Keywords: Clinical Symptoms, Post- Covid Symptoms, Coronavirus.

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Introduction:

COVID-19 is a contagious illness induced by the newfound virus SARS-CoV-2 (1) It initially surfaced in December 2019 in Wuhan, China, and rapidly disseminated to become a worldwide epidemic (2). The disease affects people of all ages, but the elderly and those with underlying health conditions are at higher risk of developing severe symptoms. The pathophysiology of COVID-19 involves a complex interplay between the virus and the human immune system (2). The virus enters the body through the respiratory

tract, primarily via droplets from an infected person's cough or sneeze. It then attaches to cells in the respiratory system using its spike protein, which binds to the ACE2 receptor on the surface of cells (3). Once the virus enters the cells, it replicates and spreads rapidly throughout the body, primarily affecting the respiratory tract but also causing damage to other organs, including the heart, kidneys, and brain (4) (5). The immune system responds to the virus by producing cytokines and chemokines, which are signaling molecules that attract immune cells to the site of infection (6). In some cases, this immune response can become dysregulated, leading to a cytokine storm, where the immune system attacks healthy cells and tissues in the body (7). COVID-19 signs and symptoms can vary in intensity from minor to severe. These may encompass elevated body temperature, coughing, breathing difficulties, exhaustion, muscle soreness, changes in taste or smell, and digestive issues like queasiness, retching, and loose stools. (8). In critical situations, the illness may result in pneumonia, acute respiratory distress syndrome (ARDS), failure of multiple organs, and fatality (9).

The term "post-COVID symptoms" refers to health issues that persist after an individual has recovered from the acute phase of COVID-19. These indications could vary in intensity from minor to significant, and their duration may extend for multiple weeks or possibly months (10)

Some common post-COVID symptoms include : (11)

- (1) Fatigue
- (2) Shortness of breath
- (3) Chest pain
- (4) Joint or muscle pain
- (5) Headaches
- (6) Loss of smell or taste
- (7) Difficulty concentrating or "brain fog"
- (8) Insomnia or other sleep disturbances
- (9) Anxiety
- (10) Depression

It is important to note that post-COVID symptoms can vary widely and may not necessarily affect everyone who has had COVID-19 (12). Article which was written in 2003 explores the topic of post-recovery manifestations that have been observed in patients following severe acute respiratory syndrome (SARS) infection. The study conducted on the subject found that some of these manifestations, including fatigue, myalgia, depression, and weakness, were chronic and necessitated prolonged monitoring. Moreover, a mild hypo activation of the hypothalamic-pituitary-adrenal (HPA) axis was demonstrated by Leow et al (27). The primary objective of this investigation is to examine the aftereffects of COVID-19 in order to acquire a more comprehensive comprehension of the diverse indications or signs that manifest in individuals after they recover from COVID-19 (13). These post-recovery manifestations can manifest in different organs and systems, including the respiratory, cardiovascular, neurological, and gastrointestinal systems (14). The study aims to examine the prevalence and characteristics of these manifestations, identify the risk factors that contribute to their development, and evaluate their impact on the quality of life of affected individuals. The article underscores the importance of closely monitoring post-recovery manifestations in COVID-19 patients, as these can significantly impact their health and quality of life. The findings of the study could inform the development of appropriate interventions and care strategies to manage these manifestations and mitigate long-term complications.

Materials & Methods:

Study was conducted on 300 individuals who recovered from the coronavirus to collect information about the post-COVID-19 symptoms experienced by patients. The study utilized a questionnaire divided into multiple parts to gather demographic data, COVID-19 status, and information about post-COVID-19 manifestations, including symptoms, investigations and symptoms recovery. The data collected from the study was analyzed to determine the rate of occurrence of each response and to identify any connections between these responses and the post-COVID-19 manifestations experienced by patients. The study also employed response surface plots generated using design expert software to demonstrate the relationship

