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Epidemiology and clinical characteristics of patients after recovery from COVID-19 infection in Erbil government, Iraq

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Abstract

Background and objective: Preliminary reports indicate some patients may develop a post-COVID-19 syndrome, in which they experience persistent symptoms after recovering from their initial illness. So, we investigated the persistent symptoms of patients after recovery from COVID-19 that attended a private clinic in Erbil city searching for care. Therefore, this study aimed to describe the demographic features of the patients, identify the clinical features of the patients after recovery and find associations between clinical and demographic features.

Methods: This is a case series of a private clinic study, which was done in Erbil city. We reviewed patients who had been diagnosed with COVID-19 and were referred to the clinic from July 31st to December 1st, 2020, in Erbil, Iraq.

Results: In this study, 154 post-recovered COVID-19 patients who attended the center during the six months of the study were enrolled. The mean age of the patients significantly increased with increased severity (*P* <0.001). A significant statistical association was also found between marital and smoking status with the severity of post-COVID-19 in which married patients developed more severe cases than non-married patients (*P* = 0.03). Also, cigarette smokers developed less severe clinical features than non-smokers (*P* = 0.005). The most frequent comorbidity among patients was hypertension (23%), while the least comorbidity was stroke, hyperthyroidism, renal failure, migraine, and osteoarthritis (0.7%).

Conclusion: Significant statistical associations were found between the severity of the post-COVID-19 condition with many variables, including the mean age of the patients, marital status, and smoking status. The most frequent comorbidity was hypertension, and the least frequent was stroke.

Keywords: Post-COVID-19 syndrome; Case series study; Comorbidity; Erbil city.

Introduction

On March 11, 2020, the World Health Organization (WHO) declared the novel coronavirus a global pandemic. The disease was later named COVID-19, standing for coronavirus disease 2019.

The disease affected most countries, and Iraqi Kurdistan was not exempt.[1] COVID-19 is a new strain of coronaviruses known to cause diseases ranging from cold to more severe illnesses such as SARS and MERS.[2] In Kurdistan, the severity of the disease ranged from mild to moderate and severe.[1] Men with a history of underlying diseases are more likely to be infected with the virus and experience worse outcomes.[3] Severe cases of the disease can lead to heart, and respiratory failure, acute respiratory syndrome, or even death.[4] Moreover, COVID-19 not only causes physical health concerns but also results in a number of psychological disorders.[5]

Recently, data shows that some patients continue to experience symptoms related to COVID-19 after the acute phase of infection,[6] in addition to information on the fairly common occurrence of asymptomatic disease.[7-10]

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Preliminary reports indicated that some patients might develop a so-called "post-COVID-19 syndrome," in which they experience persistent symptoms after recovering from their initial illness.[11] National institute for health and care excellence (NICE) defines the post-COVID syndrome (also known as Long COVID) as “as signs and symptoms that develop during or following an infection consistent with COVID-19 which continue for more than 12 weeks and are not explained by an alternative diagnosis”. Usually, the patients present with multiple symptoms that may overlap, change over time, and affect any body organ.[7]

However, information is lacking on symptoms that persist after recovery. Thus, we aimed to investigate the persistent symptoms of patients after recovery from COVID-19 that attended the clinic in Erbil government searching for care. Specific objectives of the study include describing the demographic features of the patients, identifying the clinical features of the patients that persist after recovery, and finding associations between clinical and demographic features.

Methods

This case series study was done in a private clinic in Erbil city. We have reviewed adult patients diagnosed with COVID-19 and referred to the private clinic from July 31st to December 1st, 2020, in Erbil, Iraq. Laboratory confirmation of COVID-19 was done by quantitative real-time reverse transcriptase–polymerase chain reaction (RT-PCR) on samples from the respiratory tract or serum antibodies (IgG & IgM).

Classification of the disease severity

The criteria for severity of COVID-19 were defined according to the diagnosis and treatment protocol for novel coronavirus pneumonia (version 7) as mild, moderate, severe, and critical.[12] Cases were defined as mild with no signs of pneumonia in patients on imaging. Moderate cases were defined by fever and respiratory symptoms with radiological findings of pneumonia in patients. Severe cases were adult cases that had any of the following criteria: (1) Respiratory distress of ≥30 breaths/min; (2) Oxygen saturation ≤93% at rest; (3) Arterial partial pressure of oxygen (PaO2)/fraction of inspired oxygen (FiO2) of ≤300 mmHg (l mmHg ¼ 0.133 kPa). Whereas patients with chest imaging of having obvious lesion progression within 24-48 hours, >50% were managed as severe cases. Patients with respiratory failure and requiring mechanical ventilation, shock, and organ failure that required intensive care were considered critical cases.

