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Prevalence of persistent symptoms after having COVID-19 in a cohort in Suriname

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ABSTRACT

Objectives. To determine the prevalence of persistent symptoms after having coronavirus disease 2019 (COVID-19) in a cohort in Suriname, and assess the factors associated with long COVID.

Methods. A sample of adults 18 years and older who were registered 3–4 months previously in a national database because of a positive COVID-19 test were selected. They were interviewed about socioeconomic characteristics, pre-COVID-19 health status and lifestyle, and symptoms during and after COVID-19. A subset of participants underwent a physical examination to determine body mass index, waist circumference, cardiovascular parameters, lung function, and functionality.

Results. A total of 106 participants (mean age 49 (standard deviation 15) years; 62.3% female) were interviewed, of whom 32 were physically examined. The greatest proportion of participants was of Hindustani descent (22.6%). Overall, 37.7% of participants were physically inactive, 26.4% had hypertension or diabetes mellitus, and 13.2% had been previously diagnosed with heart disease. Most participants (56.6%) had experienced mild COVID-19 and 14.2% had experienced severe COVID-19. A large proportion (39.6%) had experienced at least one persistent symptom after recovery from acute COVID-19 and more women were affected (47.0% of women versus 27.5% of men). Fatigue and alopecia were the most common symptoms, followed by dyspnea and sleep disturbance. Differences were observed between ethnic groups. Based on physical examination, 45.0% of the subset was obese and 67.7% had very high waist-circumference.

Conclusions. About 40% of the cohort had at least one persistent symptom 3–4 months after having had COVID-19, with differences observed by sex and ethnic group.

Keywords Post-acute COVID-19 syndrome; prevalence; Suriname.

Since the official announcement of coronavirus disease 2019 (COVID-19) on December 31, 2019, the disease has had a substantial global impact. To date, the COVID-19 pandemic has resulted in more than 400 million cases and almost 6 million deaths worldwide (1). On March 13 2020, the first case of the disease was detected in Suriname, a multiethnic middle-income country in South America with almost 600 000 inhabitants. Before COVID-19, cardiovascular diseases and diabetes were the most common causes of death in Suriname and lower respiratory tract infections were among the 10 main causes of death (2). Since the outbreak, more than 80 000 cases of COVID-19 and 1 350 deaths have been reported in the country (3).

Initially in the pandemic, the emphasis was on the treatment and prevention of acute COVID-19 and identification of patient characteristics that influenced the severity of the infection; for instance, the presence of comorbidities, such as hypertension (4, 5). However, with the growing number of patients who have had COVID-19, more attention is needed on the long-term health consequences of the infection. The experience of lasting symptoms as a result of COVID-19 is referred to as post-COVID

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syndrome or long COVID (6, 7). A study in England has already shown that up to 55% of people hospitalized for COVID-19 had not fully recovered 3 months after discharge from hospital, with fatigue and breathlessness being the most frequent complaints (8). Patients in Wuhan who had had COVID-19 experienced persistent fatigue, muscle weakness, sleep disturbances, anxiety, and depression 6 months after being discharged from hospital (9). Studies on the prevalence of long COVID in Europe have reported that female sex, age, comorbidities, severity of the disease, and obesity were associated with long COVID (10, 11). Extrapolations made for Latin American and Caribbean countries show that there may be around 29 million cases of long COVID (12). Data on long COVID from low- and middle-income countries such as Suriname are lacking.

The main aim of this study was to determine the prevalence of persistent symptoms after having COVID-19 in a cohort of Surinamese patients and assess the risk factors for long COVID, such as noncommunicable diseases, obesity and ethnicity (13–15). A secondary aim was to make a physical assessment of a subgroup of patients who were able to visit our research center.