between various factors, such as age, comorbidities, and the severity of post-COVID-19 manifestations. These factors were coded numerically to allow for more precise data analysis. i.e 1= mild post covid symptoms, 2= severe post covid-19 symptoms. Age of all the patients was categorized into three i.e those who were between 25-35 years included 40% of total participants. Those having age range 36-45 years made 50% of total individuals. Only 10% individuals were having age 46-55 years. There was also Gender inequity. Female survivors were more in number as compared to Males. About 35.5% individuals were Males and remaining all the participants(64.5%) were Females. Body mass index of all the participants were noted. Mostly patients were noted as overweight as their BMI was in range of 25-29.5. About 45% population of this study was marked as overweight. While about 25% patients who recovered from Coronavirus were Obese. Remaining 25% fall in Normal weight individuals. These survivors showed that SARS-cov does not have any correlation with the obesity

Results:

Data from 300 individuals were collected by using a detailed questionnaire. The demographic details of all individuals were expressed in Table. 1

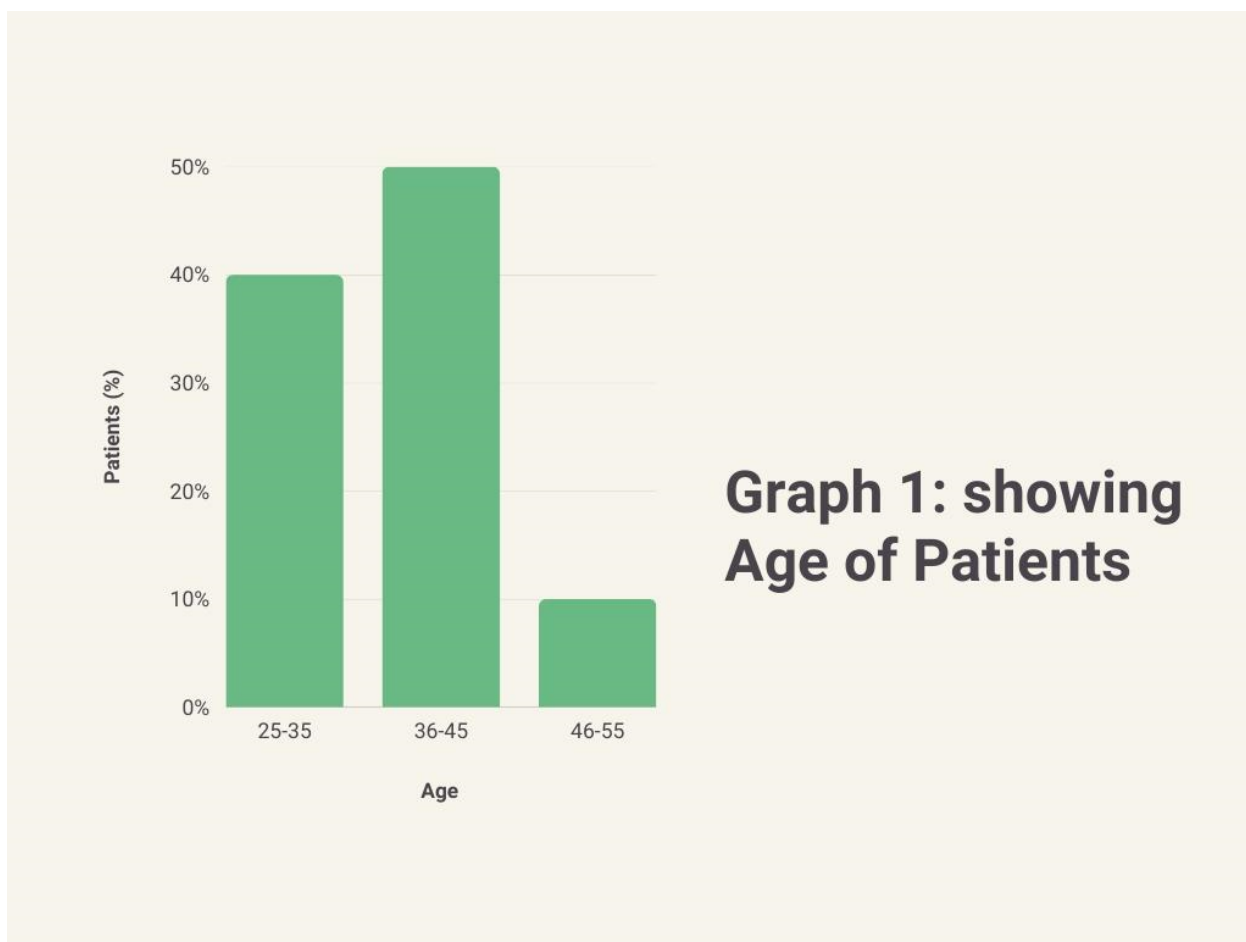
All those individuals who experienced symptoms after surviving from covid-19 are detailed discussed in Table 2. About 10% patients experienced no symptoms. Most common disease which was experienced by almost 72% individuals was Fatigue. About 65% individuals lost their sense of smell and taste, however it recovered within 3-6 weeks. Persistent Headache was a common complaint which also affected the daily routine of sufferer. And it was noted in 35.8% individuals.

