

## Post-COVID-19 among Iraqi Population: Symptoms and Duration

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### Abstract

**Background:** Earlier studies focused on description of clinical presentations of patients in the acute phase of Coronavirus disease 2019 (COVID-19). Recently, records have emerged that some patients continue to suffer from symptoms related to COVID-19 after the acute phase of infection. Yet, there is no clear definition for this condition, and different terminology has encompassed such as “post-acute COVID-19 syndrome”, “post-COVID syndrome” and “long COVID”. This study aimed to identify the prevalence of Post-COVID-19 symptoms among the adult population in Baghdad city.

**Methods:** A cross-sectional study was conducted among 341 Iraqi adults during the period from January to February 2021. All participants are confirmed and recovered cases of COVID-19. An online self-administered questionnaire was used for data collection. The questionnaire includes information about socio-demographic characteristics, presence of co-existing conditions, details about COVID-19 infection, in addition to frequency, type, and duration of symptoms.

**Results:** The results showed that the mean age of the participants was 30.41 years old and females represented about 65.1% of them. They suffer more frequently from symptoms of depression (6.7%), anxiety (6.2%), and peripheral neuropathy (6.2%) after 12 weeks after the acute phase. Feeling of fatigability was the most frequent symptom mentioned by (12.3%) of the patients that persist for more than 3-4 weeks beyond recovery followed by cognitive impairment in (11.7%) and loss of taste and/or smell in about (11.4%) of them.

**Conclusion:** The majority of the patients suffered from persistent symptoms of COVID-19 following recovery, some of these symptoms continue for more than 3-4 weeks whereas others persist for longer than 12 weeks.

**Keywords:** Post-COVID, Iraq, Symptoms, Long COVID.

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## **Introduction**

Worldwide, the coronavirus disease 2019 (COVID-19) has identified as a pandemic. That first became apparent in Wuhan, Hubei, China, in early December 2019 with clinical presentations greatly resembling viral pneumonia. This disease has affected most of the countries in the period of 2 months itself. The outbreak of COVID-19 has been declared a pandemic by World Health Organization (WHO), now infecting millions all over the world (WHO, 2019). The clinical and pathological features of infection have been extensive, with a wide spectrum of disease seen, from asymptomatic infection to mild self-limiting symptoms to acute respiratory failure and the need for invasive mechanical ventilation (Zhou, F. *et al.*, 2020).

The severity increases with the presence of comorbidities like hypertension, chronic kidney disease, obstructive sleep apnoea, and metabolic diseases like diabetes and obesity (Tian, S. *et al.*, 2020). The so-called "Post-COVID Syndrome" (PCS) includes persistent symptoms for weeks or months after the infection has gone, that could be related to residual inflammation, organ damage, non-specific effects from the hospitalization or prolonged ventilation, social isolation (Garg, P. *et al.*, 2021). According to the British Thoracic Society Guidance on respiratory follow-up of patients with a clinical diagnosis of COVID-19 pneumonia, those with severe conditions have a high prevalence of post-viral lung fibrosis, pulmonary thromboembolism, and attendant functional impairment (BTS, 2020).

In COVID-19, cardiac complications can precede and can occur in the absence of pulmonary and other complications. Myocardial inflammation and myocarditis, as well as cardiac arrhythmias, have been described after SARS-CoV-2 infections (Madjid, M. *et al.*, 2020). Deep vein thrombosis (DVT), venous thromboembolism, pulmonary embolism (PE) and cor pulmonale, systemic and pulmonary arterial thrombosis and embolism, ischemic stroke, and myocardial infarction (MI) are reported.

In Neurologic, SARS-CoV-2 can penetrate brain tissue via viremia and also by direct invasion of the olfactory nerve, leading to anosmia. To date, the most common long-term neurologic symptoms after COVID-19 are headache, vertigo, and chemosensory dysfunction (anosmia and ageusia). Although stroke is a serious albeit, uncommon consequence of acute COVID-19, encephalitis, seizures, and other conditions such as major mood swings and "brain fog" has been reported up to 2 to 3 months after initial illness onset (Zubair, A.S. *et al.*, 2020).