METHODS

Study sample

This cohort study included a sample of patients who had tested positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) by reverse transcriptase polymerase chain reaction and were recruited from the Suriname national COVID-19 database. This database contained contact details, information on comorbidities, symptoms, and vital signs of the patients who were tested due to presenting symptoms. Over the period November 2020 to November 2021, we recruited patients from the national database who were older than 18 years and who had tested positive for COVID-19 3–4 months before inclusion in our study. Severity of COVID-19 at onset of the infection was classified according to guidelines of the World Health Organization (WHO) (16). Symptomatic patients meeting the WHO case definition of COVID-19 without evidence of pneumonia or hypoxia were classified as mild COVID-19. Patients with clinical signs of pneumonia (fever, cough, dyspnea, tachypnea) but no signs of severe pneumonia (oxygen saturation ≥ 90% on room air) and with respiratory rate > 24 breaths/minute and/or oxygen saturation < 95% were classified as moderate COVID-19. Patients with clinical signs of pneumonia (fever, cough, dyspnea, tachypnea) plus respiratory rate > 30 breaths/minute and/or severe respiratory distress and/or oxygen saturation < 90% on room air were classified as severe COVID-19. Patients who were diagnosed with acute respiratory distress syndrome were also classified as severe COVID-19 (16). Patients who were willing to participate visited the medical research center, Medisch Wetenschappelijk Instituut in Paramaribo, the capital of Suriname during periods without lockdown restrictions. However, as the institute was closed during strict government lockdowns, most patients could only be interviewed by telephone.

Questionnaire

Information was gathered on socioeconomic characteristics of the participants, and their pre-COVID-19 health status, lifestyle (for example, smoking and physical activity), symptoms during and after COVID-19, and post-COVID functional status. The EQ-5D questionnaire was used to assess quality of life of the participants (17). Before the start of the study, the questionnaire was piloted and tested for its face validity in a small group of patients of different socioeconomic and educational levels.

Ethnicity was self-reported and was categorized as: Hindustani (South Asian descent, mainly from the Indian subcontinent); Javanese (Indonesian descent); Creole (predominantly of African descent); and mixed ethnicity (mixed descent) or other ethnicity. Patients were asked about their employment status (student, employed, retired, or unemployed), monthly income, and educational level (primary, secondary, tertiary, and higher education).

Patients were asked if they had any comorbidities before contracting COVID-19, such as heart or lung disease, hypertension, diabetes mellitus, kidney disease, or a neurological disorder, and if the condition had been diagnosed by a physician. Patients were also asked about the regular use of medication to cross-check the presence of comorbidities or diseases. Finally, self-reported smoking habits and regular physical activity were assessed. Physical activity was assessed using the global physical activity questionnaire and categorized according to the WHO physical activity recommendations (18).

Physical assessments

Participants who came to the medical research center, signed informed consent forms before the assessment. First, their height and weight were measured using the SECA portable stadiometer (SECA 213) and SECA weighing scale (SECA 762) and their body mass index (BMI) was calculated. Waist circumference was measured, placing the measuring tape around the abdomen at the midpoint of the line between the costal margin and the iliac crest.

Participants then lay down for at least 5 minutes for the measurement of their cardiovascular parameters using an arteriograph, according to the manufacturer's guidelines (TensioMed, Budapest, Hungary). The arteriograph is an operator-independent, non-invasive device that uses an oscillometric occlusive technique to estimate the aortic pulse wave velocity, which is a measurement of arterial stiffness. Measurement of the aortic pulse wave velocity was taken twice and we used the mean value.

Lung function was evaluated in a seated position using the Spiro USB spirometer (Carefusion, San Diego, USA). This measurement was performed twice and the best result was used for the analysis. Functional vital capacity (FVC) and forced expiration volume in 1 second (FEV1) were recorded, and the FEV1/FVC ratio was calculated.

Handgrip strength for the self-reported dominant and non-dominant hands was assessed using a hydraulic handheld dynamometer (JAMAR Model 5030J1, Sammons Preston Rolyan, Bolingbrook, USA). The measurement was performed twice for each hand and the highest strength was used for the analysis.

Finally, to assess functionality, the patients performed the 6-minute walk test in which they had to walk at their fastest possible speed, without running, for 6 minutes using a 25 m corridor. Before and directly after the test, oxygen saturation, heart rate, and blood pressure were measured.

Data-analysis

SPSS version 25 (SPSS Inc., Chicago, USA) was used for data analysis. The mean values and corresponding standard deviations (SD) were calculated for continuous variables: age, anthropometric measurements, cardiovascular and lung function parameters, handgrip strength, and functionality. Proportions were calculated for categorical variables. Partial correlation analysis was done for age and COVID-19 severity at onset. Regression analysis was done on the persistence of symptoms as the outcome variable and sex, age, ethnicity, and severity at onset as the covariates.

