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Post-COVID-19 conditions in Ecuadorian patients: an observational study



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Summary

Background Post-COVID-19 disease is not yet clearly described, presenting significant clinical variability across populations and patients. This paper compares post-COVID symptoms in three patient groups with mild, moderate, and severe infections in Ecuadorian outpatients.

Methods An epidemiological, observational, descriptive, and cross-sectional study was performed, and carried out in Quito, Ecuador. 1,366 non-hospitalized participants between 12 to 85 years, diagnosed with COVID-19 infection by molecular RT-PCR were included in the study. Demographic characteristics, including age groups, sex, ethnic group, work type, residence type, comorbidities, diagnosis, symptoms, and treatment were studied.

Findings 1,366 outpatient Ecuadorian patients were analysed with SARS-CoV2 infection confirmed with a PCR+ test. The mean age was 39 (\pm 10) years, distributed by age groups ranging between 12 and 85 years; 81.41% were between 18 and 54 years. 50.29% were men, and 49.71% were women.

Interpretation 64.3% of patients had symptoms between 4 to 6 weeks after infection, 21.1% showed ongoing symptoms between 6 to 12 weeks, and 14.6% had symptoms for more than 12 weeks. The most common symptom was fatigue in 67.3% of patients, followed by headache in 45.2%, body pain in 42.3%, and sleep disorders (insomnia, sleep apnoea, restless leg syndrome) in 36.5%. 69.3% of patients showed mild infection, 21.7% moderate, and 9.0% severe infection. On average, patients' daily life activities showed a 6.8% mean degree of impact following infection. A sedentary lifestyle (walking less than 30 minutes a day) was the most critical risk factor (40.3%), followed by being a health worker (11.87%). Patients aged \geq 55 years with HTN, CKD, smoking, and sedentary lifestyle were 4.39, 1.92, 9.19, 4.07, and 2.42 times more likely to have a severe infection level. At least 30% of patients do not feel recovered from COVID-19 infection.

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Introduction

COVID-19 infection is not merely a temporary infection. Despite advances in clinical research, it has not been possible to establish the full duration time of the symptomatic presentation of the virus and its long-term effects. Most patients with COVID-19 recover entirely within a few weeks, in some cases before three weeks, but some of them continue experiencing persistent long-term symptoms. These individuals are often referred to as COVID long-haulers and have a condition

called COVID-19 syndrome, long COVID, or simply post-COVID conditions.¹ Long COVID defines a series of chronic symptoms that patients may experience after resolving acute COVID-19 infection.² Despite this, there is no complete agreement of the case definition for post-acute COVID-19 syndrome, and no specific time frame has been established to define late infection sequelae.³ Some authors describe post-acute COVID-19 syndrome where the patient has signs and symptoms that develop during or after an infection continuing for more than four weeks after infection with SARS-CoV-2 and are not explained by an alternative diagnosis, from the onset of first symptoms and chronic Covid-19 as extending beyond 12 weeks.⁴ The most important finding is the symptoms' prolonged and persistent duration.

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Research in context

Evidence before this study

The post-covid-19 disease is not yet clearly described and presents significant clinical variability across populations and patients. In addition, there is an overlap of symptoms between the mild, moderate, and severe clinical pictures. On the other hand, there are ethnic differences that could produce a variation in response to the infection. What is the clinical question? Are there clinical differences between the mild, moderate, and severe clinical picture in an ethnical mestizo population affected by COVID-19?

Added value of this study

64.3% of patients had symptoms after infection between 4 to 6 weeks, 21.1% showed ongoing symptoms between 6 to 12 weeks, 14.6% had symptoms for more than 12 weeks. The most common symptom was fatigue in 67.3% of patients, headache in 45.2%, body pain in 42.3%, and sleep disorders in 36.5%. 69.3% of patients showed mild infection, 21.7% moderate, and 9.0% severe infection. A sedentary lifestyle (walking less than 30 minutes a day) was the most critical risk factor (40.3%), followed by being a health worker (11.87%). Patients aged ≥ 55 years with HTN, CKD, smoking, and sedentary lifestyle were 4.39, 1.92, 9.19, 4.07, and 2.42 times more likely to have a severe infection level. At least 30% of patients do not feel recovered from COVID-19 infection. At least 30% of patients do not feel recovered from COVID-19 infection.

Implication of all the available evidence

Patients may have symptoms for up to 12 weeks or more. The most common symptom is fatigue, which must be measured objectively, as it can be confused with the effects of long-term confinement. Sleep disorders are prevalent. Sedentary life is the most critical factor in worsening symptoms, leading to severe infection. There is no significant clinical difference between mild, moderate, and severe pictures since the symptoms overlap.

Post-acute covid-19 seems to be a multisystemic disease, sometimes occurring after a relatively mild acute illness and could be seen after severe and critical cases. This long-term disease shows similarities to other chronic medical illnesses such as myalgic encephalomyelitis or chronic fatigue syndrome (ME/CFS). Still, there is limited evidence in this concern, and it requires more research.⁵ Some studies discuss residual effects of SARS-CoV-2 infection, such as fatigue, dyspnoea, chest pain, cognitive disturbances, arthralgia, and decline in quality of life, caused by cellular damage, a robust innate immune response with inflammatory cytokine production, and a pro-coagulant state induced by SARS-CoV-2 infection.⁶ Based on recent research, we divided patients into two categories: subacute or ongoing

symptomatic COVID-19, which includes symptoms and abnormalities present from 4 to 12 weeks beyond acute COVID-19; and chronic syndrome including symptoms and abnormalities persisting or present beyond 12 weeks of acute COVID-19 onset and not attributable to alternative diagnoses.⁷

From the epidemiological perspective and based on the UK COVID Symptom Study, people enter their ongoing symptoms on a smartphone app; around 10% of patients tested positive for the SARS-CoV-2 virus showed symptoms beyond three weeks.⁸ Other observational studies reported 32.6% of patients with persistent symptoms, including 18.9% with new or worsened symptoms;⁹ an Italian study reported persistent symptoms in 87.4% of patients discharged from hospital who recovered from acute COVID-19.¹ In France, 66% of individuals exhibit symptoms at 60 days.¹⁰ In a prospective cohort study in Wuhan, China, 76% of patients showed at least one symptom after six months.¹¹ As can be seen, there is too much heterogeneity in the frequency of patients with persistent symptoms and in the follow-up time. The basic truth is that the health problem exists, but has not yet been well defined.

The predominant pathophysiological mechanisms of acute COVID-19 infection include endothelial damage and microvascular injury; immune system dysregulation and stimulation of a hyperinflammatory state; hypercoagulability with thrombosis; and finally, maladaptation of the angiotensin-converting enzyme 2 (ACE2) pathway.¹² Post-mortem studies have identified a disconnection between viral presence and tissue pathology - suggesting that extensive lung damage is a virus-independent immunopathology. This issue is supported by the efficacy of anti-inflammatory but not antiviral therapies in hospitalized patients.

