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ORIGINAL ARTICLE

Post-Acute COVID-19 Syndrome: a 12-month telemonitoring cohort to assess the persistent symptoms and the quality of life

Síndrome Pós-COVID-19: uma coorte de telemonitoramento de 12 meses para avaliação dos sintomas persistentes e da qualidade de vida

Raiany Franca Guimarães[1], Marcela Cangussu Barbalho-Moulim[1], Veronica Lourenço Wittmer[1], Lais Mello Serafim[1], Elizangela Kuster[1], Flavia Azevedo de Brito[2], Vanessa Rodrigues Gomes[2], Karla Nascimento Netto Zangerolame[2], Jonaina Fiorim Pereira de Oliveira[2], Juliana Zangirolami-Raimundo[3], Rodrigo Daminello Raimundo[3], Luiz Carlos Abreu[1], Flavia Marini Paro[1]

[1] Universidade Federal do Espírito Santo. Vitória/ES, Brazil.

[2] Hospital Universitário Cassiano Antônio Moraes. Vitória/ES, Brazil.

[3] Centro Universitário FMABC. Santo André/SP, Brazil.

Correspondence:
mcbarbalhomoulim@gmail.com

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ABSTRACT

Introduction: After the end of the COVID-19 pandemic, another colossal challenge continues to be faced by the health system worldwide: the post-acute COVID-19 syndrome. **Objectives:** This study aimed to evaluate respiratory symptoms and QoL (quality of life) in a cohort of previously hospitalized COVID-19 patients after twelve months of discharge. Additionally, the study aimed to identify clinical factors related to these symptoms. **Methods:** This longitudinal study, with a 12-month cohort, was conducted with adults discharged home after hospitalization for COVID-19. Twelve months post-discharge, the participants were assessed through video or phone calls and answered a questionnaire regarding persistent symptoms and QoL. The modified Medical Research Council scale (mMRC) was used to grade the impact of dyspnea on daily activities, and the WHOQoL-BREF questionnaire was used to assess the QoL. **Results:** The cohort included 15 patients, with a mean age of 63.53±7.32 years. Twelve months after discharge, 10 (66.66%) individuals suffered from at least one symptom, among which 40% reported cough, 20% reported fatigue, 20% had dyspnea at rest, and 40% had dyspnea during activities. The physical domain of QoL had the lowest score (9.14±3,54) among the WHOQoL domains. Age, sex, diabetes, and mMRC≥1 correlated with QoL. **Conclusion:** The high prevalence of respiratory symptoms and impaired QoL even 12 months after hospital discharge highlight the need to adopt protocols for in-hospital rehabilitation and prepare patients for practice physical activity or exercise-based rehabilitation programs after discharge.

Keywords: Post-Acute COVID-19 Syndrome. COVID-19. SARS-CoV-2. Quality of life. Telemonitoring.

RESUMO

Introdução: Após o fim da pandemia de COVID-19, outro desafio de grande magnitude continua sendo enfrentado pelos sistemas de saúde em todo o mundo: a síndrome pós-COVID-19. **Objetivos:** Este estudo teve como objetivo avaliar os sintomas respiratórios e a qualidade de vida (QV) em uma coorte de pacientes previamente hospitalizados por COVID-19 após doze meses da alta hospitalar. Adicionalmente, buscou identificar fatores clínicos relacionados a esses sintomas. **Métodos:** Trata-se de um estudo longitudinal, com acompanhamento de 12 meses, realizado com adultos que receberam alta para o domicílio após internação por COVID-19. Doze meses após a alta, os participantes foram avaliados por videochamada ou ligação telefônica e responderam a um questionário sobre sintomas persistentes e qualidade de vida. A escala modificada do Medical Research Council (mMRC) foi utilizada para graduar o impacto da dispneia nas atividades diárias, e o questionário WHOQOL-BREF foi utilizado para avaliar a qualidade de vida. **Resultados:** A coorte foi composta por 15 pacientes, com idade média de 63,53±7,32 anos. Após 12 meses da alta hospitalar, 10 (66,66%) indivíduos apresentavam pelo menos um sintoma persistente, sendo que 40% relataram tosse, 20% fadiga, 20% dispneia em repouso e 40% dispneia durante atividades. O domínio físico da qualidade de vida apresentou o menor escore (9,14±3,54) entre os domínios do WHOQOL-BREF. Idade, sexo, diabetes mellitus e escore mMRC ≥1 apresentaram correlação com a qualidade de vida. **Conclusão:** A elevada prevalência de sintomas respiratórios e o comprometimento da qualidade de vida, mesmo 12 meses após a alta hospitalar, evidenciam a necessidade de adoção de protocolos de reabilitação ainda durante a internação, bem como da preparação dos pacientes para a prática de atividade física ou participação em programas de reabilitação baseados em exercícios após a alta.