Ethical considerations

The study was conducted according to the principles of the Declaration of Helsinki and ethical clearance was obtained from the ethics committee of the Ministry of Health in Suriname (approval letter no: AG 3468). The participants visiting the research center provided written informed consent, whereas participants interviewed by telephone provided verbal informed consent. The data were anonymized using a unique code for each participant and only the primary investigator had access to the names and contact information of the participants.

RESULTS

Sample characteristics

From the national COVID-19 database, 194 patients diagnosed with COVID-19 and referred to a government institution were contacted (Figure 1). As shown in Figure 1, 55 patients were lost to follow-up because of missing contact information and 33 declined to participate, resulting in a total cohort of 106 patients. From this cohort, 32 (30.2%) visited the Medisch Wetenschappelijk Instituut and 74 (69.8%) were interviewed by telephone. Our sample was not significantly different from the national COVID-19 database for age, sex, ethnicity, and severity of COVID-19 (data not shown).

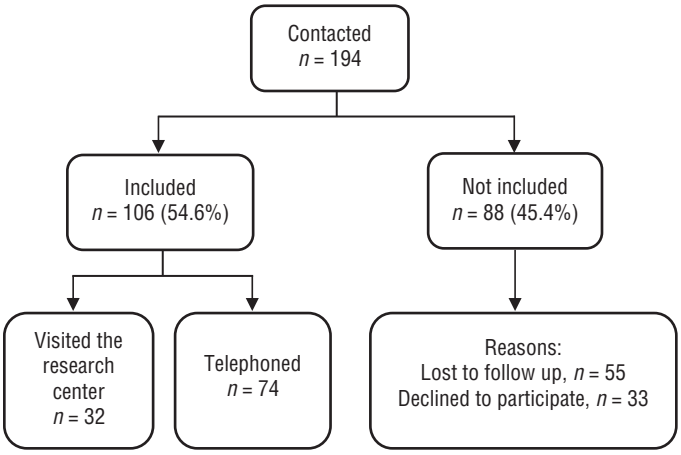
Table 1 shows the sociodemographic characteristics of the cohort. The mean age of the total cohort was 49 years and 62.3% were female. The greatest proportion of the total cohort was of Hindustani descent (22.6%), whereas the greatest proportion visiting the institute was of Creole descent (25.0%). Most of the cohort (61.3%) were employed and about 30% had an income between 1 345 Surinamese dollars (Sr$) and Sr$ 4 898 (between November 2020 and November 2021: Sr$ 1 = 0.058 United States dollars). Only 1.9% of the cohort did not have any formal education. A tenth of the cohort were current smokers and 37.7% were physically inactive before they got COVID-19. More than half the cohort (56.6%) had mild COVID-19, 26.4% had moderate COVID-19, and 14.2% had severe COVID-19. About a quarter of the cohort had hypertension (26.4%) and diabetes mellitus (24.5%) before they got COVID-19 and 13.2% had previously been diagnosed with heart disease. Correlation of severity and age was not significant (correlation coefficient 0.122, $p = 0.219$).

Symptoms during and after COVID-19

Table 2 shows the prevalence of symptoms while suffering from acute COVID-19 and after recovery from COVID-19 for the total cohort, and by sex and ethnicity. At enrolment in the study, 38.7% of the participants still had at least one symptom after having had COVID-19. Fatigue and alopecia were the most commonly reported symptoms, followed by dyspnea and sleep disturbance. After having had COVID-19, substantially more women had at least one symptom (47.0% versus 27.5%) and alopecia was only reported by women. The highest prevalence of at least one symptom was in the Hindustani population (45.8%) and the lowest was in the Javanese population (28.6%). For each ethnic group, the three most common symptoms differed. Fatigue was the most commonly reported symptom in all ethnic groups except the Javanese population, in which alopecia was the most prevalent symptom followed by fatigue and sleep disturbance. In the Creole population, after fatigue, coughing and concentration problems were the most commonly reported symptoms, whereas in the Hindustani population dyspnea and sleeping disturbance followed fatigue.