The sequelae of post-acute COVID-19 overlap with SARS and MERS infection.¹³ This is explained by the phylogenetic similarity between the different pathogenic coronaviruses responsible. SARS-CoV-2, SARS-CoV, MERS-CoV, and Influenza-A Respiratory Viruses are all thought to be transmitted by infection via respiratory droplets or secretions of infected individuals, the primary mode of transmission between humans.¹⁴

It is not known why some people have prolonged recoveries. One contribution to the disease is the persistent RNA presence in nasopharyngeal swabs due to weak or absent antibody response. In addition, relapse or reinfection, inflammation processes and other immune reactions, and mental factors such as post-traumatic stress play a role.¹⁵ Symptoms vary significantly between individuals.¹⁶ It is known that the sequelae affect the pulmonary, hematic, renal, neuropsychiatric, endocrine, gastrointestinal and hepatobiliary, and dermatological systems, and that children present a Multi-system Inflammatory Syndrome. Symptoms also vary by specific aspects of each population, such as previous health status, comorbidities, access to health promotion

and prevention services, and cultural factors related to life habits such as nutrition, physical activity, and mental health.

This paper compares post-Covid symptoms in three groups of patients with mild, moderate, and severe infections in Ecuadorian outpatients.

Methods

An epidemiological, observational, and cross-sectional study was performed, in Quito, Ecuador, between January and April 2021. 1,366, participants between 12 to 85 years were studied. All participants were identified through family groups and residents of neighbourhoods around the city. By word of mouth, the consultation was personal since they were non-hospitalized outpatients, usually at home. There was no control group.

Acute COVID-19 was defined when the patient had signs and symptoms of COVID-19 for up to 4 weeks. Ongoing symptomatic COVID-19: signs and symptoms were present for 4 to 12 weeks. Chronic COVID-19 syndrome: patient had signs and symptoms that developed during or after an infection that continued for more than 12 weeks and were not explained by an alternative diagnosis. Some studies propose defining late sequelae as sequelae that last beyond four weeks after initial infection. There is no complete agreement of the case definition for post-acute COVID-19 syndrome, and no specific time frame has been established to define late infection sequelae. Delirium, also known as the acute confusional state, is a clinical syndrome that usually develops in the elderly. It is characterized by an alteration of consciousness and cognition with reduced ability to focus, sustain, or shift attention. It develops over a short period and fluctuates during the day. The clinical presentation can vary, but usually, it flourishes with psychomotor behavioural disturbances such as hyperactivity or hypoactivity with increased sympathetic activity and impairment in sleep duration and architecture.¹⁷ Anxiety is defined as a mental health disorder that produces fear, worry, and a constant feeling of being overwhelmed. It is characterized by excessive, persistent, and unrealistic worry about everyday things. This worry could be multifocal such as finance, family, health, and the future. It is excessive, difficult to control, and is often accompanied by many non-specific psychological and physical symptoms. Excessive worry is the central feature of generalized anxiety disorder.¹⁸ Depression is defined as a period of at least two weeks when a person experienced a depressed mood or loss of interest or pleasure in daily activities, and had a majority of specified symptoms, such as problems with sleep, eating, energy, concentration, or self-worth. major depression can result in severe impairments that interfere with or limit one's ability to carry out major life activities.¹⁹ For the next definitions, the CDC Criteria was used.²⁰ Asymptomatic or pre-symptomatic infection: individuals with

a PCR+ test but do not have symptoms compatible with COVID-19. Mild illness: individuals with a PCR+ test who have any of several COVID-19 symptoms (e.g., fever, cough, dysphagia, malaise, headache, myalgia, nausea, vomiting, diarrhoea, loss of taste and smell) but who does NOT have dyspnoea or abnormal chest images. Moderate disease: individuals with PCR+ test, showing evidence of lower respiratory illness during clinical evaluation or imaging, and with oxygen saturation (SpO₂) ≥94% in ambient air at sea level. Severe illness: Individuals with PCR+ test who have SpO₂ <94% in ambient air at sea level, respiratory rate > 30 resp/min, or pulmonary infiltrates >50%. Chest X-ray scans were used as a criterion of severity when available or when the patients visited a doctor. It was not always possible to apply this criterion. However, it was possible to obtain O₂ saturation in all patients, even more so when pulse oximeters availability is high in the general population.

The inclusion criteria included: patients with a PCR+ test for SARS-CoV2; residents in Ecuador; patients older than 12 years; of any sex, ethnicity, or nationality; that meet any of these conditions: a) Home patients who have been isolated due to CoViD19 infection who were never hospitalized; b) Home patients, who were hospitalized and discharged, with new, ongoing, or worse symptoms in the last seven days; c) Patients with late sequelae lasting more than four weeks after CoViD19 infection; d) Patients with continuous signs and symptoms 4-12 weeks after infection; e) Patients with continuous symptoms for more than 12 weeks and NOT explained by an alternative diagnosis.

We excluded patients who were hospitalized with critical clinical presentation or asymptomatic; and defined critical illness when individuals with PCR+ had respiratory failure, septic shock, or multi-organ dysfunction and required critical care. We also excluded patients with post-intensive care syndrome (PICS), who is anyone who survives a critical illness that justifies admission to an ICU or is susceptible to developing PICS. This syndrome is characterized by the appearance or worsening of cognitive, physical, or mental health in patients after discharge. We differentiated between this syndrome caused by COVID-19 or caused by merely being in the ICU. We excluded patients with symptoms less than four weeks after discharge from hospital or leaving isolation, or who have received the flu vaccine in the last six months or pneumococcus in the previous five years (confounders).

The following variables were studied: demographic characteristics included age groups, sex, ethnic group, province of residence, employment, and work changes. Clinical characterization included previous vaccination, symptom duration, symptom type, isolation days, hospitalization days, re-admission, and comorbidities. We also included symptoms observed in the last seven days, difficulties in daily living and habits, risk factors, and current health conditions.

The author collected the data and analysed the same. We used the Chalder Fatigue Scale (CFQ-11) to assess fatigue: 33 points indicated severe fatigue; 22-33 points, moderate fatigue; below 22 points, no fatigue. We also used a subjective perception scale. We asked the patient: indicate the average intensity of your fatigue in the last 24 hours on a scale of 0 to 10. Where: 0 = no fatigue and 10 = maximum fatigue you can imagine. To avoid the bias, it used a standardized data collection sheet.

Data was analysed with SPSS© software version 22. Descriptive and inferential statistics were used; Chi-square was used for comparing the differences of variables. We accepted statistical significance with a p-value under 0.05 and performed multivariate analysis. At a descriptive level, quantitative variables were presented with central tendency and dispersion measures, while qualitative variables were presented with their absolute and relative frequencies. At the inferential level, the Chi-square test was used to relate demographic and clinical characteristics with the severity of the infection. If necessary, Fisher's exact test was used. In the multivariate analysis, we performed logistic regression to predict infection severity. No t-student test or Gaussian analysis was performed. We only used the Chi-square test or Fisher's exact statistic, the latter when the expected frequencies were less than 5. We used the multivariate relationship to predict severe infection based on comorbidities and risk factors. Infection severity was grouped into severe and mild-moderate to obtain a possible predisposition. An exploratory analysis with three levels of severity using ordinal regression provided about 43% of combinations of severity with zero (0) frequencies; therefore, it was decided to use logistic regression as an alternative, using serious condition as the main category. Mild, moderate, and severe infection with COVID-19 proved by a positive RT-PCR+ molecular test in patients who met inclusion criteria was analysed as exposure.