Palavras-chave: Síndrome Pós-COVID-19. COVID-19. SARS-CoV-2. Qualidade de vida. Telemonitoramento.

INTRODUCTION

More the one year after the end of COVID-19 pandemic, another challenge continue to be faced by the health system worldwide: the long COVID-19[1-3].

Several patients who have recovered from acute COVID-19 report persistent symptoms and disabilities, resulting in impairment of daily activities and quality of life, lasting weeks or months[4,5]. Long COVID-19[3,5] or post-acute COVID-19 syndrome[4] are terms commonly used to describe symptoms that continue or develop after acute COVID-19 diagnosis after four weeks.

Although these long-term symptoms may persist for months after acute COVID-19, even in individuals who have not developed a severe form of the disease[6], it has been evidenced that its prevalence increases with the severity of the disease, but although several hypotheses have been proposed to explain the persistence of symptoms, the mechanisms involved are not yet completely understood[4].

Moreover, impairments in quality of life have been described in post-acute COVID-19 syndrome after weeks or months of follow-up, and a recent study reported that hospitalization during the acute phase of COVID-19 is a risk factor for impaired quality of life even 12 months after the acute infection[7].

Strategies to improve the effectiveness of preventing and treating post-acute COVID-19 syndrome depend on longitudinal research to increase the knowledge about this health condition, analysing different contexts, periods, and populations. So, there is a need for studies about the predisposing factors, the symptom patterns associated with long-term sequelae, and their long-term consequences, alongside patient factors, particularly disability and quality of life[1].

Therefore, the main objectives of this study were to assess, twelve months after hospital discharge, the respiratory symptoms and quality of life in a cohort of individuals previously hospitalized by COVID-19. The secondary objectives were to identify clinical factors associated with quality of life in this cohort.

METHODS

Study design

This longitudinal study included a cohort of adult individuals previously hospitalized due to COVID-19 who were monitored from the day of hospital discharge until 12 months later.

The research ethics committee of the Federal University of Espírito Santo approved this study (Number 4.032.838 / CAAE: 31522720.2.0000.5060), and all methods were performed in accordance with the Declaration of Helsinki. Informed consent was obtained from all subjects and/or their legal guardian(s).

Setting and samples

The study included patients aged 18 years or older, of both sexes, diagnosed with COVID-19, admitted to a University Hospital from July to December 2020, who agreed to participate in the Informed Consent, who was possible to contact after discharge, had no cognitive conditions that precluded answer the questionnaire, had no previous chronic pulmonary disease, and attended the evaluation by phone calls. Exclusion criteria were death after discharge, needing rehospitalization, being unable to be contacted, not answering phone calls, refusing to answer questions, and not participating in teleconsultation.

Data collection

Demographic, clinical, and functional data regarding the in-hospital period (ability to sit on the bed, stand up, and walk during hospitalization and on the day of hospital discharge) were collected from the charts.

After hospital discharge, patients were contacted by phone and invited to participate in the research follow-up (through video call or phone call) in the third, sixth, and twelfth months after the hospital discharge. If they agreed to participate, the researchers asked questions about persistent symp-

toms, and applied specific tools to assess dyspnea and quality of life.