The risk of having at least one persisting symptom at 3–4 months after having had COVID-19 was significantly greater in participants who had experienced moderate to severe COVID-19 compared with those who had had mild disease: risk ratio 2.2 (95% CI: 1.01–5.1). This risk was also higher in women than men: risk ratio 2.3 (95% CI: 1.00–5.4). When ethnicity was controlled for, the risk ratios did not change. However, when also controlling for age, the risk of having at least one persisting symptom at 3–4 months was no longer significantly associated with disease severity.

FIGURE 1. Flowchart of recruitment of participants



Source: prepared by authors based on the results.

Physical examination

Table 3 gives the results of the assessment of the participants who visited the Medisch Wetenschappelijk Instituut. Mean (SD) BMI was 28.4 (5.4) kg/m^2 and waist circumference was 97.3 (15.1) cm. Based on the WHO categories using BMI, 29.0% of these participants were overweight and 45.0% were obese. Using the cut-off for waist circumference (moderate central fat accumulation = 80.0–87.9 cm for women and 94.0–101.9 cm for men; high central fat accumulation = ≥ 88.0 cm for women and ≥102.0 cm for men(18)), 83.8% of the participants were categorized as moderate or high central fat accumulation. Systolic and diastolic blood pressure was measured in 27 patients, whereas

TABLE 1. Sociodemographic characteristics of the sample, Suriname

Characteristic	Total population (*n* = 106)	Visited research institute (*n* = 32)	Interviewed by telephone (*n* = 74)
Mean age (SD), in years	49 (15)	50 (13)	49 (16)
Male sex, n (%)	40 (37.7)	10 (31.3)	30 (40.5)
Ethnicity, n (%)			
Creole	19 (17.9)	8 (25.0)	11 (14.9)
Hindustani	24 (22.6)	4 (12.5)	20 (27)
Javanese	21 (19.8)	3 (9.4)	18 (24.3)
Mixed ethnicity	21 (19.8)	8 (25.0)	13 (17.6)
Other ethnicity	21 (19.8)	9 (28.1)	12 (16.2)
Work status, n (%)			
Student	2 (1.9)	1 (3.1)	1 (1.4)
Employed	65 (61.3)	24 (75.0)	41 (55.4)
Currently unemployed	18 (16.9)	3 (9.4)	15 (20.3)
Retired	21 (19.8)	4 (12.5)	17 (23.0)
Income category in Sr$,[a] n (%)			
No income	12 (11.3)	1 (3.1)	11 (14.9)
< 1 344	9 (8.5)	1 (3.1)	8 (10.8)
1 345–3 121	19 (17.9)	6 (18.8)	13 (17.6)
3 122–4 898	12 (11.3)	8 (25)	4 (5.4)
4 899–6 675	8 (7.5)	5 (15.6)	3 (4.1)
6 676–8 452	5 (4.7)	0 (0.0)	5 (6.8)
8 453–10 299	2 (1.9)	1 (3.1)	1 (1.4)
10 299–12 000	1 (0.9)	1 (3.1)	0 (0.0)
> 12 000	4 (3.8)	3 (9.4)	1 (1.4)
Missing information	34 (32.1)	6 (18.8)	28 (37.8)
Education level, n (%)			
No formal education	2 (1.9)	0 (0.0)	2 (2.7)
Primary education	27 (25.5)	8 (25.0)	19 (25.7)
Secondary and tertiary education	51 (48.1)	14 (43.8)	37 (50.0)
Higher education	25 (23.6)	10 (31.3)	15 (20.3)
Missing information	1 (0.9)	0 (0.0)	1 (1.4)
Current smoker, n (%)	11 (10.4)	4 (12.5)	7 (9.5)
Met physical activity recommendations before getting COVID-19, n (%)	66 (62.3)	19 (59.4)	47 (63.5)
Severity of COVID-19, n (%)			
Mild	60 (56.6)	17 (53.1)	43 (58.1)
Moderate	28 (26.4)	8 (25.0)	20 (27.0)
Severe	15 (14.2)	6 (18.8)	9 (12.2)
Missing	3 (2.8)	1 (3.1)	2 (2.7)
Prevalence of comorbidities before getting COVID-19, n (%)			
Heart disease	14 (13.2)	4 (12.5)	10 (13.5)
Lung disease	7 (6.6)	2 (6.2)	5 (6.8)
Hypertension	28 (26.4)	8 (25.0)	20 (27.0)
Diabetes mellitus	26 (24.5)	8 (25.0)	18 (24.3)
Kidney disease	2 (1.9)	1 (3.1)	1 (1.4)
Neurological disorder	7 (6.6)	3 (9.4)	4 (5.4)