All patients provided information voluntarily, signed an Informed Consent form, or gave their Consent via telephone, in both cases with the presence of a witness. In some cases, we made an anamnesis and additional physical examination to confirm the symptoms. The information obtained is confidential, and we anonymized all individual data. Our research group maintains the data. We received the IRB approval from the Ethics Committee on Research in Humans (CEISH-HCAM) on July 6th of 2020, with the code IEISS-HCAM-CEISH-2020-200-DF. This research is part of the frame project entitled "Clinical, neurological, and radiological characterization of adult Ecuadorian patients with SARS-CoV2 infection to establish phenotype-based risk prediction models".

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Results

We performed a population characterization considering individuals' socio-demographic and clinical characteristics. We analysed 1,366 outpatient Ecuadorian patients with SARS-CoV2 infection confirmed with a PCR+ test. All statistical means were calculated after confirming normal data distribution. The mean age was 39 (± 10) years, distributed by age groups ranging between 12 and 85 years; 81.41% were between 18 and 54 years. 50.29% were men, and 49.71% were women. The predominant ethnic group was mestizo at 98.68%. The main provinces of residence and origin were 53.73% Pichincha, 9.44% Cotopaxi, 6.51% Imbabura, 5.78% Tungurahua, 3.07% Chimborazo, 2.48% Manabí, and 2.42% Guayas, among others. Regarding employment, 74.23% had a paid job before the illness, and 94.86% remained after the disease. The leading cause of job type change was patients being laid off due to the loss of active jobs due to the pandemic (35.29%); followed by a reduction in working hours (9.80%), poor health conditions (7.84%), caregiving responsibility for another (5.88%), and the same percentage, sick leave, and retirement, among others. 69.33% (947/1366) presented mild infection. 21.67% (296/1366) presented moderate infection, and finally, 9.00% (123/1366) presented severe infection. The different variables were compared at these severity levels, considering the severity of the COVID-19 infection described above. Chest X-ray scans were used as a criterion of severity when available or when the patients visited a doctor. It was not always possible to apply this criterion. However, it was possible to obtain O₂ saturation in all patients, even more so when the availability of pulse oximeters is high in the general population.

Table 1 shows the distribution of patients with SARS-CoV2 by infection severity according to age and gender group. By age group, significant differences were observed in the level of infection with p-value < 0.001 , where the proportions for mild level were 77.50% in the age group between 12 and 17 years old, 72.66% for the 18-54 group, 52.31% for the 55-64 group and 47.62% for people ≥ 65 years old. For moderate level, the proportions were 22.5% in the 12-17 group, 21.22% for the 18-54 group, 21.54% for the 55-64 group, and 27.38% for people ≥ 65 . At the severe level of infection, the proportions were 0% for the 12-17 group, 6.12% for the 18-54 group, 26.15% for the 55-64 group, and 25% for people ≥ 65 . The 55-64 and ≥ 65 age groups had higher infection levels compared to the 12-17 years and 18-54 group. When comparing infection level by gender, NO significant differences were observed.

Table 2 shows patients' clinical characteristics. 64.22% of patients showed symptoms lasting between 4 to 6 weeks, 20.66% between 6 to 12 weeks, and 15.13% more than 12 weeks. By level of COVID-19 infection severity, we observed symptoms between 4 to 6 weeks in 67.09% of mild infections vs. 58.45% of

9m8 Variable	Total n (%)	Infection			p-value
		Mild n (%)	Moderate n (%)	Severe n (%)	
Groups of age in years (n (%))					
12-17	40 (2.93)	31 (77.5)	9 (22.50)	0 (0)	<0.001*
18-54	1112 (81.41)	808 (72.66)	236 (21.22)	68 (6.12)	
55-64	130 (9.52)	68 (52.31)	28 (21.54)	34 (26.15)	
≥65	84 (6.15)	40 (47.62)	23 (27.38)	21 (25)	
Sex (n (%))					
Women	687 (50.29)	472 (68.70)	148 (21.54)	67 (9.75)	0.623
Men	679 (49.71)	475 (69.96)	148 (21.80)	56 (8.25)	

Table 1: Distribution of patients with SARS-CoV2 by severity of infection according to group of age and sex.
 Note: * Significant differences in the proportions p-value <0.05; based on Chi-square test

Clinical characteristics	Total n (%)	Infection severity			p-value
		Mild n (%)	Moderate n (%)	Severe n (%)	
Symptom duration time in weeks					
4-6	877 (64.3)	634 (67.09) ^a	173 (58.45) ^b	70 (56.91) ^b	0.020*
6-12	288 (21.11)	189 (20)	70 (23.65)	29 (23.58)	
>12	199 (14.59)	122 (12.91) ^a	53 (17.91) ^b	24 (19.51) ^b	
Type of symptoms					
Ongoing symptoms	634 (46.41)	443 (46.78)	133 (44.93)	58 (47.15)	0.072
Intermittent symptoms	537 (39.31)	379 (40.02)	106 (35.81)	52 (42.28)	
Recurring symptoms	195 (14.28)	125 (13.2)	57 ^b (19.26)	13 (10.57)	
Isolation days					
<10	116 (8.51)	84 (8.89) ^a	14 (4.75) ^b	18 (14.63) ^c	<0.0001*
10-14	406 (29.79)	310 (32.8) ^a	75 (25.42) ^b	21 (17.07) ^b	
>14	841 (61.7)	551 (58.31) ^a	206 (69.83) ^b	84 ^b (68.29) ^b	
Hospitalization days					
<10	70 (50)	21 (70) ^a	27 (64.29) ^a	22 (32.35) ^b	0.001*
10-14	25 (17.86)	5 (16.67)	8 (19.05)	12 (17.65)	
15-30	34 (24.29)	4 (13.33) ^a	6 ^a (14.29) ^a	24 (35.29) ^b	
>30	11 (7.86)	0 (0) ^a	1 (2.38) ^a	10 (14.71) ^b	
Re-admission	9 (0.66)	0 (0) ^a	5 (1.69) ^b	4 (3.25) ^b	<0.0001*
Comorbidities					
HTN	90 (6.63)	40 (4.24) ^a	24 (8.25) ^b	26 (21.14) ^c	<0.0001*
Obesity	86 (6.34)	45 (4.77) ^a	27 (9.28) ^b	14 (11.38) ^b	0.001*
Hypercholesterolemia	51 (3.76)	29 (3.08) ^a	10 (3.44) ^a	12 (9.76) ^b	0.001*
T2DM	40 (2.95)	15 (1.59) ^a	13 (4.47) ^b	12 (9.76) ^c	0.000*
Peptic ulcer	16 (1.18)	8 (0.85)	4 (1.37)	4 (3.25)	0.063
Peripheral vascular disease	11 (0.81)	4 (0.42) ^a	3 (1.03) ^a	4 (3.25) ^b	0.004*
CKD	11 (0.81)	3 (0.32) ^a	1 (0.34) ^a	7 (5.69) ^b	0.000*
Tumor in only one location	7 (0.52)	5 (0.53)	2 (0.69)	0 (0)	0.668
Cardiac arrhythmia	5 (0.37)	4 (0.42)	1 (0.34)	0 (0)	0.764
COPD	5 (0.37)	4 (0.42)	1 (0.34)	0 (0)	0.764
Connective tissue disease	3 (0.22)	2 (0.21)	1 (0.34)	0 (0)	0.789
Chronic liver disease with portal hypertension	3 (0.22)	1 (0.11)	2 (0.69)	0 (0)	0.157
Complications to T2DM	3 (0.22)	2 (0.21)	1 (0.34)	0 (0)	0.789
Immunosuppression	3 (0.22)	2 (0.21)	0 (0)	1 (0.81)	0.272
Vaccinated against flu in the previous 6 years	55 (4.1)	41 (4.39)	10 (3.42)	4 (3.45)	0.716
Vaccinated against pneumococcus in the previous 5 years	25 (1.97)	21 (2.38)	2 (0.72)	2 (1.82)	0.216