All patients who met WHO criteria for discontinuation of quarantine (no fever for three consecutive days, improvement in other symptoms, and two negative test results for severe acute respiratory syndrome coronavirus 2 [SARS-CoV-2] 24 hours apart) were followed up.

At enrollment in the study, quantitative RT-PCR for SARS-CoV-2 was performed, and patients with negative test results were included. Any patient who did not meet the WHO criteria was excluded from the study.

This study was approved by the Research Ethics Committee of the Kurdistan Board of Medical Specialties (641) on 22 November 2020. Written informed consent was obtained from all participants.

Sample size results from OpenEpi, Version 3, open-source calculator was based on the population size (for finite population correction factor or fpc) (N): 600, hypothesized % of outcome factor in the population (p): 16%+/-5,[8] confidence limits as % of 100 (absolute +/- %)(d): 5%, design effect (for cluster surveys-DEFF): 1 and confidence level (%)= 95%.

The sample size was 154.

Sample size no. = [DEFF*Np(1-p)]/ [(d2/ Z21-α/2*(N-1)+p*(1-p)]

Patients were offered a comprehensive medical assessment with detailed history and physical examination. Data on all clinical characteristics, including clinical and pharmacological history, lifestyle

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measurements, were collected in a structured electronic data collection system.

In particular, data on specific symptoms potentially correlated with COVID-19 were obtained using a standardized questionnaire at enrollment. Patients were asked to retrospectively recount the presence or absence of symptoms during the acute phase of COVID-19 and whether each symptom persisted at the time of the visit. More than one symptom could be reported.

Data on demography and clinical features of patients were expressed as means ± SD and/or frequencies and percentages. The data were checked for normal distribution by the Shapiro-Wilk test. In the study, the One-way ANOVA and Chi-square tests of the association were used to compare variables. When the expected count > 20% of the cells of the table was < 5, Fisher exact test was used. A *P* value of ≤0.05 was considered as the level of significance for all analyses. The statistical package for the social sciences (SPSS) software, version 22 was used for data analysis.

Results

In this study, 154 adult post-COVID-19 syndrome patients attended the private clinic during the six months of the study. The majority of those who were diagnosed clinically were mild and moderate clinically (81.9%), 17% were diagnosed as severe cases, and 1 case (1.1%) was critical (Table 1).

The mean age of the patients significantly increased with increased severity (*P* <0.001). A significant statistical association was also found between marital and smoking status with the severity of post-COVID-19 in which married patients developed more severe cases than non-married patients (*P* = 0.03). Also, cigarette smokers developed less severe clinical features than non-smokers (*P* = 0.005) (Table 2).

The majority of those treated at home were mild (71.9%) cases, followed by moderate (25%) cases, and 3.1% were severe cases. Regarding treatment at the hospital, the majority were severe cases (76.9%), 19.2% were moderate cases, and only 1 case (3.8%) was critical. There was a significant statistical difference between the place of treatment and the severity of the cases (*P* <0.001) (Table 3).

Table 1 Severity of the post-COVID-19 syndrome patients by diagnosis

Diagnosis	Severity								Total	
	Mild		Moderate		Severe		Critical			
	No.	%	No.	%	No.	%	No.	%	No.	%
Clinically	57	60.60	20	21.30	16	17.00	1	1.10	94	100
Clinically plus PCR or positive antibodies (IgG, IgM)	35	58.30	17	28.30	8	13.40	0	0.00	60	100

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Table 2 Demographic features of post-COVID-19 syndrome patients

Demographic features		Severity of cases								*P* value
		Mild		Moderate		Severe		Critical		
		No.	%	No.	%	No.	%	No.	%	
Age, years	Mean ± (SD)	44.6± (13.7)		55.45± (15.1)		57 ± (13.0)		69 ± (0.0)		<0.001*
Gender	Male	51	60.0	19	22.4	14	16.5	1	1.2	0.770
	Female	41	59.4	18	26.1	10	14.5	0	0.0	
Occupation	Governmental employee	29	67.4	10	23.3	4	9.3	0	0.0	0.521
	Self-employed	21	65.6	4	12.5	7	21.9	0	0.0	
	Student	0	0.0	0	0.0	0	0.0	0	0.0	
	Retired	5	41.7	4	33.3	3	25.0	0	0.0	
	None	37	55.2	19	28.4	10	14.9	1	1.5	
Education	Illiterate	14	42.4	10	30.3	9	27.3	0	0.0	0.618
	Read & Write	13	65.0	5	25.0	2	10.0	0	0.0	
	Primary	12	66.7	4	22.2	2	11.1	0	0.0	
	Secondary	20	62.5	5	15.6	6	18.8	1	3.1	
	Diploma or University	30	65.2	12	26.1	4	8.7	0	0.0	
	Master & PhD	3	60.0	1	20.0	1	20.0	0	0.0	
Married	Yes	80	56.3	37	26.1	24	16.9	1	0.7	0.033**
	No	12	100	0	0.0	0	0.0	0	0.0	
Cigarette smoker	Yes	17	100	0	0.0	0	0.0	0	0.0	0.005**
	No	75	54.7	37	27.0	24	17.5	1	0.7	
Alcohol drinker	Yes	1	100	0	0.0	0	0.0	0	0.0	0.878
	No	91	59.5	37	24.2	24	15.7	1	0.7	