COVID-19, coronavirus disease 2019; Sr$, Surinamese dollar.
[a] Sr$ 1 = 0.058 United States dollars.
Source: prepared by authors based on the results.

the pulse wave velocity was only measured in 21 patients. The mean (SD) systolic blood pressure was 134 (16) mmHg, mean (SD) diastolic blood pressure was 77 (11) mmHg, and mean (SD) pulse wave velocity was 8.2 (1.8) m/s. As regards lung function parameters, mean (SD) FVC, FEV1, and FEV1/FVC ratio were 2.77 (0.74) L, 2.28 (0.61) L, and 85 (10)%, respectively. Mean (SD) handgrip strength in the dominant hand was 28 (11) N and was measured in 29 patients. In the 6-minute walking test the mean (SD) distance walked was 440 (64) m. The pre- and post-test measurements of saturation, heart rate and blood pressure are shown in Table 3.

DISCUSSION

Our results show that 38.7% of the participants still had at least one symptom 3–4 months after having had COVID-19.

TABLE 2. Prevalence of symptoms in patients while suffering from COVID-19 and after recovery, by sex and ethnicity, Suriname

Symptom	n (%)															
	Total cohort (*n* = 106)		Men (*n* = 40)		Women (*n* = 66)		Creole (*n* = 19)		Hindustani (*n* = 24)		Javanese (*n* = 21)		Mixed ethnicity (*n* = 21)		Other ethnicity (*n* = 21)	
	During	After	During	After	During	After	During	After	During	After	During	After	During	After	During	After
At least one symptom	97 (91.5)	42 (39.6)	34 (85.0)	11 (27.5)	63 (95.4)	31 (47.0)	17 (89.5)	7 (36.8)	20 (83.3)	11 (45.8)	21 (100)	6 (28.6)	19 (90.5)	9 (42.9)	20 (95.2)	9 (42.9)
Fatigue	49 (46.2)	25 (23.6)	16 (40.0)	8 (20)	33 (50)	17 (25.8)	8 (42.1)	3 (15.8)	10 (41.7)	8 (33.3)	10 (47.6)	3 (14.3)	12 (57.1)	5 (23.8)	9 (42.2)	6 (28.6)
Alopecia	7 (6.6)	16 (15.1)	3 (7.5)	0 (0.0)	4 (6.1)	16 (24.2)	0 (0.0)	1 (5.3)	2 (8.3)	4 (16.7)	0 (0.0)	4 (19.0)	2 (9.5)	2 (9.5)	3 (14.3)	5 (23.8)
Dyspnea	37 (34.9)	12 (11.3)	11 (27.5)	3 (7.5)	26 (39.4)	9 (13.6)	5 (26.3)	1 (5.3)	10 (41.7)	5 (20.8)	9 (42.9)	1 (4.8)	13 (61.9)	2 (9.5)	16 (23.8)	3 (14.3)
Trouble sleeping	32 (30.2)	12 (11.3)	8 (20)	2 (5)	24 (36.4)	10 (15.2)	3 (15.8)	0 (0.0)	8 (33.3)	4 (16.7)	8 (38.1)	3 (14.3)	5 (23.8)	2 (9.5)	9 (42.9)	3 (14.3)
Headaches	52 (49.1)	11 (10.4)	14 (35)	3 (7.5)	38 (57.6)	8 (12.1)	9 (47.4)	1 (5.3)	13 (54.2)	2 (8.3)	10 (47.6)	0 (0.0)	8 (38.1)	1 (4.8)	12 (57.1)	7 (33.3)
Painful joints	32 (30.2)	9 (8.5)	7 (17.5)	2 (5)	25 (37.9)	7 (10.6)	8 (42.1)	1 (5.3)	9 (37.5)	3 (12.5)	4 (19)	1 (4.8)	4 (19)	1 (4.8)	7 (33.3)	3 (14.3)
Concentration problems	17 (16)	9 (8.5)	4 (10)	2 (5)	13 (19.7)	7 (10.6)	2 (10.5)	2 (10.5)	2 (8.3)	3 (12.5)	2 (9.5)	0 (0.0)	4 (19)	1 (4.8)	7 (33.3)	3 (14.3)
Muscle pain	35 (33)	7 (6.6)	7 (17.5)	1 (2.5)	28 (42.4)	6 (9.1)	8 (42.1)	1 (5.3)	11 (45.8)	2 (8.3)	7 (33.3)	0 (0.0)	4 (19)	0 (0.0)	5 (23.8)	4 (19.0)
Depression	15 (14.2)	5 (4.7)	4 (10)	1 (2.5)	11 (16.7)	4 (6.1)	4 (21.1)	0 (0.0)	6 (25)	2 (8.3)	1 (4.8)	1 (4.8)	2 (9.5)	0 (0.0)	2 (9.5)	2 (9.5)
Palpitations	24 (22.6)	5 (4.7)	4 (10)	1 (2.5)	20 (30.3)	4 (6.1)	5 (26.3)	1 (5.3)	5 (20.8)	0 (0.0)	3 (14.3)	1 (4.8)	5 (23.8)	1 (4.8)	7 (33.3)	2 (9.5)
Hyposmia	41 (38.7)	5 (4.7)	15 (37.5)	1 (2.5)	26 (39.4)	4 (6.1)	9 (47.4)	1 (5.3)	11 (45.8)	2 (8.3)	8 (38.1)	2 (9.5)	6 (28.6)	0 (0.0)	7 (33.3)	0 (0.0)
Coughing	60 (56.6)	4 (3.8)	23 (57.5)	0 (0.0)	37 (56.1)	4 (6.1)	10 (52.6)	3 (15.8)	12 (50)	0 (0.0)	13 (61.9)	1 (4.8)	12 (57.1)	0 (0.0)	13 (61.9)	0 (0.0)
Chest pain	18 (17.9)	3 (2.8)	4 (10)	1 (2.5)	14 (21.2)	2 (3)	7 (36.8)	0 (0.0)	4 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	4 (19)	1 (4.8)	3 (14.3)	2 (9.5)
Hypogeusia	36 (34)	2 (1.9)	14 (35)	0 (0.0)	22 (33.3)	2 (3)	6 (31.6)	0 (0.0)	10 (41.7)	1 (4.2)	5 (23.8)	1 (4.8)	13 (61.9)	0 (0.0)	7 (33.3)	0 (0.0)
Fever	60 (56.6)	1 (0.9)	22 (55)	0 (0.0)	38 (57.6)	1 (1.5)	8 (42.1)	0 (0.0)	15 (62.5)	0 (0.0)	13 (61.9)	1 (4.8)	11 (52.4)	0 (0.0)	13 (61.9)	0 (0.0)
GI disorders	24 (22.6)	0 (0.0)	8 (20)	0 (0.0)	16 (24.2)	0 (0.0)	5 (26.3)	0 (0.0)	7 (29.2)	0 (0.0)	3 (14.3)	0 (0.0)	4 (19)	0 (0.0)	6 (28.6)	0 (0.0)