Table 2: Distribution of patients with SARS-CoV2 by the severity of infection according to clinical characteristics. (n= 1366 patients)

Note: * Significant differences in the proportions p-value <0.05. ^{a,b} distinct superscripts indicate differences in the category concerning the severity of infection; based on the Chi-square test;

^{a,b} They indicate which categories differ in relation to severity, when the superscripts are different indicates that they are different in relation to severity, for example if it has a superscript in mild and moderate and b in severe, it indicates that mild and moderate are the same, but these are different with the severe one for the evaluated characteristic.

HTN= hypertension; T2DM= Type 2 Diabetes Mellitus; CKD= chronic kidney disease; COPD= chronic obstructive pulmonary disease.

Ongoing: continuous symptoms Intermittent: That is interrupted and continues from time to time repeatedly.

Recurrent: What happens, appears, or is done with a specific frequency or in an iterative way (which is repeated or has been repeated many times).

moderate infections and 56.91% of severe infections. Likewise, we observed differences in symptom proportions of > 12 weeks between mild infection at 12.91% vs. moderate infection at 17.91% and severe infection at 19.51%. The most frequent symptom type was continuous (ongoing symptom) at 46.41%, followed by intermittent (39.31%) and recurrent (14.28%), without differences by infection severity. 61.88% of patients remained isolated > 14 days, while 29.50% isolated between 10 to 14 days and 8.62% for less than ten days. **Figure 1** shows the distribution of most common symptoms in the last seven days in patients with post-COVID-19 conditions according to infection severity.

Table 3 shows the distribution of patients with SARS-CoV2 by infection level according to symptoms in the last seven days after illness. Fatigue was present in 67.12% of all patients, of which 33.31% had mild fatigue, 31.67% moderate, and 2.14% severe fatigue. When comparing fatigue severity with infection severity, we observed significant differences between patients without fatigue, at 24.79% for severe infection vs. 32.38% mild and 37.97% moderate. At the respiratory level, the most frequent symptoms were cough (29.72%), nasal congestion (29.14%), rhinorrhoea (23.75%), and dyspnoea (22.87%). The proportion of patients with dyspnoea was 38.21% for severe infection versus 19.96% mild and 25.85% moderate. For cardiovascular symptoms, we observed chest tightness (16.03%), chest pain (15.30%), and palpitations (14.49%). The proportion of patients with chest tightness was 14.04% for mild infection versus 20.61% moderate and 20.33% severe.

In contrast, the proportion of patients with palpitations was 12.88% for mild infection versus 21.14% severe infection. The main neurological symptoms were headache (45.27%) and sleep disturbance (36.48%). This last symptom presented significant differences due to infection severity with a p-value of 0.037, where the proportion of patients with sleep disturbances was 34.32% for mild infection versus 40.54% for moderate infection and 43.44% for severe infection. Regarding psychological or psychiatric impact, we observed anxiety symptoms in 26.06% of patients and depression symptoms in 18.08%. Regarding the otorhinolaryngological symptoms, we observed that the most frequent were loss of smell (28.28%), sore throat (19.18%), loss of taste (18.45%), and dizziness (9.08%). Purple or pinkish bumps or rashes presented significant differences by severity. The proportion of patients with this symptom was 5.28% for moderate infections, 1.28% for mild infections, and 0.83% for severe infections. **Figure 2** shows the distribution of symptom types and symptoms in patients with post-COVID-19 conditions according to infection severity. **Figure 3** shows the distribution of comorbidities in patients with post-COVID-19 conditions by infection severity.

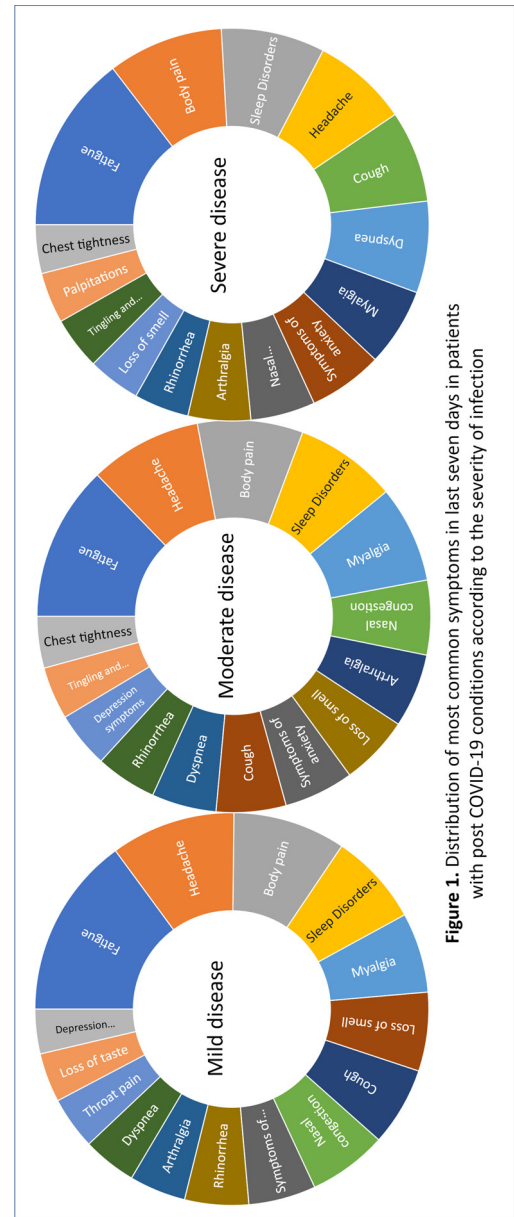


Figure 1. Distribution of most common symptoms in last seven days in patients with post-COVID-19 conditions according to the severity of infection

Figure 1. Distribution of most common symptoms in last seven days in patients with post-COVID-19 conditions according to the severity of infection

