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Research Article

Post-COVID-19 Syndrome: Quality of Life One Year after ICU Discharge

Arantxa Cabañas-Martínez[1], Mª Desamparados Bernat-Adell[2*], Ana Folch-Ayora[2], Eladio Joaquín Collado-Boira[2], Pablo Salas-Medina[2]

[1]Resuscitation Unit. General University Hospital Consortium of Valencia (CHGUV). Valencia, Spain

[2]Nursing Department. Health Sciences Faculty. Jaume I University. Castellón de la Plana, Spain

[*]**Corresponding author:** Mª Desamparados Bernat Adell, Nursing Department, Health Sciences Faculty, Universitat Jaume I. Castellón de la Plana, Spain

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Abstract

Persistent COVID represents a new challenge as it negatively affects the quality of life of patients. The aim is to identify the factors that affect the quality of life of the patient diagnosed with COVID-19 one year after ICU discharge. Observational, descriptive, and cross-sectional study carried out in the Resuscitation Unit of the General University Hospital Consortium of Valencia with 417 patients admitted in the first year of the pandemic. Deceased patients and those with cognitive dysfunction were excluded. Data were collected through a self-administered online questionnaire that included the Short Form of the Health Survey (SF-36) to assess quality of life. Mann-Whitney's U, Kruskal-Wallis, Chi-square tests and multiple linear regression analyses were applied, accepting a level of statistical significance at $p \leq 0.05$. We worked with a sample of (n=122). For an interval confidence of 95%, all dimensions of quality of life were negatively related to sequelae, depression, and anxiety. Significant results were found for: "Physical functioning" [R^2=.418 (F=29.956 (p<.001)]; for "Emotional Well-being" [R^2=.511 (F=43.161 (p<.001)]; in the case of "Vitality" [R^2=.559 (F=52.127 (p<.001)] and for "General Health" [R^2=.569 (F=54.251 (p<.001)]. The dimension "Emotional role" was also influenced by marital status [R^2=.427 (F=23.510 (p<.001)]. The models indicate that the presence of sequelae and high levels of anxiety and depression negatively affect all dimensions of quality of life one year after discharge from the ICU.

Keywords: COVID-19; Critically ill patients; Disability; Quality of life; Sequelae

Background

COVID-19 is an infectious disease whose causal agent is SARS-CoV-2. This is a particular strain that had not been previously identified in humans, so initially there was not enough information on the natural history of the disease, epidemiology, or associated clinical presentation. First reports were made public at the end of December 2019 from China (Wuhan), where it was spreading rapidly and causing a serious Public Health problem [1]. The World Health Organization (WHO) declared at the end of January 2020 that the outbreak caused by the coronavirus, 2019-nCov, constituted a "public health emergency of international importance", and on the 11th of March 2020, COVID-19 was declared a pandemic [2].

The rapid progression of the pandemic and the scant evidence regarding the appearance, behavior and treatment of SARS Cov-2 increased uncertainty about the management and control of the disease, as well as the short, medium, and long-term sequelae. Regarding these sequelae, it is a multiorgan disease with a complex pathophysiology that alternates direct effects of the virus at the respiratory level with a multisystemic inflammatory syndrome, immune disorders, neuropsychological symptoms, and thrombotic complications that in some cases notably affect the quality of life of patients [3-6].

The Post-COVID syndrome is a new challenge to manage. Previous studies show that patients with COVID-19 and with greater comorbidity are more likely to have a poor prognosis [7]. Identifying the most important risk groups is essential when making decisions regarding the anti-2019-nCoV [8] therapy. Although most of the attention is focused on the pulmonary and cardiovascular complications, healthcare professionals should be aware of neurological complications, which can present themselves subtly and substantially increase morbidity and mortality [9-13].

Therefore, it is appropriate to further study the concept of quality of life in patients diagnosed with COVID-19 and observe their development, especially those who were admitted to Intensive Care Units (ICU) [14]. The main objective of the present study was to identify the factors that affect the quality of life (QOL) of patients diagnosed with Covid-19 one year after their diagnosis and admission to the ICU.

Materials and Methods

Study design and population

This is an observational, descriptive, and cross-sectional study carried out in the Resuscitation Unit of the General University Hospital Consortium of Valencia (CHGUV), which is a third-level hospital located in the center of the city of Valencia. From March 14th, 2020, to December 31st, 2020, 417 patients diagnosed with COVID-19 were admitted to the ICU. The sample size was calculated from a population of (N=311) patients who survived the disease. The calculation of the sample was carried out by estimating proportions, accepting a confidence level of 95%, a degree of precision of 5% and losses of 10% (n=66). All surviving patients were contacted and 122 of them met the inclusion criteria and showed interest in participating in the study; therefore, they were all included, generating a sample size of (n=122).