*One-way ANOVA, **Chi-square statistic is significant at *P* <005.

Table 3 Diagnosis approach, place, and choice of receiving oxygen and/or CPAP by post-COVID-19 syndrome patients

Diagnosis & treatment approaches		Severity								*P* value
		Mild		Moderate		Severe		Critical		
		No.	%	No.	%	No.	%	No.	%	
Diagnosis	Clinically	57	60.6	20	21.3	16	17.0	1	1.1	0.626
	Clinically plus PCR	35	58.3	17	28.3	8	13.3	0	0.0	
Place of receiving treatment	Home	92	71.9	32	25.0	4	3.1	0	0.0	<0.001*
	Hospital	0	0.0	5	19.2	20	76.9	1	3.8	
On admission	Oxygen	1	3.7	12	44.4	14	51.9	0	0.0	0.293
	CPAP**	0	0.0	0	0.0	0	0.0	0	0.0	
	Both	0	0.0	1	10.0	8	80.0	1	10	
	None	0	0.0	0	0.0	1	100	0	0.0	

*The Chi-square statistic is significant at the 0.05 level, **CPAP: Continues Positive Airway Pressure.

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The severity of patients with post-COVID-19 syndrome was not statistically significant with the presence of comorbidities, as 61 (39.6%) patients were without other diseases (*P* <0.001). The most frequent disease observed was hypertension (54.1%), while the least comorbidity was stroke (1.6%), hyperthyroidism (1.6%), renal failure (1.6%), migraine (1.6%), and osteoarthritis (1.6%) (Table 4).

Table 4 Comorbidities of patients with post-COVID-19 syndrome

Comorbidity		Severity										*P* value
		Mild		Moderate		Severe		Critical		Total		
		No.	%	No.	%	No.	%	No.	%	No.	%	
COM	No	30	32.6	17	45.9	13	54.2	1	100	61	39.6	0.077*
	Yes	62	67.4	20	54.1	11	45.8	0	0.0	93	60.4	
DM	No	22	75.9	8	47.1	6	42.9	0	0.0	36	59.0	0.061
	Yes	7	24.1	9	52.9	8	57.1	1	100	25	41.0	
HT	No	11	37.9	10	58.8	7	50.0	0	0.0	28	45.9	0.419
	Yes	18	62.1	7	41.2	7	50.0	1	100	33	54.1	
IHD	No	27	93.1	15	88.2	10	71.4	1	100	53	86.9	0.251
	Yes	2	6.9	2	11.8	4	28.6	0	0.0	8	13.1	
Stroke	No	29	100	16	94.1	14	100	1	100	60	98.4	0.452
	Yes	0	0.0	1	5.9	0	0.0	0	0.0	1	1.6	
Asthma	No	29	100	16	94.1	13	92.9	1	100	59	96.7	0.564
	Yes	0	0.0	1	5.9	1	7.1	0	0.0	2	3.3	
Dyslip.	No	27	93.1	17	100	14	100	1	100	59	96.7	0.516
	Yes	2	6.9	0	0.0	0	0.0	0	0.0	2	3.3	
Hypot.	No	24	82.8	14	82.4	13	92.9	1	100	52	85.2	0.783
	Yes	5	17.2	3	17.6	1	7.1	0	0.0	9	14.8	
Hypert.	No	28	96.6	17	100	14	100	1	100	60	98.4	0.772
	Yes	1	3.4	0	0.0	0	0.0	0	0.0	1	1.6	
RF	No	29	100	16	94.1	14	100	1	100	60	98.4	0.452
	Yes	0	0.0	1	5.9	0	0.0	0	0.0	1	1.6	
Migraine	No	28	96.6	17	100	14	100	1	100	60	98.4	0.772
	Yes	1	3.4	0	0.0	0	0.0	0	0.0	1	1.6	
OA	No	28	96.6	17	100	14	100	1	100	60	98.4	0.772
	Yes	1	3.4	0	0.0	0	0.0	0	0.0	1	1.6	
BPH	No	27	93.1	17	100	14	100	1	100	59	96.7	0.516
	Yes	2	6.9	0	0.0	0	0.0	0	0.0	2	3.3	