Symptoms	Total n (%)	Infection severity			P-value
		Mild n (%)	Moderate n (%)	Severe n (%)	
Fatigue					
No fatigue	447 (32.92)	305 (32.38) ^a	112 (37.97) ^a	30 (24.79) ^b	<0.0001*
Mild	454 (33.43)	353 (37.47) ^a	73 (24.75) ^b	28 (23.14) ^b	
Moderate	428 (31.52)	269 (28.56) ^a	100 (33.9) ^b	59 (48.76) ^b	
Severe	29 (2.14)	15 (1.59)	10 (3.39)	4 (3.31)	
Fever ≥ 38°C occasional	90 (6.59)	56 (5.91)	28 (9.46)	6 (4.88)	0.072
Fever ≥ 38°C intermittent	52 (3.81)	32 (3.38)	14 (4.73)	6 (4.88)	0.461
Body pain	578 (42.31)	395 (41.71)	124 (41.89)	59 (47.97)	0.412
Respiratory					
Nasal congestion	398 (29.14)	277 (29.25)	88 (29.73)	33 (26.83)	0.830
Rhinorrhea	324 (23.75)	224 (23.65)	72 (24.49)	28 (22.76)	0.923
Dyspnea	312 (22.87)	189 (19.96) ^a	76 (25.85) ^a	47 (38.21) ^b	<0.0001*
Cough	406 (29.72)	277 (29.25)	82 (27.7)	47 (38.21)	0.085
Sputum	158 (11.58)	104 (10.98)	36 (12.24)	18 (14.63)	0.454
Other non-specific	65 (4.76)	44 (4.65)	11 (3.72)	10 (8.13)	0.148
Cardiovascular					
Chest tightness	219 (16.03)	133 (14.04) ^a	61 (20.61) ^b	25 (20.33) ^b	0.011*
Chest pain	209 (15.3)	134 (14.15)	53 (17.91)	22 (17.89)	0.207
Palpitations	198 (14.49)	122 (12.88) ^a	50 (16.89) ^{a,b}	26 (21.14) ^b	0.021*
Arrhythmia	58 (4.25)	33 (3.48)	20 (6.76)	5 (4.07)	0.069
Neurological					
Cognitive impairment (brain fog, loss of concentration, or memory problems)	201 (14.71)	126 (13.31)	52 (17.57)	23 (18.7)	0.083
Headache	618 (45.27)	437 (46.19)	132 (44.59)	49 (39.84)	0.397
Sleep Disorders (insomnia, sleep apnea, restless leg syndrome)	498 (36.48)	325 (34.32) ^a	120 (40.54) ^b	53 (43.44) ^b	0.037*
Peripheral neuropathy symptoms (tingling and numbness)	245 (17.94)	156 (16.47)	62 (20.95)	27 (21.95)	0.103
Dizziness	196 (14.35)	127 (13.41)	49 (16.55)	20 (16.26)	0.330
Delirium (older people)	23 (1.68)	15 (1.58)	6 (2.03)	2 (1.63)	0.874
Visual changes	122 (8.93)	76 (8.03)	32 (10.81)	14 (11.38)	0.207
Hearing loss	60 (4.39)	34 (3.59)	18 (6.08)	8 (6.5)	0.092
Gastrointestinal					
Abdominal pain	156 (11.42)	100 (10.56)	43 (14.53)	13 (10.57)	0.165
Nausea	123 (9.01)	78 (8.25)	31 (10.47)	14 (11.38)	0.318
Diarrhea	119 (8.71)	74 (7.81) ^a	39 (13.18) ^b	6 (4.88) ^a	0.005*
Hyporexia (in older people and children)	68 (4.98)	39 (4.12)	20 (6.76)	9 (7.32)	0.087
Skeletal muscle					
Myalgia	435 (31.84)	281 (29.67) ^a	114 (38.51) ^b	40 (32.52) ^b	0.017*
Arthralgia	317 (23.22)	198 (20.93) ^a	87 (29.39) ^b	32 (26.02) ^b	0.008*
Reduced mobility (inability to move fully or to control movement)	89 (6.52)	44 (4.65) ^a	30 (10.14) ^b	15 (12.2) ^b	<0.0001*
Psychological/psychiatric					
Symptoms of depression	247 (18.08)	157 (16.58)	66 (22.3)	24 (19.51)	0.076
Symptoms of anxiety	356 (26.06)	236 (24.92)	82 (27.7)	38 (30.89)	0.280
Ear nose, and throat symptoms					
Tinnitus	80 (5.86)	49 (5.17)	21 (7.09)	10 (8.13)	0.250
Earache	58 (4.25)	42 (4.44)	14 (4.73)	2 (1.63)	0.312
Throat pain	262 (19.18)	185 (19.54)	56 (18.92)	21 (17.07)	0.802
Dizziness	124 (9.08)	85 (8.98)	29 (9.8)	10 (8.13)	0.847
Loss of taste (Hypogeusia/dysgeusia)	252 (18.45)	173 (18.27)	57 (19.26)	22 (17.89)	0.916
Loss of smell	386 (28.28)	277 (29.28)	82 (27.7)	27 (21.95)	0.229
Dermatological					
Eruptions/rashes	106 (7.77)	64 (6.77)	32 (10.85)	10 (8.13)	0.072
Purple or pinkish bumps or rashes	28 (2.09)	12 (1.28) ^a	15 (5.28) ^b	1 (0.83) ^a	<0.0001*

Table 3: Distribution of symptoms in last seven days in patients with SARS-CoV2 according to the severity of infection. Analysis of 38 reported different symptoms.

We asked: In the past seven days, have you experienced any of these symptoms? (That he had not experienced before the onset of his COVID-19 disease)

Hypogeusia/dysgeusia = chronic chili pepper consumers have taste bud atrophy; they were excluded as they cannot identify the cause of the problem.

Note: * Significant differences in the proportions p-value <0.05. ^{a,b} distinct superscripts indicate differences in the category concerning the severity of infection; based on the Chi-square test.

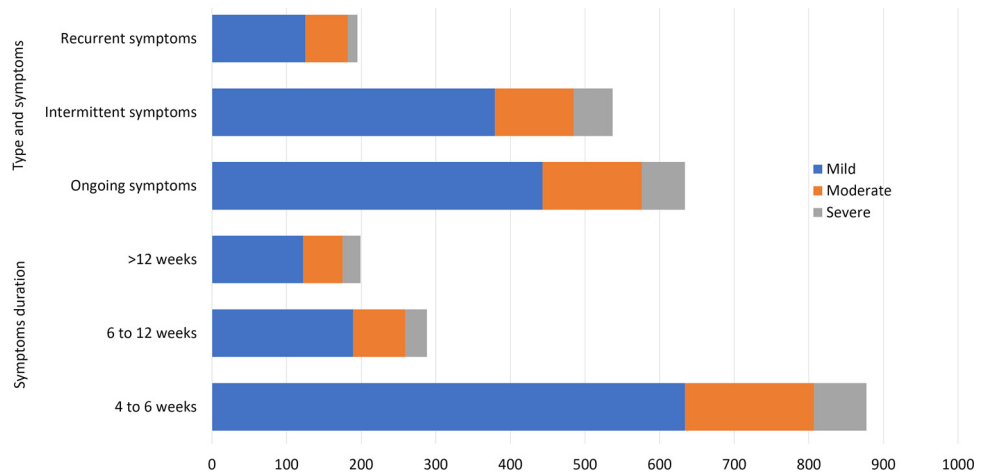


Figure 2. Distribution of symptoms type and symptoms duration in patients with post COVID-19 conditions according to the severity of infection

Figure 2. Distribution of symptoms type and symptoms duration in patients with post COVID-19 conditions according to the severity of infection