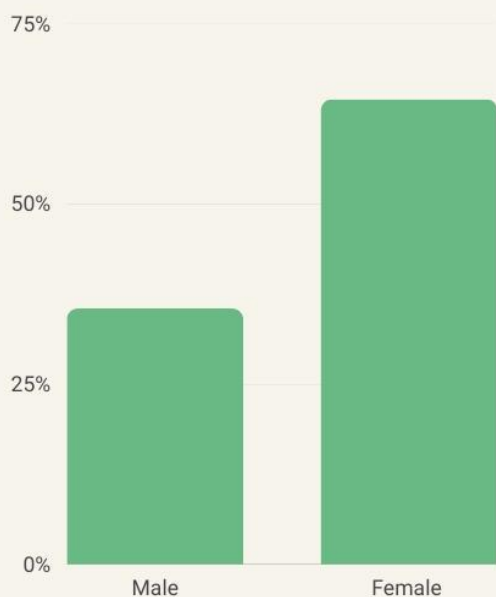
Fever and Anxiety were also less severe symptoms which appeared in coronavirus. Anxiety happened in 25.5% individuals and Symptoms of Mild Fever after recovering from COVID-19 took happened in only 2% individuals in those patients who were also suffering from fatigue. Stroke, pulmonary fibrosis, Arrhythmias and Renal failure were severe and more intense symptoms which badly affected the covid suffered patients. Symptoms of Hemorrhagic Stroke occurred in 5% covid warriors, while life damaging symptoms relating to Respiratory tract making the lungs permanently useless was pulmonary fibrosis which took place in almost 35% individuals making their life more miserable as they were also suffering from post covid Depression and Fatigue. Another life threatening condition involving Cardiovascular system was Arrhythmias, and unfortunately he could not survive. All the detail of individuals who fought with coronavirus and survived but experienced symptoms which affected their lives are demonstrated in the Graph 3 along their percentage.

Table 1: showing Baseline Demographic details of Patients

Sr.No	Specification	Total Patients	Percentage
1.	Age(years)		
	25-35	120	40%
	36-45	150	50%
	46-55	30	10%
2.	Gender		
	Male	106	35.5%
	Female	194	64.5%
3.	BMI		
	Normal(18.5-24.5)	75	25%