COVID-19 skin manifestations resembling other viruses and chronic inflammatory diseases like acne, eczema, psoriasis, and rosacea. Vascular problems associated with skin manifestations can be neurogenic, microthrombotic, or immune complex-mediated (Darlenski, R. *et al.*, 2020).

Long-term follow-up studies on persistent symptoms, lung function, physical, and psychological problems of discharged patients are urgently required (Yelin, D. *et al.*, 2020). For which it is necessary to know the short, medium, and long-term scope of the possible physical and psychological consequences post-COVID, including in these questions, if the times set for social isolation are sufficient (Wang, J. *et al.*, 2020). Our study aims to find out the prevalence of Post COVID-19 symptoms among the adults' population in Baghdad city.

## **Methods**

An internet-based study was done among 341 Iraqi adults who recovered from COVID-19 infections. The respondents were selected by using invitation links in the WhatsApp groups and Facebook using non-probability convenience sampling. The questions were distributed to

respondents by using Google Forms. The respondent when opening the invitation link needs to agree to participate in research and upload a picture of their COVID-19 test to make sure that they are a confirmed case of COVID-19 before answering the questions. The inclusion criteria include adults aged 18 to 65 years old, living in Baghdad city, and a confirmed case of COVID-19. The questionnaire was adapted from a previous study (Peghin *et al.* 2021). It consists of 4 parts, which part 1 concerns socio-demographic data (age, gender, educational level, working status, weight, and length). Part 2 included questions to clarify whether if the respondent has any chronic diseases like (diabetes, Hypertension, Heart disease, Kidney disease). Part 3 includes a set of questions regarding COVID infection, which month the infection happened, how many days did the virus lasted, did the patient used antibiotics and treatments during the period of infection, did the patient need to use oxygen supplements while contracting the disease, also Part 3 included a set of questions about the symptoms that appeared during the period of COVID-19 and up to 12 weeks after recovery from COVID-19. The last part of the questionnaires includes a set of questions about daily hygiene, protection practices, and the daily routine that respondents followed to prevent a second infection with the virus. Data were analyzed using SPSS version 24. Mean and standard deviations were used for numerical variables, while frequency and percentages were used for categorical variables. The Chi-square test and the independent t-test were used to test the significance of the association between variables. Participation in the study was on a voluntary basis and all participants agreed to participate before answering the questions. A full explanation of the purpose of the study was placed at the beginning of the questionnaires and the authors assured participants that all data will be used for scientific purposes only.

## Results

The result of this study was depending on the analysis of data obtained from all 341 filled questionnaires. These data show that the mean age of the participants was 30.41 years old, and females represented about 65.1%. The majority 220 (64.5%) were with University degrees and near half (49.3%) work in governmental jobs (Table 1).

**Table 1: Sociodemographic characteristics of the respondents**

Variables	Analytical Data			
<b>Age</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>SD*</b>
	18	62	30.41	11.40
<b>Gender</b>	<b>Number</b>	<b>Percentage (%)</b>		
Male	119	34.9		
Female	222	65.1		
<b>Working Status</b>	<b>Number</b>	<b>Percentage (%)</b>		
Unemployed	150	44.0		
Government Worker	168	49.3		
Private Sector	23	6.7		
<b>Educational level</b>	<b>Number</b>	<b>Percentage (%)</b>		
Primary school	13	3.8		
Secondary school	108	31.7		
University degree and above	220	64.5		

\*Standard Deviation

**Table 2** revealed that 302 (88.6%) of the patients were never smoked during their lives. The most frequent comorbidity that exists among those patients was hypertension (10%) followed by renal problems which represented only (6.5%) of the whole sample.