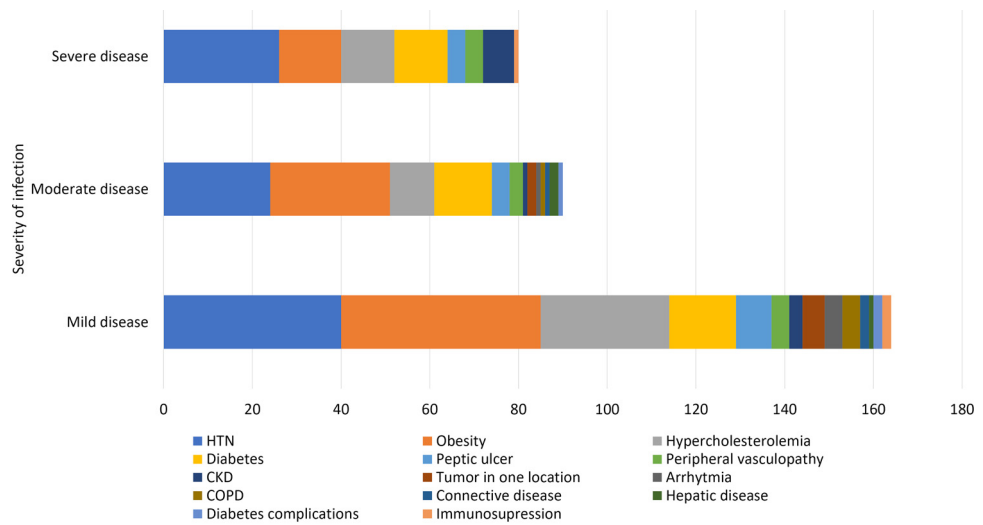


Figure 3. Distribution of comorbidities in patients with post COVID-19 conditions according to the severity of infection

Figure 3. Distribution of comorbidities in patients with post COVID-19 conditions according to the severity of infection

Table 4 shows the distribution of patients with SARS-CoV2 by infection severity according to difficulties in daily life activities and habits. We also assess the challenges of daily life activities and the living practices of patients before and after the COVID-19 disease. Before the disease, 16.03% of the patients declared they had vision difficulties; currently, 25.18% said they had this difficulty. Before the illness, the proportion of patients with visual impairment was 14.04% for a mild infection, 20.61% for moderate infection, and 20.33% for severe infection; by contrast, the proportion of patients with visual impairment was 21.93%

for mild infection vs. 33.45% for moderate infection and 34.96% for severe infection. We observed hearing difficulties in 4.98% of patients before the disease and 9.15% currently; and difficulty in remembering or concentrating in 7.03% of patients before the illness and 27.23% currently. We found difficulty communicating in 3.22% of cases before the disease and 8.57% currently.

Table 5 shows the distribution of patients with SARS-CoV2 by infection level according to risk factors. We consider the following definitions. A frequent traveller is a person with more than three trips outside the

Difficulties	Total n (%)	Infection severity			p-value
		Mild n (%)	Moderate n (%)	Mild n (%)	
Visual					
Before infection	219 (16.03)	133 (14.04) ^a	61 (20.61) ^b	25 (20.33) ^b	0.011*
Current	344 (25.18)	202 (21.33) ^a	99 (33.45) ^b	43 (34.96) ^b	<0.0001*
Hearing					
Before infection	68 (4.98)	36 (3.8) ^a	21 (7.09) ^b	11b (8.94) ^b	0.003*
Current	125 (9.15)	70 (7.39) ^a	40 (13.51) ^b	15. (12.2) ^b	0.008*
Walk					
Before infection	116 (8.49)	61 (6.44) ^a	35 (11.82) ^b	20 (16.26) ^b	<0.0001*
Current	399 (29.21)	239 (25.24) ^a	104 (35.14) ^b	56 (45.53) ^b	<0.0001*
Memory and focus					
Before infection	96 (7.03)	56 (5.91) ^a	30 (10.14) ^b	10 (8.13) ^b	0.041*
Current	372 (27.23)	235 (24.82) ^a	91 (30.74) ^b	46 (37.40) ^b	0.004*
Grooming or dressing					
Before infection	37 (2.71)	15 (1.58) ^a	16 (5.41) ^b	6 (4.88) ^b	<0.0001*
Current	73 (5.34)	32 (3.38) ^a	23 (7.77) ^b	18 (14.63) ^b	<0.0001*
Communicating					
Before infection	44 (3.22)	22 (2.32) ^a	16 (5.42) ^b	6. (4.88) ^b	0.017*
Current	117 (8.57)	64 (6.76) ^a	34 (11.49) ^b	19 (15.45) ^b	0.001*
Smoking					
Before infection	326 (23.88)	215 (22.73)	82 (27.7)	29 (23.58)	0.215
Current	335 (24.54)	224 (23.68)	83 (28.04)	28 (22.76)	0.280
Alcohol					
Before infection	673 (49.3)	471 (49.79)	146 (49.32)	56 (45.53)	0.674
Current	653 (47.84)	466 (49.26)	140 (47.3)	47 (38.21)	0.068
Eat healthy					
Before infection	1087 (79.63)	761 (80.44)	227 (76.69)	99 (80.49)	0.364
Current	1216 (89.15)	853 (90.17)	255 (86.44)	108 (87.8)	0.175
Physical activity					
Before infection	954 (69.89)	677 (71.56) ^a	189 (63.85) ^b	88. (71.54) ^{a,b}	0.038*
Current	1052 (77.07)	751 (79.39) ^a	206 (69.59) ^b	95 (77.24) ^{a,b}	0.003*
Recreational drugs use					
Before infection	51 (3.74)	31 (3.28)	17 (5.74)	3 (2.44)	0.108
Current	62 (4.54)	38 (4.02)	21 (7.09)	3 (2.44)	0.051
Sleep					
Before infection	1192 (87.33)	842 (89.01) ^a	242 (81.76) ^b	108. (87.8) ^{a,b}	0.005*
Current	1233 (90.33)	866 (91.54) ^a	255 (86.15) ^b	112. (91.06) ^{a,b}	0.022*

Table 4: Distribution of symptoms in last seven days in patients with SARS-CoV2 according to difficulties in activities of daily living and life habits.
Note: * Significant differences in the proportions p-value <0.05. ^{a,b} distinct superscripts indicate differences in the category concerning the severity of infection; based on the Chi-square test.

country per year, whether by land, water, or air—older adults when over 65 years of age. A sedentary lifestyle is when an individual walks less than 30 minutes a day. Vulnerable groups are children, pregnant women, the elderly, ethnic minorities, migrants, and individuals with a social risk situation. The proportion of smoking patients was 4.88% for severe infections, 1.06% for mild infections, and 2.05% for moderate infections. Obesity was 5.96% for mild infections, 10.92% for

moderate infections, and 19.51% for severe infections. The frequent traveller condition was 8.94% for severe infections versus 3.83% for mild infections and 2.05% for moderate infections. The older adult condition was 2.87% for mild infections versus 6.83% for moderate infections and 13.82% for severe infections. The sedentary lifestyle was 36.17% for mild infections, 44.03% for moderate infections, and 63.41% for severe infections. The proportion of patients with complications was

Risk factors	Total n (%)	Infection severity			p-value
		Mild n (%)	Moderate n (%)	Severe n (%)	
Healthworker or health professional	161 (11.87)	120 (12.77)	28 (9.56)	13 (10.57)	0.298
Smoking (more than 5 units every day)	22 (1.62)	10 (1.06) ^a	6 (2.05) ^a	6 (4.88) ^b	0.006*
Obesity	112 (8.26)	56 (5.96) ^a	32 (10.92) ^b	24 (19.51) ^b	<0.0001*
Frequent traveler (more than three trips outside the country per year, whether by land, river, or air)	53 (3.91)	36 (3.83) ^a	6 (2.05) ^a	11 (8.94) ^b	0.004*
Older adults (≥ 65-year-old)	64 (4.72)	27 (2.87) ^a	20 (6.83) ^b	17 (13.82) ^b	<0.0001*
Sedentary lifestyle (walking less than 30 minutes a day)	547 (40.34)	340 (36.17) ^a	129 (44.03) ^b	78 (63.41) ^c	<0.0001*
Patients with complications	66 (4.87)	28 (2.98) ^a	13 (4.44) ^a	25 (20.33) ^b	<0.0001*
Vulnerable group (children, pregnant women, older adults, ethnic minority, migrants, risk situation)	131 (9.66)	73 (7.77) ^a	34 (11.6) ^{a,b}	24 (19.51) ^b	<0.0001*

Table 5: Distribution of symptoms in last seven days in patients with SARS-CoV2 according to risk factors.