The modified Medical Research Council (mMRC) scale was used to grade the impact of dyspnea on daily activities[8], ranging from "0" (I only get breathless with strenuous exercise) to "4" (I am too breathless to leave the house or I am breathless when dressing)[8].

The World Health Organization Quality of Life Instrument, Short-Form (WHOQOL-BREF) was used to assess quality of life. It is an abbreviated version of the WHOQOL-100, developed by the World Health Organization Quality of Life Group, composed of 26 questions divided into four domains: physical, psychological, social relationships, and environment[9]. This questionnaire has been used in research about COVID-19 and other respiratory diseases[10-11].

Statistical analysis

Statistical analysis was performed with the IBM SPSS Statistics software package, version 22.0 (IBM Corporation, Armonk, NY, USA). Categorical variables were reported as absolute and relative frequencies, and continuous numerical variables as means and standard deviations. Correlations were evaluated using Spearman's correlation coefficient, adopting the significance level of 5%. The strength of the correlation was determined by the value of the correlation coefficient (r), according to the following criteria: weak correlation if $0 < r < 0.3$; moderate correlation if $0.3 < r < 0.6$; strong correlation if $0.6 < r < 0.9$; very strong correlation if $0.9 < r < 1$.

RESULTS

The sample was encompassed by 15 patients, with a mean age of 63.53 ± 7.32 years. Most of the individuals were male (60%), brown (73.3%), and aged between 60-69 years (53.3%). Clinical and demographic characteristics of hospitalized COVID-19 patients are shown in Table 1. Regarding the hospital admission sector, 8 (53.3%) individuals were initially admitted to the ward, 5 (33.3%) to the ICU, and 2 (13.3%) to the emergency room.

TABLE 1. Clinical and demographic characteristics of hospitalized COVID-19 patients

VARIABLES	
Age (years), mean ± SD	63 ± 16
Age group, n (%)	
50 - 59 years old	4 (26.7)
60 - 69 years old	8 (53.3)
70 - 79 years old	3 (20.0)
Sex, n (%)	
Male	9 (60.0)
Race/skin color, n (%)	
Brown	11(73.3)
White	3 (20.0)
Black	1 (6.7)
Marital status, n (%)	
With partner	6 (40.0)
Single, widowed or divorced	4 (26.7)
Unknown	5 (33.3)
Comorbidity	
Hypertension	11 (73.3)
Diabetes	5 (33.3)
Obesity	3 (20)
Smoking	3 (20.0)
Alcoholism	1 (6.7)
Neurologic/neuromuscular conditions	2 (13.3)
Cardiovascular conditions	9 (60.0)
Chronic kidney disease	1 (6.7)
Oxygen on during hospitalization, n (%)	11 (73.3)
Oxygen on discharge day, n (%)	1 (6.6)
Oxygen 12 months after discharge, n (%)	0 (0)
Need of NVI during hospitalization, n (%)	0 (0)
Need of MV during hospitalization, n (%)	0 (0)
Need of ICU stay during hospitalization, n (%)	9 (60.0)
Length of ICU stay, days (mean ± SD)	7.8 ± 18.17
Length of hospital stay, days (mean ± SD)	20.60 ± 29.83
SpO2 on admission day, mean ± DP	95.21 ± 3.21
SpO2 on discharge day, mean ± DP	96.62% ± 1.50
Physiotherapy care, mean ± DP	31.8 ± 65.80

SpO_2, Peripheral Oxygen Saturation; NIC, Noninvasive Mechanical Ventilation; MV, Invasive Mechanical Ventilation; ICU, Intensive Care Unit; SD, Standard Deviation. Source: Authors.

Only two (13.3%) patients did not have any comorbidity. Hypertension (11; 73.3%), Diabetes (5; 33,3%), obesity (3; 20%) and smoking (3; 20%) were the most prevalent comorbidities (Table 1).