**Table 2: Presence of co-existing conditions among the participants**

Questions	Number	Percentage
<b>Do you smoke?</b>		
Never smoke	302	88.6
Ex-smoker	25	7.3
Current smoker	14	4.1
<b>Do you have Hypertension?</b>		
No	307	90.0
Yes	34	10.0
<b>Do you have Diabetic Mellitus?</b>		
No	328	96.2
Yes	13	3.8
<b>Do you have Renal diseases?</b>		
No	319	93.5
Yes	22	6.5
<b>Do you have heart problems?</b>		
No	327	95.9
Yes	14	4.1

**Table 3** shows the frequency distribution of issues regarding COVID-19 acute infection. The mean duration of acute illness among patients in this study was (13.83) days and one-quarter of patients (25%) were diagnosed with COVID-19 during September. Even though 238 of the patients (69.8%) mentioned taking medications for the treatment of COVID-19 infections, which is similar to the percentage of patients who took antibiotic drugs and only 79(23.2%) mentioned anticoagulants drugs. For severe cases that required hospital admission or oxygen supply, the percentages were 2.9% and 5.6% respectively. Forty-five (13.2%) of the participants have had at least one of their relatives die from COVID-19.

The majority of the patients suffered from continuous symptoms of COVID-19 even they recovered and got their negative PCR, some of these symptoms continue for more than 3-4 weeks and others may persist for longer than 12 weeks. The most frequent symptoms which they suffer from after 12 weeks were symptoms of depression (6.7%), anxiety (6.2%), and peripheral neuropathy (6.2%). No one has delirium for more than 12 weeks as it is shown in **Table 4**. Feeling of fatigability was the most frequent symptom mentioned by (12.3%) of the patients that persist for more than 3-4 weeks beyond recovery followed by cognitive impairment in (11.7%) and loss of taste and/or smell in about (11.4%) of them. A lot of symptoms had never been reported by patients even during the acute COVID-19 infection like delirium which never presented among 289 (84.7) followed by ear symptoms like earache (82.7%) and tinnitus (81%).

Table 3: Frequency distribution of the issues related to COVID-19 infection

Questions	Analytical Data			
<b>How many days your acute symptoms last?</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>SD</b>
	1	30	13.83	6.54
<b>In which month you got infected with COVID19</b>	<b>Number</b>	<b>Percentage (%)</b>		
March	4	1.2		
April	3	0.9		
May	4	1.2		
June	25	7.3		
July	53	15.5		
August	54	15.8		
September	85	25.0		
October	59	17.3		
November	29	8.5		
December	25	7.3		
<b>Did you require to be admitted to the hospital?</b>	<b>Number</b>	<b>Percentage (%)</b>		
No	332	97.4		
Yes	9	2.6		
<b>Did you use any medications for COVID-19?</b>	<b>Number</b>	<b>Percentage (%)</b>		
No	103	30.2		
Yes	238	69.8		
<b>Did you take Anticoagulant?</b>	<b>Number</b>	<b>Percentage (%)</b>		
No	262	76.8		
Yes	79	23.2		
<b>Do you take Antibiotics?</b>	<b>Number</b>	<b>Percentage (%)</b>		
No	103	30.2		
Yes	238	69.8		
<b>Did you require oxygen?</b>	<b>Number</b>	<b>Percentage (%)</b>		
No	322	94.4		
Yes	19	5.6		
<b>Do you still wear a mask after recovery?</b>	<b>Number</b>	<b>Percentage (%)</b>		
No	114	33.4		
Yes	227	66.6		
<b>Do you still wash hands regularly after recovery?</b>	<b>Number</b>	<b>Percentage (%)</b>		
No	78	22.9		
Yes	263	77.1		
<b>Any family members died of COVID19?</b>	<b>Number</b>	<b>Percentage (%)</b>		
No	296	86.8		
Yes	45	13.2		