We consider the following definitions. Frequent traveler is a person with more than 3 trips outside the country per year, whether by land, water or air. Older adult when over 65 years of age. Sedentary lifestyle when an individual walks less than 30 minutes a day. Vulnerable groups are children, pregnant women, the elderly, ethnic minority, migrant, and individuals with a social situation of risk.

Note: * Significant differences in the proportions p-value <0.05. ^{a,b} distinct superscripts indicate differences in the category concerning the severity of infection; based on the Chi-square test.

Health condition	Total n (%)	Infection severity			p-value
		Mild n (%)	Moderate n (%)	Severe n (%)	
You feel recovered from COVID-19					
Completely disagree	65 (4.77)	41 (4.33)	19 (6.44)	5 (4.1)	<0.0001*
In disagreement	407 (29.86)	249 (26.32) ^a	108 (36.61) ^b	50 (40.98) ^b	
Neither agree nor disagree	327 (23.99)	227 (24)	70 (23.73)	30 (24.59)	
Agree	406 (29.79)	298 (31.5)	80 (27.12)	28 (22.95)	
Completely agree	158 (11.59)	131 (13.85) ^a	18 (6.1) ^b	9 (7.38) ^b	
Assessment of their health (%)					
0-20	1 (0.07)	1 (0.11)	0 (0)	0 (0)	<0.0001*
21-40	16 (1.17)	8 (0.85)	6 (2.03)	2 (1.64)	
41-60	155 (11.37)	77 (8.14) ^a	45 (15.25) ^b	33 (27.05) ^c	
61-80	615 (45.12)	416 (43.97)	147 (49.83)	52 (42.62)	
81-100	576 (42.26)	444 (46.93) ^a	97 (32.88) ^b	35 (28.69) ^b	
COVID-19 has affected their health and well-being described above					
Yes	513 (37.72)	319 (33.79) ^a	139 (47.28) ^b	55 (45.08) ^b	<0.0001*
Not	694 (51.03)	515 (54.56) ^a	121 (41.16) ^b	58 (47.54) ^b	
I'm not sure	153 (11.25)	110 (11.65)	34 (11.56)	9 (7.38)	

Table 6: Distribution of symptoms in last seven days in patients with SARS-CoV2 according to current health status.

Note: * Significant differences in the proportions p-value <0.05. ^{a,b} distinct superscripts indicate differences in the category concerning the severity of infection; based on the Chi-square test.

20.33% for severe infections versus 2.98% for mild infections and 4.44% for moderate infections. The proportion of vulnerable patients was 7.77% for mild infections, and 19.51% for severe infections.

Table 6 shows the distribution of patients with SARS-CoV2 by infection level according to current health. When consulting patients whether they felt recovered from COVID-19 and comparing by infection

severity level after illness, we observed significant differences; namely, the differences for the Disagree option were 26.32% for mild infection versus 36.61% for moderate infection and 40.98% for severe infection. On the other hand, a difference was observed for the Completely option with 13.85% for mild infection vs. 6.10% for moderate infection and 7.33% for severe infection. We asked patients to rate their health status

Variables	B	Wald	p-value	OR	CI-OR 95%	
					ILi	SLi
Age ≥ 55	1,48	38,29	<0,001*	4,39**	2,75	7,02
Male sex	0,27	1,69	0,194	1,31	0,87	1,97
HTN	0,65	4,09	0,043*	1,92**	1,02	3,63
Hypercholesterolemia	0,47	1,42	0,233	1,59	0,74	3,43
Obesity	0,32	0,83	0,362	1,37	0,69	2,72
T2DM	0,51	1,51	0,220	1,66	0,74	3,72
CKD	2,22	8,99	0,003*	9,19**	2,16	39,20
Peripheral vascular disease	0,92	1,71	0,190	2,51	0,63	9,96
Smoking	1,40	7,42	0,006*	4,07**	1,48	11,16
Elderly	-0,46	0,87	0,351	0,63	0,24	1,66
Sedentary lifestyle	0,88	17,69	<0,001*	2,42**	1,60	3,65
Vulnerable group	0,10	0,06	0,803	1,11	0,50	2,44
Constant	-3,54	257,43	<0,001*			

Table 7: Multivariate relationship to predict severe infection based on comorbidities and risk factors.

Note: * significant variable p-value <0.05. ** OR = significant odds ratio Li> i; based on logistic regression.

HTN= hypertension; T2DM= Type 2 Diabetes Mellitus; CKD= chronic kidney disease; COPD= chronic obstructive pulmonary disease; SLi= superior limit; ILi= inferior limit.

on a scale from zero “0” (worst health status) to 100 (best health status), observing significant differences due to infection severity, which is 8.14% for a mild infection, 15.25% for moderate infection and 27.05% for severe infection. Likewise, we observed differences in the health status scale ranging from 81 to 100 points, where the proportions were 46.93% for mild infection vs. 32.88% for moderate infection and 28.69% for severe infection. For the question regarding whether COVID-19 has affected their health and well-being, we observe that the answer was yes for 33.79% following a mild infection, 47.28% for moderate infection, and 45.08% for severe infection.

Table 7 shows the multivariate relationship to predict severe infection based on comorbidities and risk factors. Infection severity level was grouped into severe and mild-moderate to obtain possible predictors of severe infection by COVID-19, for which the comorbidities and risk factors that were significant in the bivariate analysis were used. The results showed that age ≥ 55 years, HT, CKD, smoking, and sedentary lifestyle are predictors of COVID-19 infection severity; these variables presented a multivariate relationship, where patients aged ≥ 55 years, HT, CKD, smoking, and sedentary lifestyle were 4.39, 1.92, 9.19, 4.07 and 2.42 times more likely to have a severe infection level.