	Overweight (25-29.5)	135	45%
	Obese(>30)	75	25%





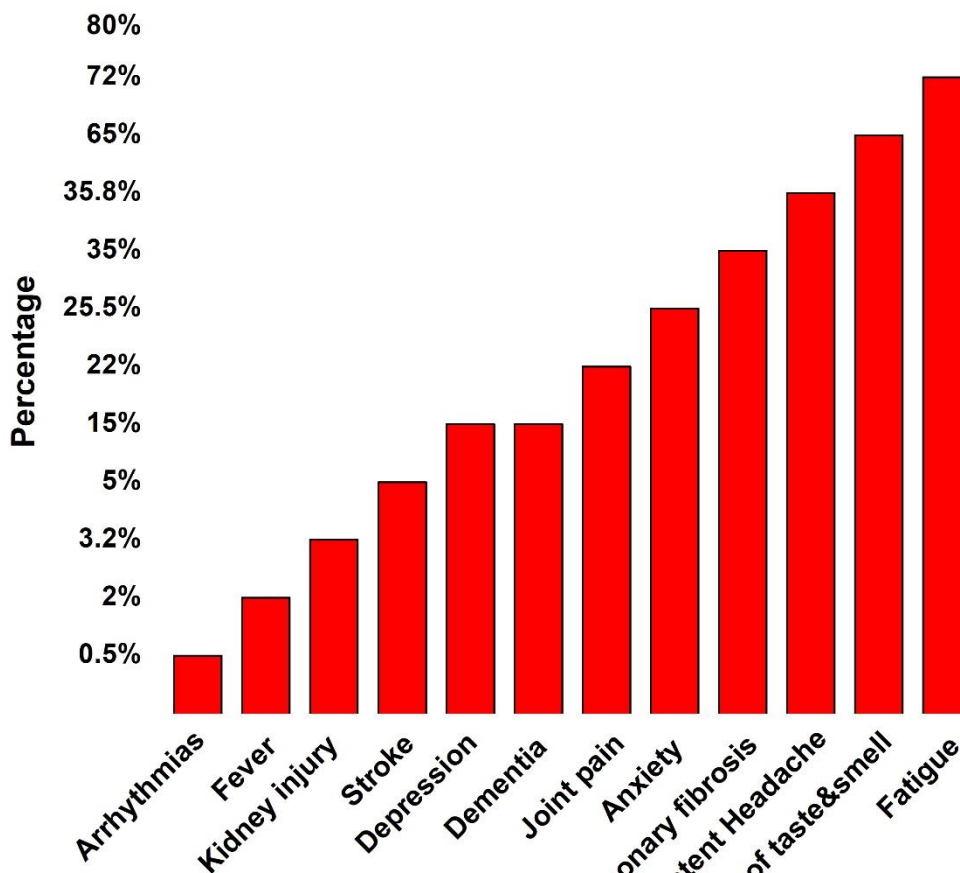
**Graph 2:
showing
Gender
of
patients**

Table 2: Demonstrating Symptoms of Recovered warriors of COVID-19

Sr.No	Symptoms	Percentage
1	Fatigue	72%
2	Loss of taste&smell	65%
3	Persistent Headache	35.8%
4	Pulmonary fibrosis	35%
5	Anxiety	25.5%
6	Joint pain	22%
7	Dementia	15%
8	Depression	15%
9	Stroke	5%
10	Kidney injury	3.2%

11	Fever	2%
12	Arrhythmias	0.5%

Graph 3: Demonstrating Symptoms of Patients who suffered after Covid Recovery



Discussion:

The Intensity of COVID-19 can be categorized into three groups: mild, moderate, and severe (15). Mild cases refer to those with symptoms that can be treated at home in the absence of oxygen uses (16). Moderate cases experience breathing difficulties and require oxygen therapy at home. Severe cases require hospitalization and possibly ICU care (17). Age and comorbidities are strong indicators of COVID-19 severity, as the presence of other medical conditions and increasing age are associated with more severe disease progression.

The majority of reported COVID-19 symptoms are mild and can be reversed, such as exhaustion and headache (24). Joint and muscle pain are also frequently reported and can be classified as mild symptoms. However, some COVID-19 symptoms affect the central nervous system, such as persistent headache, migraine, depression, anxiety, and obsessive-compulsive disorder (18).

A small percentage of subjects experience intense complications For example Hemorrhagic Stroke, Cardiovascular involvement causing myocarditis , kidney failure, and pulmonary fibrosis, which may be reversible but require additional investigation (19).