COVID-19, coronavirus disease 2019; GI, gastrointestinal.
Source: prepared by authors based on the results.

TABLE 3. Physical assessments of participants visiting the Medisch Wetenschappelijk Instituut, Suriname

Measures	Value
Anthropometric parameters (*n* = 32)	
Height in m, mean (SD)	1.62 (0.1)
Weight in kg, mean (SD)	79.1 (19.9)
Body mass index in kg/m^2, mean (SD)	28.4 (5.4)
Waist circumference in cm, mean (SD)	97.3 (15.1)
Overweight[a], %	29.0
Obese[b], %	45.0
Moderate central fat accumulation[c], %	16.1
High central fat accumulation[d], %	67.7
Cardiovascular parameters, mean (SD)	
Systolic blood pressure in mmHg (*n* = 27)	134 (16)
Diastolic blood pressure in mmHg (*n* = 29)	77 (11)
Resting heart rate in beats/minute (*n* = 21)	72 (11)
Pulse wave velocity in m/s (*n* = 21)	8.2 (1.8)
Lung function parameters (*n* = 29), mean (SD)	
FVC in L	2.77 (0.74)
FEV1 in L	2.28 (0.61)
FEV1/FVC ratio	85 (10)
Handgrip strength in N (*n* = 29), mean (SD)	
Dominant hand	28 (11)
Non-dominant hand	25 (10)
Functionality test (*n* = 30), mean (SD)	
6 minute walking distance in m	440 (64)
Saturation pre-test, %	98 (0.9)
Saturation post-test, %	98 (1.0)
Heart rate pre-test in beats/minute	78 (16)
Heart rate post-test in beats/minute	107 (24)
Systolic pressure post-test in mmHg	139 (32)
Diastolic pressure post-test in mmHg	80 (11)