The mean length of hospital stay was 20.6 ± 29.83 days. During the hospitalization, 11 (73.3%) patients needed oxygen supplementation; however, only one (6.6%) continued to require it on the day of discharge. None required non-invasive or invasive ventilation during the in-hospital period. More than half of the patients, 9 (60.0%), required ICU admission, where they remained for a mean of 7.8 ± 18.17 days. On the day of the hospital discharge, the patients had an average SpO2 of 96.62% ± 1.50 (Table 1).

Regarding functional capacity on the hospital discharge day, 13 (86.7%) patients were able to sit on the bed and stand up without help, and 11 (73.3%) were able to walk without aid (Table 2). Correlations between the quality of life and functional capacity at discharge were not analysed due to the small number of patients who presented functional limitations on the discharge day.

TABLE 2. Functional capacity of COVID-19 patients at hospital admission and discharge

	Admission	Discharge
Sit, n (%)		
Yes, without help	12 (80.0)	13 (86.7)
Yes, with help	2 (13.3)	2 (13.3)
No	1 (6.7)	0 (0)
Stand, n (%)		
Yes, without help	11 (73.3)	13 (86.7)
Yes, with help	2 (13.3)	2 (13.3)
No	2 (13.3)	0 (0)
Walk, n (%)		
Yes, without help	9 (60,0)	11 (73.3%)
Yes, with help	3 (20.0)	2 (13.3)
No	3 (20.0)	2 (13.3)

Source: Authors.

In the assessment of 12 months after discharge, 10 (66.66%) individuals suffered from at least one symptom. Among them, 6 (40%) individuals reported cough as a persistent symptom, while fatigue was reported by 3 (20%). Only 3 (20%) patients had dyspnea at rest, but when the mMRC scale was used to grade the impact of dyspnea on daily activities, 6 (40%) individuals reported mMRC ≥ 1, which means that they had dyspnea during activities. Table 3 presents details about these symptoms.

TABLE 3. Clinical characteristics of individuals previously hospitalized due to COVID-19 and evaluated 12 months after discharge

VARIABLES	
Respiratory symptoms after 12 months	
Fatigue at rest	3 (20.0)
Cough	6 (40.0)
Dyspnea at rest	3 (20.0)
Dyspnea on daily activities (mMRC scale)	6 (40.0)
Dyspnea (mMRC scale)	
Grade 0	9 (60.0)
Grade 1	2 (13.3)
Grade 2	2 (13.3)
Grade 3	2 (13.3)
Grade 4	0 (0)
QoL domains (WHOQoL-BREF questionnaire), mean ± SD	
Physical	9.14 ± 3.14
Psychological	15.55 ± 2.04
Social	15.37 ± 2.13
Environmental	14.63 ± 2.14
QoL self-assessment	14.93 ± 3.10
Total	14.53 ± 2.18
Modality of teleconsultation, n (%)	
Video call	8 (53.3)
Phone call	5 (33.3)

Legend: QoL, quality of life; MRC, Modified Medical Research Council Dyspnea Scale. Source: Authors.

The physical domain of quality of life had the lowest score (9.14 ± 3,54) among the WHOQoL domains. Table 3 presents details about the quality-of-life assessment.

The total score of quality of life (r = -0,61; p = 0,01), physical (r=-0,63; p=0,01), and psychological (r = -0,67; p < 0,01) domains presented strong negative correlations with age. Quality of life did not

TABLE 4. Correlation between numerical variables and quality of life domains

Variable	Age		LHS, days		ICU, days		Physiotherapy	
	r	p-valor	r	p-valor	r	p-valor	r	p-valor
Physical	-0.63	0.01*	0.05	0.86	0.08	0.75	0.05	0.83
Psychological	-0.67	<0.01*	0.16	0.56	0.26	0.34	0.21	0.44
Social	-0.26	0.35	-0.04	0.87	0.04	0.88	0.02	0.93
Environmental	-0.45	0.09	0.03	0.91	0.03	0.90	-0.03	0.91
QoL self-assessment	-0.14	0.63	0.20	0.48	0.17	0.54	0.11	0.69
QoL total score	-0.61	0.01*	0.06	0.82	0.13	0.64	0.08	0.78
Age	-	-	-0.21	0.45	-0.24	0.38	-0.23	0.40
LHS, days	-0.21	0.45	-	-	0.97	<0.01	0.97	<0.01
ICU, days	-0.24	0.38	0.97	<0.01*	-	-	0.98	<0.01*
Physiotherapy	-0.23	0.40	0.97	<0.01*	0.98	<0.01*	-	-