*Fisher's exact Test, COM: Comorbidity, DM: diabetes mellitus, HT: Hypertension, IHD: ischemic heart disease, Dyslip: Dyslipidemia, Hypot: Hypothyroidism, Hypert: Hyperthyroidism, RF: Renal failure, OA: Osteoarthritis, BPH: Benign prostatic hyperplasia.

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Regarding skin manifestations of patients with post-COVID-19 syndrome, 76 (58.9%) of those with skin manifestations had mild disease, 31 (24%) had moderate, 21 (16.3%) had severe, and only 1 (0.8%) had critical disease.

The skin manifestations were significantly (*P* = 0.030) more common in mild cases (Table 5).

Table 5 Clinical features of patients with post-COVID-19 syndrome

Clinical features	Severity								Total (n=154)		*P* value
	Mild		Moderate		Severe		Critical				
	No.	%	No.	%	No.	%	No.	%	No.	%	
Cough	27	40.3	25	37.3	14	20.9	1	1.5	67	43.5	0.280
Sputum	2	13.3	6	40.0	6	40.0	1	6.7	15	9.7	1.0
Sore throat	15	65.2	4	17.4	4	17.4	0	0	23	14.9	1.0
Dyspnea	6	15.0	15	37.5	19	47.5	0	0.0	40	26.0	1.0
Nasal congestion	1	25.0	1	25.0	1	25.0	1	25.0	4	2.6	1.0
Smell disorder	6	85.7	1	14.3	0	0.0	0	0.0	7	4.5	1.0
Taste disorders	2	66.7	1	33.3	0	0.0	0	0.0	3	1.9	1.0
Chest pain	17	50.0	7	20.6	10	29.4	0	0.0	34	22.1	1.0
Fever	8	40.0	7	35.0	5	25.0	0	0.0	20	13.0	1.0
Fatigue	73	59.3	30	24.4	19	15.4	1	0.8	123	79.9	1.0
Dizziness	6	85.7	1	14.3	0	0.0	0	0.0	7	4.5	1.0
Headache	14	53.8	7	26.9	5	19.2	0	0.0	26	16.9	1.0
Joint pain	4	66.7	2	33.3	0	0.0	0	0.0	6	3.9	1.0
Muscle pain	7	63.6	1	9.1	3	27.3	0	0.0	11	7.1	1.0
Difficult focusing	1	50.0	1	50.0	0	0.0	0	0.0	2	1.3	1.0
Anorexia	3	60.0	1	20.0	1	20.0	0	0.0	5	3.2	1.0
Skin manifestations	76	58.9	31	24.0	21	16.3	1	0.8	129	83.8	0.030**

*Fisher's exact Test, **The test statistic is significant at the *P* <0.05 level.

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Discussion

We investigated the persistent symptoms of patients after recovery from COVID-19 who attended the respiratory disease clinic in Erbil government searching for care. This study described the demographic features of the patients, identified the clinical features of the patients that persisted after recovery, and found the associations between the severity of the disease with demographic and clinical features.

In this study, the severity of the disease increased significantly with increasing age (P <0.001). Although no age group is safe from COVID-19, the epidemiological studies confirmed that children are the least affected age group with the least clinical impact of COVID-19. Meanwhile, the burden of the disease is most severe among persons aged 70 and more,[13] older age was associated with a greater risk of development of acute respiratory distress syndrome to death among patients with COVID-19. The underlying cause is most likely due to less robust immune responses.[14]

Another interesting finding of this study is the significant association between marital status and the severity of COVID-19 (P = 0.03). The severity of the disease increased among married men and women compared to non-married status. Although individuals infected with SARS-CoV-2 have experienced different psychiatric manifestations during the period of infectivity and post-COVID-19 infection[15] and there are infrequent studies in this regard, our finding is dissimilar to a Nigerian study that showed married individuals coped better, were less stressed, and reported high self-esteem.[16] No other studies have found such relationship that could be regarded as a gap for further studies.