SD, standard deviation; FVC, functional vital capacity; FEV1, forced expiratory volume in 1 second.
n is the number of valid measurements.
[a] Body mass index 25–29.9 kg/m^2.
[b] Body mass index ≥ 30 kg/m^2.
[c] Moderate central fat accumulation: men 94.0–101.9 cm and women 80.0-87.9.
[d] High central fat accumulation: men ≥ 102.0 cm and women: ≥ 88.0 cm.
Source: prepared by authors based on the results.

Fatigue and alopecia were the most commonly reported symptoms, followed by dyspnea and sleep disturbance. More women reported at least one symptom and the prevalence of symptoms differed between ethnic groups.

Compared with other studies, we found a lower prevalence of the persistence of at least one symptom after having had COVID-19. For instance, a systematic review and meta-analysis reported a prevalence of at least one symptom of between 65% and 92% (20), whereas a longitudinal study of non-hospitalized patients reported that 53.1% of the participants still had at least one symptom a mean of 125 days after the onset of symptoms (21). Studies on long COVID vary considerably which makes comparisons difficult (22). This variety might be caused by bias due to differences in the follow-up period, the severity of COVID-19, and patient characteristics, such as age, sex, ethnicity, and presence of comorbidities (20, 21, 23).

In line with most studies, we found women were more likely to report persistent symptoms (20, 22, 23). Few studies have investigated the relationship between ethnicity and persistent symptoms (23, 24, 25). We found differences in the prevalence of symptoms between ethnicities; of particular interest is that alopecia was more prevalent than fatigue in the Javanese population whereas fatigue was the most common symptom in the other ethnic groups. These findings underscore the importance of investigating the relationship between persistent symptoms and ethnicity.

Our finding that fatigue was the most common persistent symptom is in line with most studies (20, 21, 23). We intended to evaluate this symptom further by performing a lung function, hand grip, and 6-minute walk test for all participants. However, we could not invite everybody to the research institute because of government lockdown measures that were in place during the recruitment period. Therefore, we were only able to conduct additional measurements for 32 participants.

Some limitations need to be considered. Almost half of the individuals we contacted were either lost to follow-up or declined to participate, which restricted the size and representativeness of the cohort. No analysis was done on the possible link between the different virus variants and the persistence of symptoms, and this association is still unclear (26). Finally, information on symptoms was self-reported, which is sensitive to recall bias. Irrespective of these limitations, this is the first study in Suriname on long COVID. We found persistent symptoms after having COVID-19, which supports the body of evidence on long COVID and underlines the importance of continuing awareness of late COVID-19 complications. COVID-19 is an ongoing problem with infections still occurring worldwide. It is becoming increasingly clear that patients can suffer from long-term effects of the infection. It is also unknown how much these persistent symptoms influence the mental health and socioeconomic situation of people who are affected. Therefore, we recommend that further studies be done to clarify the characteristics of patients who are at risk of developing persistent symptoms. For example, in our study, women were more likely to experience persistent symptoms as were some ethnic groups. Hence attention should be paid to these groups to explain the reasons for these findings.

Conclusion

Almost 40% of our cohort had at least one symptom at least 3 months after having had COVID-19, with fatigue being the most common symptom. Women were more likely to experience persistent COVID-19 symptoms. These findings are in line with international findings and add to knowledge about post-COVID-19 symptoms in low- and middle-income countries. The symptoms between ethnic groups varied and should be researched further.

Authors' contributions. All authors contributed equally to the design of the study. SB coordinated and supervised the assessments. IK and SB did the statistical analysis and all authors contributed to drafting the manuscript. IK prepared the manuscript for submission and all authors approved the final version for submission.