**Table 4: Frequency distribution of symptoms presented by the participant patients**

Symptoms	During the acute infection	After 3-4 weeks of recovery	After 12 weeks of recovery	Never
Shortness of breath	131 (38.4)	15 (4.4)	17 (5.0)	178 (52.2)
Cough	184 (54.0)	13 (3.8)	11 (3.2)	133 (39.0)
Chest tightness	166 (48.7)	13 (3.8)	14 (4.1)	148 (43.4)
Chest pain	127 (37.2)	17 (5.0)	13 (3.8)	184 (54.0)
Palpitations	118 (34.6)	16 (4.7)	17 (5.0)	190 (55.7)
Fatigue (extreme tiredness)	263 (77.1)	42 (12.3)	8 (2.4)	28 (8.2)
Fever (temperture $\geq$ 38°C)	256 (75.1)	2 (0.6)	-----	83 (24.3)
Generalized pain	283 (83.0)	15 (4.4)	7 (2.1)	36 (10.6)
Cognitive impairment	113 (33.1)	40 (11.7)	13 (3.8)	175 (51.3)
Headache	278 (81.5)	4 (1.7)	7 (2.1)	52 (15.2)
Sleep disturbance	177 (51.9)	15 (4.4)	19 (5.6)	130 (38.1)
Peripheral neuropathy*	57 (16.7)	6 (1.7)	21(6.2)	257 (75.4)
Dizziness	207 (60.7)	18 (5.3)	18 (5.3)	98 (28.4)
Delirium	51 (14.7)	1 (0.3)	-----	289 (84.7)
Abdominal pain	117 (34.3)	6 (1.7)	7 (2.1)	211 (61.9)
Nausea/ vomiting	110 (32.2)	8 (2.3)	3 (0.9)	220 (64.5)
Diarrhoea	150 (44.0)	7 (2.1)	1 (0.3)	183 (53.7)
Anorexia & reduced appetite	244 (71.5)	12 (3.5)	2 (0.6)	83 (24.3)
Joint pain	158 (46.3)	26 (7.6)	11 (3.2)	146 (42.8)
Muscle pain	176 (51.6)	20 (5.9)	4 (1.2)	141 (41.3)
Symptoms of depression	145 (42.5)	21 (6.2)	23 (6.7)	152 44.6)
Symptoms of anxiety	169 (49.6)	20 (5.9)	21 (6.2)	131 (38.4)
Tinnitus	45 (13.2)	10 (2.9)	10 (2.9)	276 (81.0)
Earache	48 (14.1)	4 (1.2)	7 (2.1)	282 (82.7)
Sore throat	186 (54.5)	8 (2.3)	7 (2.1)	140 (41.1)
Loss of taste and/or smell	214 (62.8)	39 (11.4)	7 (2.1)	81 (23.7)
Skin rashes	22 (6.4)	6 (1.8)	1 (0.3)	312 (91.5)

\*symptoms identified with respect to the actions of pins and needles and numbness



**Discussion**

COVID-19 is a highly infectious disease that developed respiratory, physical, and psychological dysfunction in patients. Post covid-19 seems to be a multifactorial disease that affects different organs such as CNS, GIT, heart, blood, skin, and spleen (Tabary, M. *et al.*, 2020) and attributes a wide range of conditions and symptoms that varied from mild symptoms such as a headache, fever, myalgia and anosmia to more critical conditions such as renal failure, stroke, chest pain, pulmonary fibrosis, and dyspnea. Clinical management is required as these symptoms may be recovered or persist with time (Chirwa, G.C., 2020; Davido, B., *et al.*, 2020; Kamal, M. *et al.*, 2021). Similarly, Greenhalgh *et al.*, 2020 reported that about 10% of have post-covid-19 symptoms persisted for months.

Although the minority of the participants in this study was 3.8% diabetes mellitus, 10% hypertension, 4.1% heart problems, and 6.5% renal diseases, there are many speculations about the susceptibility to covid-19 with these comorbidities. Covid-19 makes use of angiotensin-converting enzyme 2 (ACE2) as a receptor for entry into the host pneumocytes and this interaction may lead to an imbalance of the Renin-Angiotensin System (RAS). Once the virus uses this enzyme to gain entry into the host tissue, ACE2 gets downregulated and it is unable to protect against lung injury and increase disease proliferation. The ACE2 inhibitors (ACE2i) and angiotensin-receptor blockers (ARB) are commonly used in patients with hypertension and DM to increase expression of ACE2 as an adaptive response to decrease the angiotensin-II elevated levels. Diabetes mellitus patients are the vulnerability to covid-19 due to decreased viral clearance, higher affinity cellular binding and efficient virus entry, increased susceptibility to cytokine storm syndrome and hyper inflammation, decreased T cell function, and occurrence of cardiovascular system disease. Various mechanisms have been proposed to explain the increased risk of patients underlying hypertension and cardiovascular diseases for severe COVID-19 such as direct myocardial injury, ineffective adaptation to the elevated demand of severe viral illness, diminished systemic oxygenation during pneumonia, immune dysregulation, and electrolyte imbalances. Generally, patients with chronic diseases are more prone to covid-19 mortality risk and may many critical conditions such as worsening of insulin resistance, acute lung injury, cardiac function deterioration, sepsis, uncontrolled hypertension, and renal function impairment (Pal, R., *et al.*, 2020; Tadic, M. *et al.*, 2020; Tadic, M. & Mancia, G. *et al.*, 2020; Hassanein, M. *et al.*, 2020; Babapoor F.S. *et al.*, 2020; Bitencourt, L., *et al.*, 2021).