Cigarette smoking in our study was inversely associated with the severity of the disease (P = 0.005). Globally, till now, there is no consensus regarding the true association of cigarette smoking with COVID-19. Although during the COVID-19 pandemic, researchers have highlighted the association between tobacco smoking and adverse outcomes of COVID-19 disease. For instance, evidence from the US Surgeon General's report shows that cigarette smoking can suppress the immune system, increase the risk of respiratory infections, increase the risk of respiratory illnesses such as chronic obstructive pulmonary disease and asthma, and cause heart and lung diseases.[17]

Similarly, in a study of the UK population sample, smoking was independently associated with self-reported confirmed COVID-19 infection.[18] Meanwhile, a highly significant inverse correlation between current daily smoking prevalence and the COVID-19 mortality rate was noted for the group of hot countries (R=-.718, P = 0.0002) and the combined group.[19] Preliminary meta-analysis based on Chinese patients concluded that active smoking does not apparently seem to be significantly associated with the severity of the disease of COVID-19.[20] The interaction of smoking and COVID-19 will be reliably depended by carefully designed prospective study; furthermore, there may be unknown confounds that may be spuriously suggesting a protective effect of smoking. However, the magnitude of the apparent inverse association between COVID-19 and smoking and its numerous clinical implications recommend further investigation.[19]

Also, a significant association was found between hospital admission of the patients and their disease severity (P <0.001). The WHO recommendations indicate that severe cases should be given empiric antimicrobial therapy, with mechanical ventilation implemented depending on the patient's clinical condition. It is clear that such comprehensive treatments of the patients are given in the hospitals during their admission, as observed by a systematic review of the therapeutic used for managing patients with COVID-19 in

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clinical practice since the emergence of the virus.[21]

More than one-third 49.6% (61/154) of the post-COVID-19 syndrome patients with different severities of the disease were associated with comorbidities and the association was statistically significant (*P* <0.001). Also, the most prevalent comorbidity in the confirmed post-COVID-19 syndrome patients was hypertension, which was found in <1/3 of the patients 23% (34/148). Apart from diabetes mellitus that reported a prevalence of 16.9% (25/148), other accompanying comorbidities reported less than 10%.

Similar findings are found in systematic reviews that included limited studies of this outbreak and reported the same finding about the association of the COVID-19 infection with comorbidities and accompanying hypertension as the most prevalent risk of symptomatic COVID-19 infection. Although other reports have noted different accompanying comorbidities such as chronic liver, kidney, heart, and even lung diseases, we presume that the comorbidities only cause the patients to refer more to the hospital. However, the comorbidities do not seem to cause disease severity or even mortality.[22]

This finding in our study may indicate that the presence of comorbidities as predictors of the outcome of COVID-19 infection may extend and associate with the post-COVID-19 syndrome if the patients were followed up from the onset of the disease till the cure from the post-COVID-19 syndrome. This raises the importance of follow-up studies in the future.

Therefore, patients with COVID-19 disease who have comorbidities, such as hypertension or diabetes mellitus, are expected to develop a more severe course and progression of the disease. Furthermore, older patients with comorbidities have an increased admission rate into the intensive care unit and mortality from COVID-19. Patients with comorbidities should take all necessary precautions to avoid getting infected with COVID-19, as they usually have the worst prognosis.[23]

Finally, the patients with post-COVID-19 syndrome developed many clinical features, but only the skin manifestations were found to be statistically significant (*P* = 0.043), with a prevalence of 83.7% (129/154). However, the second and third least frequent prevalence clinical features were fatigue (79.9% (123/154) and cough 43.5% (67/154), but none of them was statistically significant. It is obvious that the patients present with multiple symptoms that may overlap, change over time, and affect any organ of the body.[7] Although COVID-19 is an infectious disease primarily affecting the lung, its multi-organ involvement requires an interdisciplinary approach encompassing virtually all branches of internal medicine and geriatrics.[13]

The main limitation of the current study is that it is a single-center study and lacks preliminary information on the patients at the onset of COVID-19 infection.

Conclusion

The mean age of the patients with COVID-19 syndrome significantly increased with the increasing severity of the disease. Significant statistical associations were also found between marital and smoking status with the severity of the post-COVID-19 syndrome. Also, cigarette smokers developed less severe clinical features than non-smokers. Mild and moderate cases were treated at home, while severe cases were treated at the hospital. The severity of patients with post-COVID-19 syndrome was statistically significant with the presence of comorbidities; the most frequent were hypertension, and the least frequent was stroke. Regarding the clinical features of patients with post-COVID-19 syndrome, the skin manifestations were significantly more common in mild cases.

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Competing interests

The authors declare that they have no competing interests.

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