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Prevalencia de síntomas persistentes tras la COVID-19 en una cohorte en Suriname

RESUMEN

Objetivos. Determinar la prevalencia de síntomas persistentes tras la enfermedad por coronavirus 2019 (COVID-19) en una cohorte en Suriname, y evaluar los factores asociados a la COVID-19 de larga duración.
Métodos. Se seleccionó una muestra de personas mayores de 18 años que habían sido registradas tres a cuatro meses antes en una base de datos nacional debido a un resultado positivo en una prueba de COVID-19. Se les realizaron preguntas sobre sus características socioeconómicas, estado de salud y modo de vida previos a la COVID-19 y sobre sus síntomas durante y después de esta enfermedad. A un subconjunto de participantes se les realizó un examen físico para determinar su índice de masa corporal, perímetro abdominal, parámetros cardiovasculares, función pulmonar y estado funcional.
Resultados. Se entrevistó a 106 participantes (media de edad: 49 años [desviación estándar: 15 años]; 62,3% mujeres); de los cuales a 32 se les realizó una exploración física. La mayor parte de los participantes tenían ascendencia indostana (22,6%). En términos generales, el 37,7% de los participantes eran sedentarios, el 26,4% tenían hipertensión o diabetes mellitus y al 13,2% les habían diagnosticado previamente una cardiopatía. La mayor parte (56,6%) habían presentado síntomas leves de COVID-19 y el 14,2% síntomas graves. Una proporción elevada (39,6%) había manifestado al menos un síntoma persistente tras recuperarse de un cuadro crítico de COVID-19; esto se daba con mayor frecuencia en las mujeres (47,0% de las mujeres frente a 27,5% de los hombres). Los síntomas más frecuentes fueron fatiga y alopecia, seguidos por disnea y alteraciones del sueño. Se observaron diferencias entre los grupos étnicos. De acuerdo con los resultados del examen físico, el 45,0% del subgrupo era obeso y el 67,7% tenía un perímetro abdominal muy elevado.
Conclusiones. Aproximadamente el 40% de la cohorte presentaba al menos un síntoma persistente tres o cuatro meses tras haber tenido COVID-19, con diferencias en función del sexo y el grupo étnico.

Palabras clave Síndrome post agudo de COVID-19; prevalencia; Surinam.

Prevalência de sintomas persistentes após COVID-19 em uma coorte no Suriname

RESUMO

Objetivos. Determinar a prevalência de sintomas persistentes pós-doença do coronavírus de 2019 (COVID-19) em uma coorte no Suriname e avaliar os fatores associados à COVID longa.
Métodos. Foi selecionada uma amostra de adultos (a partir dos 18 anos) que haviam sido cadastrados 3 a 4 meses antes do estudo em um banco de dados nacional devido a um teste positivo para COVID-19. Os indivíduos selecionados foram entrevistados acerca de seu perfil socioeconômico, estado de saúde, estilo de vida pré-COVID-19 e sintomas durante e após a COVID-19. Um subconjunto de participantes foi submetido a exame físico para determinar índice de massa corporal, circunferência abdominal, parâmetros cardiovasculares, função pulmonar e funcionalidade.
Resultados. Foram entrevistados 106 participantes (média de idade, 49 anos; desvio padrão, 15 anos; 62,3% do sexo feminino), dos quais 32 foram submetidos ao exame físico. A maior proporção de participantes era de ascendência hindu (22,6%). No total, 37,7% dos participantes eram fisicamente inativos, 26,4% tinham hipertensão ou diabetes e 13,2% tinham diagnóstico prévio de cardiopatia. A maioria dos participantes (56,6%) teve COVID-19 leve, e 14,2%, COVID-19 grave. Uma grande proporção (39,6%) apresentou pelo menos um sintoma persistente após a recuperação da COVID-19 aguda. Mais mulheres foram afetadas (47,0% das mulheres versus 27,5% dos homens). Fadiga e alopecia foram os sintomas mais comuns, seguidos de dispneia e distúrbios do sono. Foram observadas diferenças entre grupos étnicos. Dos participantes submetidos ao exame físico, 45,0% eram obesos e 67,7% tinham circunferência abdominal muito larga.
Conclusões. Cerca de 40% da coorte apresentou pelo menos um sintoma persistente 3 a 4 meses após a COVID-19. Foram observadas diferenças por sexo e grupo étnico.

Palavras-chave Síndrome pós-COVID-19 aguda; prevalência; Suriname