The condition of being overweight does not seem to exert a noteworthy influence on the severity level or category of post-COVID-19 symptoms, although most subjects are overweight or obese (20). Post-COVID-19 symptoms can be classified as mild or severe, with severe manifestations affecting organ functions like pulmonary fibrosis, renal failure, myocarditis, arrhythmia, and stroke (21).

The severity of post-COVID-19 symptoms is related to the severity of the disease, as severe cases tend to have more severe symptoms than those with mild conditions. Age and comorbidities are also factors that contribute to the severity of symptoms (22).

Exhaustion is the most frequently reported manifestation, which can persist for several months after recovery (25) . Fatigue refers to a sensation of bodily or cognitive depletion that can hinder an individual's performance at their optimum level. Apart from its physical and mental indications, weariness can also have a noteworthy effect on a person's psychological health. Prolonged weariness may result in emotions of annoyance, impatience, and despondency, along with a reduction in the standard of living (26). Neuropsychiatric symptoms are also documented in a significant percentage of COVID-19 subjects, which is consistent with findings in other studies that examined neuropsychiatric symptoms in individuals with Alzheimer's disease and mild cognitive impairment infected with the new coronavirus (23). Laboratory investigations and imaging procedures like CT scans are necessary to confirm the diagnosis of severe COVID-19 symptoms .

Pulmonary fibrosis is a condition in which there is scarring and thickening of the lung tissue, leading to a progressive decrease in lung function over time. COVID-19 is a respiratory illness caused by the SARS-CoV-2 virus, and it can cause pulmonary fibrosis in some people (27).When a person is infected with COVID-19, the virus can cause inflammation and damage to the lung tissue. In some cases, this damage can lead to the formation of scar tissue in the lungs, which can cause a decrease in lung function and difficulty breathing. In our study, 35% individuals suffered from pulmonary fibrosis. In this study pulmonary fibrosis was present in 35% individuals making their life more troublesome as they were also suffering from joint pain and Fatigue. Diagnosis of pulmonary fibrosis due to COVID-19 may involve a physical examination, imaging tests such as a chest X-ray or CT scan, and pulmonary function tests to measure lung capacity and function. Treatment may include medication to reduce inflammation and slow the progression of the disease, oxygen therapy, and pulmonary rehabilitation to improve breathing and physical function.

Kidney injury, also known as acute kidney injury (AKI), has been reported in some patients with Coronavirus (COVID-19) infection (28) . In this study, 3.2% individuals were found to have acute injury of kidney. The exact mechanism by which COVID-19 causes kidney injury is not fully understood. However, it is believed that the virus can directly infect the cells in the kidneys, leading to inflammation and damage. Additionally, the virus can also trigger an immune response in the body, which can cause further damage to the kidneys. Patients with pre-existing kidney disease or other comorbidities are at a higher risk of developing kidney injury as a result of coronavirus (29). Arrhythmias is rare but serious complication in Corona recovered patients. As the study showed that Arrhythmias were found in only 0.5% individuals. After recuperating from COVID-19, a negative PCR test result should not be the termination of patient supervision. It is imperative to continuously and for a prolonged duration monitor the individuals to assess the occurrence of post-COVID-19 symptoms and quickly intervene if critical signs arise. Additionally, providing continuous guidance to the patients is of utmost importance, not only to ensure their adherence to medication but also to detect early indications of severe manifestations. Therefore, emphasizing the significance of continuous patient observation and guidance cannot be overstated.

Conclusion:

After recovery from the coronavirus, symptoms still present varying from mild headache and fatigue to life threatening pulmonary fibrosis, stroke and Arrhythmias. All the patients after covid must be evaluated for any persistent symptoms and should be treated to make the life of patients more comfortable.

Author Contributions:

Funding: No outside funding was obtained for this study.

Institutional Review Board Statement: Ethical approval was taken from Ethical review board of Mayo Hospital Lahore.

Informed Consent Statement: Proper consent was taken from all the participants who contributed in this study.

Data Availability Statement: The data in the current study is only available from corresponding authors.

Conflicts of Interest: No conflict of interest was found in this study

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