Legend: QoL, quality of life; LHS, length of hospital stay; ICU, length of stay in intensive care unit. *: p < 0,05. Spearman's correlation coefficient. Source: Authors.

present correlations with any other numerical variables (Table 4).

A very strong positive correlation was found between the length of hospital stay and the length of ICU stay. In addition, both these variables presented a strong positive correlation with the number of physiotherapy attendance during hospitalization (Table 4).

The results of correlations among the domains of quality of life and the categorical variables are presented in Table 5. We identified a moderate positive correlation between sex and the self-assessment domain of quality of life, which means that women had worse scores in this domain than men. Although the number of risk factors did not present a correlation with quality of life, diabetes demonstrates a direct correlation with the psychological domain, that is, individuals with diabetes mellitus have a worse score in this domain. In addition, mMRC ≥ 1 had a strong correlation with the physical domain of quality of life.

TABLE 5. Correlation between categorical variables and quality of life domains

Variable	Sex		DM		Risk Factors		mMRC	
	r	p-valor	r	p-valor	r	p-valor	r	p-valor
Physical	-0.02	0.95	0.37	0.18	-0.20	0.50	-0.59	0.02*
Psychological	0.14	0,62	0.60	0.02*	-0.40	0.15	-0.90	0.74
Social	0.02	0.95	-0.03	0.91	-0.30	0.28	0.07	0.80
Environmental	0,32	0.25	0.35	0.20	-0.33	0.23	-0.28	0.31
QoL self-assessment	0.53	0.04*	0.13	0.65	0.60	0.83	-0.44	0.10
QoL total score	0.18	0.53	0.42	0.12	-0.30	0.28	-0.41	0.12
Sex	-	-	0.29	0.30	0.11	0.70	-0.17	0.55
DM	0.29	0.30	-	-	-0.50	0.06	0.00	1.00
Risk Factors	0.11	0.70	-0.50	0.06	-	-	-0.11	0.70
mMRC	-0.17	0.55	0.00	1.00	-0.11	0.70	-	-

Legend: QoL, quality of life; DM, diabetes mellitus; mMRC, Modified Medical Research Council Dyspnea Scale; *: p < 0,05. Spearman's correlation coefficient. Source: Authors.

DISCUSSION

The results showed that, even 12 months after the hospital discharge, this sample of individuals previously hospitalized due to COVID-19 presented persistent symptoms and impaired quality of life. Moreover, age had a strong negative correlation with the total score of quality of life and with their physical and psychological domains.

In a recent systematic review of long COVID symptoms, the longest follow-up time among the 36 included studies was eight months, and the most common follow-up time was four months[10]. Another review included only four studies with 12-month follow-ups, but they used heterogeneous tools to assess, classify, and group the symptoms[10]. These reviews highlight the need for studies with 12 months or more of follow-up.

Fatigue was the most prevalent symptom in 12-month follow-up studies[12, 18-21], ranging from 61.2% to 20%[12, 18-23]. The prevalence of fatigue found in our results is among the lowest described in the literature for twelve months of follow-up. However, caution in comparisons is needed because the results are influenced by heterogeneity in the way of assessment among the studies. In the current study, we asked specifically about fatigue at rest, and the prevalence would probably have been higher if we had asked about fatigue during activities.