This study showed only 11.4% were smokers or ex-smokers and this is following the study of Tsigaris *et al.*, 2020 indicated a negative association between smoking prevalence and COVID-19 occurrence at the population level in 38 European countries. However, cigarette smoke is related to a wide range of respiratory diseases and lung cancer and some studies revealed that smoking is a risk factor of development COVID-19 infection, as nicotine interacts with the renin-angiotensin system in many organ systems as well the cigarette smoke increases the angiotensin-converting 2 enzyme gene expression by the bronchial epithelium. More experimental researches are needed to underlying the potential links between smoking and COVID-19 (Patanavanich, R. *et al.*, 2020; Shastri, M.D. *et al.*, 2021; Polverino, F., 2020).

This study reported that 69.8% of the ill patients took medications such as anticoagulants, antibiotics to reduce or prevent the severity and co-infection of the disease. Other medications can also be beneficial to use in the management of covid-19 like antiviral agents such as Remdesivir and steroid drugs such as Dexamethasone to modulate the immune response of the host and limit the replication of the virus (Chan, K.W. *et al.*, 2020). However,

5.6% of severe patients required oxygen therapy, and 2.6% required admission to hospital as the disease frequently progresses to induce complications like septic shock, respiratory failure and to decrease the chance of mortality (Shi, Y., *et al.*, 2020).

Some symptoms such as fatigue, skin rashes, muscle pain, and loss of taste and/ or smell in this study decreased within 12 weeks following the acute phase of the disease. On the other hand, other symptoms such as depression, anxiety, and peripheral neuropathy may persist for more than 12 weeks this may belong to relapse, reinfection, weak or absent antibody response, inflammatory and other immune reactions, direct effects of viral infection, corticosteroid therapy, intensive care unit (ICU) stay social isolation, and stigma deconditioning and mental factors such as post-traumatic stress. Furthermore, Long term musculoskeletal, respiratory, and neuropsychiatric sequelae have pathophysiological parallels with post-acute covid-19 and have been observed for other coronaviruses [Severe acute respiratory syndrome (SARS) and Middle East Respiratory Syndrome (MERS)]. Also, rare long-term sequelae can result after other viral infections such as measles, infectious mononucleosis, and hepatitis B. Long-term sequelae of COVID-19 are unknown as are many aspects of the acute disease (Candan, S.A. *et al.*, 2020; Garg, P. *et al.*, 2021).

Our study reported that fatigue and cognitive impairment are the main symptoms that persist more than 4 weeks following the covid-19 acute phase. These results are in line with the study of Carfi *et al.*, 2020, Goërtz *et al.*, 2020 and Huang *et al.*, 2021 that these symptoms may persist from 2 to 6 months.

Wearing a mask, washing the hands, management, and follow-up of covid-19 ill patients is required even for the discharged patients taking into account the age, sex, previous history (DM and hypertension), lifestyle, occupation, hobbies, and physical conditions of the patient. Blood tests are necessary to perform for any degree of dysfunction suspected such as WBC count, C reactive protein, natriuretic peptides ferritin, and D-dimer. Also, the rapid development of remote devices that can monitor real-time physical conditions of the patient may encourage better adherence to management training programs (Candan, S.A. *et al.*, 2020; Sun, T. *et al.*, 2020).

## **Conclusion**

The majority of the patients suffered from persistent symptoms of COVID-19 following recovery, some of these symptoms continue for more than 3-4 weeks whereas others persist for longer than 12 weeks such as depression, anxiety, and peripheral neuropathy.

## **Conflicts of Interest**

The authors declare no conflicts of interest.

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