Discussion

64.3% of patients had symptoms after infection between 4 to 6 weeks, 21.1% showed ongoing symptoms between 6 to 12 weeks, and 14.6% had symptoms for more than 12 weeks. The most common symptom

was fatigue in 67.3% (919/1366) of patients, followed by headache in 45.2% (618/1366), body pain in 42.3% (578/1366), and sleep disorders (insomnia, sleep apnoea, restless leg syndrome) in 36.5% (408/1366). As previously mentioned, the symptoms vary widely in each country and population. Some studies reported that the most common symptoms were cough, low-grade fever, and fatigue, all of which may relapse and remit,⁴ such as shortness of breath, chest pain, headaches, neurocognitive difficulties, muscle pains and weakness, gastrointestinal upset, rashes, metabolic disruption, thromboembolic conditions, and depression and other mental health conditions.²¹

An important characteristic is that symptoms present relapses and remissions, which cannot be adequately explained. Individual immune responses may directly influence this process. This post-COVID syndrome resembles postinfectious syndromes following outbreaks such as Chikungunya, Ebola, Dengue, and Zika, and manifests a dysregulated autonomic nervous system and perturbed immune parameters. More research is needed to understand these postinfectious conditions' pathogenesis.²²

In our study, neuropsychiatric sequelae were the most common, contrary to what most research states. We found fatigue, headache, body pain, and sleep disorders as the most common symptoms. Fatigue was the most important, and although it is relevant, it is not exempt from bias. Due to multiple confinements and lockdowns, social tension due to control measures in each country, and the psychological tension produced by the pandemic, this symptom could be confused

with the neuropsychological effect of the pandemic itself. For this reason, we objectify the symptom through the Chalder Fatigue Scale (CFQ-11) to assess fatigue. Fatigue could be the consequence of permanent cell damage caused by viremia and metabolic depletion. This cellular damage could also explain the headache and body pain. Fatigue features in some post-acute COVID-19 patients could be confusing features with chronic fatigue syndrome described after other severe infections, including SARS, MERS, and community-acquired pneumonia. However, evidence supporting this claim remains limited.²³

On the other hand, sleep disorders have a double causality mechanism. First and foremost, there is the neuropsychological effect caused by the pandemic and, second, the cellular effect caused by viral toxicity. Like other reports, COVID-19 survivors have reported a post-viral syndrome of chronic malaise, diffuse myalgia, depressive symptoms, and non-restorative sleep, including migraine-like headaches.²⁴ The known mechanisms of neuropathology are direct viral infection, severe systemic inflammation, neuroinflammation, microvascular thrombosis, and neurodegeneration.²⁵

Concerning comorbidities, in our study, only 10.9% (149/1366) were hospitalized, and 24.5% (334/1366) had at least one comorbidity. Patients with HTN, T2DM, CKD, smoking, and sedentary lifestyle were 2.29, 2.36, 8.51, 4.01, and 2.48 times more likely to have a severe infection with a life-threatening situation. SARS-CoV-2 utilizes ACE-2 receptors found at the surface of the host cells to enter the cell, showing a robust ACE-2 receptor expression and higher release of proprotein convertase that enhances viremia.²⁶ CKD has 8.51 times more probability of causing critical disease leading to death. CKD seems to be associated with an enhanced risk of severe COVID-19 infection.²⁷ SARS-CoV-2 could damage the kidney through several mechanisms, including acute lung injury, sepsis, hemodynamic alterations, cytotoxic effects, cytokine release syndrome, rhabdomyolysis, coagulopathy, microangiopathy, and collapsing glomerulopathy.

Regarding infection stage, 69.3% (947/1366) showed mild disease, 21.7% (296/1366) moderate, and 9.0% (123/1366) severe. We observe that the greater the clinical presentation burdens, the fewer the number of patients. We characterize mild illness in people who have any of the various signs and symptoms of COVID-19 (for example, fever, cough, dysphagia, malaise, headache, myalgia, nausea, vomiting, diarrhoea, loss of taste and smell) but who do not have dyspnoea or abnormal chest images, with a PCR+ test. The definition of moderate disease is lower respiratory tract disease during clinical evaluation or imaging and oxygen saturation (SpO₂) \geq 94% in ambient air at sea level, with PCR + test. Finally, severe illness was declared in individuals with SpO₂ <94% in ambient air at sea level, a relationship between arterial partial pressure of oxygen

and the fraction of inspired oxygen (PaO₂/FiO₂) <300 mm Hg, respiratory rate > 30 resp/min or pulmonary infiltrates > 50%, with a PCR+ test.²⁸ As we can see, the differences are not highly significant, and patients can move quickly from one stage to another.

All patients had increased difficulties in life habits and daily activities. Patients saw impacts on walking (20.7% of cases), remembering and focusing (20.2%), eating healthy (9.5%), and in physical activities (7.2%). They also suffered increased visual problems (9.2%), communicating skill problems (5.6%), hearing problems (4.2%), and sleep problems (3%). On average, activities of daily living patients showed a 6.8% (ranging from 0 to 21%) mean alteration after infection. A sedentary lifestyle (walking less than 30 minutes a day) was the most critical risk factor (40.3%), followed by being a health worker (11.87%). 29.86% of patients do not feel recovered from COVID-19. 45.1% of patients who assessed their health between 60 to 80% had a health condition. 51% of patients said COVID-19 had affected their health and well-being. At least 30% of patients do not feel recovered from COVID-19 infection. At the end of this study, it is undeniable that post-COVID-19 infection symptoms and sequelae must be studied in greater depth.

There are some possible limitations in this study. We had some methodological limitations in patient sampling and selection because we use only patient data limited to some geographic areas of the country. However, few studies talk about non-hospitalized infected patients. Due to the scale of the pandemic, we believe that the sample size could be more extensive in future research. Furthermore, many asymptomatic patients refuse to recognize the disease or confuse the symptoms, making it challenging to identify potential patients. The potential for self-report bias or memory bias are also major limitations in this study. This research was conducted directly with patients, raising the possibility of certain biases inherent to the individuals themselves. The results must be considered in that context. One significant limitation was that participants were self-selected; they were the people who came forward in response to word of mouth about the study.

Additionally, in Ecuador, molecular diagnostic tests availability and access are still reduced. The future perspectives of this research will be the clinical follow-up of these patients and the follow-up with computed tomography and respiratory function tests. It is possible to generalize this research with a prospective design that includes a larger sample of patients with a demographic redistribution.

Conclusion

64.3% of patients had symptoms after infection between 4 to 6 weeks, 21.1% showed ongoing symptoms between 6 to 12 weeks, and 14.6% had symptoms

for more than 12 weeks. The most common symptom was fatigue in 67.3% of patients, followed by headache in 45.2%, body pain in 42.3%, and sleep disorders (insomnia, sleep apnoea, restless leg syndrome) in 36.5%. 69.3% of patients showed mild infections, 21.7% had moderate infections, and 9.0% had severe infections. On average, patients' daily life activities showed a mean impact of 6.8% after infection. A sedentary lifestyle (walking less than 30 minutes a day) was the most critical risk factor (40.3%), followed by being a health worker (11.87%). Patients aged ≥ 55 years with HTN, CKD, smoking, and sedentary lifestyle were 4.39, 1.92, 9.19, 4.07, and 2.42 times more likely to have a severe infection level. At least 30% of patients do not feel recovered from COVID-19 infection.

Contributors

The author carried out the research protocol and its design, data collection, statistical analysis, evaluation, interpretation of the data, critical analysis, discussion, writing, and final manuscript approval.

Data sharing statement

The data supporting this manuscript are available upon request to the corresponding author.

Declaration of Competing Interest

The author reports NO conflict of interest.

Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:[10.1016/j.lana.2021.100088](https://doi.org/10.1016/j.lana.2021.100088).

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