Dyspnea was one of the most prevalent symptoms 12 months after COVID-19. Its prevalence ranged between 43.48% and 12.8%[12, 18-19, 21, 23-24]. Lombardo et al. mentioned 36% of respiratory disorders after 12 months but did not mention dyspnea specifically[20]. In the current study, 20% of the individuals had dyspnea at rest, and 40% had dyspnea during daily activities assessed by the mMRC scale (mMRC ≥ 1). Most studies did not present the severity of dyspnea in their results, only its general prevalence, but did not specify if it was present at rest or in which grade of activity. Huang et al. used the mMRC scale to stratify the severity of dyspnea like us, and they reported that 30% of the individuals had a mMRC score of 1 or more at a 12-month visit[19]. To grade the dyspnea during daily activities may contribute to better planning the rehabilitation program and its aims.

Although the cough has high levels of prevalence in the acute phase and in the first weeks[22] and months[25] of post-acute COVID-19, its prevalence naturally decreases during the first year after SARS-CoV-2 infection[10]. Cough prevalence was barely mentioned in the studies with 12 months of follow-up. In a multicentric study, the prevalence of cough was 2.5% in the follow-up of 12 months, but they could not identify risk factors associated with long-term cough[18]. In comparison, the prevalence of cough in the current study was higher (40%), and we could not infer the reasons.

This study showed impaired quality of life after 12 months of follow-up, using the WHOQoL-bref. Different tools to assess the quality of life have been used in the assessment of post-COVID; however, independent of the tools used, the studies have reported impaired quality of life in 12 months of follow-up[13, 26-31].

A prospective cohort study showed that 12 months after COVID-19, people with COVID-19 had quality of life within population norms, whereas persons with moderate or severe COVID-19 still had impaired quality of life[29]. Another recent study reported that in previously hospitalized COVID-19 survivors, the quality of life (assessed by SF-36) remained lower than population norms after 12 months, including in the physical domain[32]. In addition, hospital admission during acute infection was also identified as a factor associated with lower scores in the physical domain of quality of life[7]. Maybe these factors are related to the poor quality of life, especially in the physical domain score found in this study, since having been hospitalized during the acute infection was an inclusion criterion.

The physical domain of quality of life presented the worst score, 9.14 ± 3.14, which means 45.7% of the total score, and higher age was the only factor associated negatively with quality-of-life total score and with the physical and psychological domain of quality of life. This means that the greater the age, the worse the quality of life overall and in these domains. In another study, advanced age was also associated with reduced physical domain scores (below 50%) at 12 months of assessment[13].

In addition to age, female sex, pre-existing chronic respiratory diseases, diabetes, respira-

tory symptoms, and renal complications during the acute infection have been suggested as other risk factors associated with reduced score (<50) of quality of life at the 12-month assessment[13]. In the current study, we did not include patients with pre-existing chronic respiratory diseases to avoid the bias of respiratory symptoms reported by individuals being attributable to the pre-existing chronic respiratory disease since our assessment was by phone call without additional evaluation to exclude this possibility. Regarding female sex, respiratory symptoms, and diabetes, we also found correlations between these variables and the quality of life. The female sex had worse scores in the quality-of-life self-assessment, individuals with diabetes mellitus had worse scores in the psychological domain, and individuals with dyspnea ≥ 1 in the MRC scale had worse scores in the physical domain. Significantly bad perception of health status among persons with post-COVID-19 syndrome was associated with female gender in another recent cross-sectional study[31]. Female sex and duration of mechanical ventilation were recently described as factors independently related to lower quality of life assessed by the EQ-5D index one year after admission to the ICU for severe Sars-COV$_2$ infection[33].

A new classification for post-COVID-19 syndrome, based on the phenotypes, was proposed by a recent study. They classified the individuals into four clinical phonotypes and concluded that the highest reduction in quality of life was detected in individuals with respiratory syndrome (cough and dyspnea) and chronic pain syndrome (arthralgia and myalgia)[13]. It is important to note that most of our sample could be classified in the respiratory syndrome phenotype group and that the scores ≥ 1 in mMRC had a strong positive correlation with the physical domain of quality of life. These findings highlight the need to screen persistent respiratory symptoms in individuals previously hospitalized by COVID-19 and refer them to rehabilitation since it has been shown that respiratory and functional impairment may improve with ambulatory rehabilitation[27]. In addition, a recent systematic review reported that pulmonary rehabilitation had a significant positive effect on dyspnea, physical function, quality of life, anxiety, and depression in patients with Long COVID-19[34].

Another study identified an association between the number of comorbidities and the quality of life. Participants with three or more COVID-19 comorbidities had worse health-related quality of life than part participants with fewer comorbidities in 12 months of follow-up[29]. It is important to note that they included chronic respiratory disease among the comorbidities[29]. So, we did not find any association between the number of risk factors and the quality of life because chronic respiratory disease was an exclusion criterion in the present study.

Length of hospitalization and Length of UTI stay had a very strong positive correlation, which could be expected since it has been reported that patients with COVID who need ICU admissions have a more extended period of hospital stay as these patients might need additional care and recovery time when their disease reaches severe stage to need ICU[33]. In the same way, both the Length of hospitalization and the Length of UTI stay had very strong positive correlations with the number of physiotherapy attendance during hospitalization, which is understandable because physiotherapy was widely recommended for hospitalized patients with COVID-19 in the ICU and ward during the whole period of hospitalization[33-37], so patients who stayed more time hospitalized had more days of physiotherapy attendance. This variable did not correlate with the quality of life 12 months after discharge.

The main limitation of this study is that the results could not be generalizable due to the convenience sample. The small sample number precluded the inclusion of many variables in the statistical analysis, and it was caused by the difficulty of contacting the patients after discharge. Another limitation is that the measures of outcomes were done through self-report questionnaires and scales, by video call and phone call, so there is a possibility of recall bias. Then, we could not exclude the risk of some symptoms reported being attributable to other health conditions than COVID-19; thus, we excluded the individuals with chronic pulmonary disease to reduce this bias risk.

In conclusion, in this sample of individuals previously hospitalized for COVID-19, we found a high prevalence of respiratory symptoms and reduced QoL, even 12 months after hospital discharge. Age,

sex, dyspnea, and diabetes mellitus correlated with the quality of life.

CONCLUSION

The high prevalence of respiratory symptoms and impaired QoL even 12 months after hospital discharge highlight the need to adopt protocols for in-hospital rehabilitation and prepare patients for practice physical activity or exercise-based rehabilitation programs after discharge.

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NOTES

Authors' contributions

Conceptualization: MCBM, JZR, RDR, LCA, FMP. Investigation: RFG, LMS, EK, FAB, VRG, KNNZ, JFPO. Methodology: MCBM, JZR, RDR, LCA, FMP. Data collection: MCBM, RFG, LMS, EK, FAB, VRG, KNNZ, JFPO, FMP. Data processing and analysis: JZR, RDR, LCA. Writing – original draft: FMP, RFG. Review and editing: MCBM, VLWP, RFG, LMS, EK, FAB, VRG, KNNZ, JFPO, JZR, RDR, LCA, FMP. Approval of the final version: MCBM, VLWP, RFG, LMS, EK, FAB, VRG, KNNZ, JFPO, JZR, RDR, LCA, FMP. Supervision: MCBM.

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Conflict of interest

The authors declare no conflicts of interest.

Ethics committee approval

The research project was approved by the Research Ethics Committee of the Federal University of Espírito Santo under CAAE number 31522720.2.0000.5060 and approval opinion number 4.032.838.

Data availability statement

Anonymized data can be made available upon reasonable request to the corresponding author via e-mail: mcbarbalhomoulim@gmail.com or marcela.moulim@ufes.br.

Handling editors

Carolina Fiorin Anhoque, Claudio Piras.

Corresponding address

Universidade Federal do Espírito Santo, Centro de Ciências da Saúde, Departamento de Educação Integrada em Saúde, Av. Marechal Campos, 1468, Maruípe, Vitória/ES, Brazil, ZIP code: 29043-900.