Selection criteria

As inclusion criteria, all patients had to be positive for SARS-CoV-2 confirmed by RT-PCR (reverse transcription polymerase chain reaction) in pharyngeal samples and/or lung aspirate, be older than 18 years, have been admitted to the Resuscitation Unit of the CHGUV within the studied period and have expressed their desire to voluntarily participate in the study by giving the Informed Consent.

Those patients whose communication skills prevented them from undergoing an interview or completing a questionnaire (acute psychiatric illness, dependency situation, cognitive deficit, or previous neurological disease) were excluded. Those patients who died during the year after hospital discharge were also excluded.

Study variables

Quality of life, assessed by the SF-36 [15], was identified as the dependent variable. The following independent sociodemographic variables were defined: age expressed in years, age distributed in groups, gender, and educational level. The independent clinical variables were length of stay in the ICU, length of stay at the hospital, the severity index measured by the Simplified Acute Physiologic Score SAPS-II [16], the presence of sequelae and the anxiety/depression status measured by the Golberg [17] scale.

Study period and procedure

Data were collected after a year ICU discharge between March 2021 to December 2021, one year after hospital discharge. For the data collection, a field notebook was prepared that collected all the previously described variables and a single questionnaire was generated that was distributed through the Qualtrics application using the email addresses of each patient. This required previously contacting the patients by telephone to check the veracity of their email and inform them that they would receive the questionnaire. At this telephone contact, the patients were informed about the objectives of the study and that participation was very important but also voluntary. Clinical data were obtained from the patient's computerized clinical history.

Statistical analyses

Continuous variables were presented as mean and standard deviation, if they did not follow normality criteria, they were expressed as median and interquartile range (IQR=P75-P25). Nominal variables were expressed as frequencies and percentages. Bivariate analyses were performed using nonparametric statistics tests since the Kolmogorov Smirnov test showed non-normality of the variables. Mann-Whitney's U, Kruskal-Wallis and Bonferroni tests were applied to observe differences, and the relationship between nominal variables was determined using the Chi-squared test. A multiple linear regression by the stepwise method analysis was performed. To identify the predictive value of the model for quality of life, the Cohen criterion [18] was applied to one-way ANOVA models. This criterion indicates that R^2 values less than 0.10 do not present a relevant explanatory value, an R^2 between 0.10 and 0.25 indicates a dependency of the analyzed variables, and R^2 values above 0.25 suggest that the explanatory model is clinically relevant. Data were processed using IBM SPSS Statistics version 26 software for PC (IBM Corporation). A level of statistical significance of $p \leq 0.05$ was accepted.

Ethical Considerations

The study always respected the principles of bioethics, the general data protection regulation (EU) 2016/679 [19], and

the Organic Law 3/2018, of 5th of December, on the Protection of Personal Data and guarantee of digital rights [20]. The study received the approval from the Ethics Commission of the Universitat Jaume I "Code CD/31/2021" as well as the approval from the Ethics and Research Committee of the General University Hospital Consortium of Valencia "Code 8/2021".

To preserve sensitive data, a pseudonymization process was carried out, assigning each patient a random number. The patients voluntarily agreed to collaborate by accepting the informed consent prior to beginning the survey. The project received financial support from the Generalitat Valenciana "Code GV/2021/020".

Results

During the period from March to December 2020, 417 patients diagnosed with COVID-19 were admitted to the Resuscitation Unit, of which 25.41% (106) died and 74.56% (311) survived. Of those survivors, (n=122) agreed to participate in the study. A total of 122 patients were interviewed one year after they were discharged from the ICU; The mean age of the sample was 58.92 ± 12 years, with 65.6% (80) men and 34.4% (42) women.

The ICU stay had a median of 15 [28.5-8.5] days and the hospital stay was 71 [56-23.5] days. The SAPS II indicated a severity level of 28.58 ± 11.093 points. A total of 36 patients (29.5%) required invasive mechanical ventilation and 86 (70.5%) were ventilated by non-invasive modality. The comorbidity index was 2.87±1.937. Table 1 presents the sociodemographic and clinical characteristics of the sample.

Sociodemographic Characteristics		**Percentages % (Frequencies)**
Age by groups	Under 30 years of age	1.60(2)
	Between 31 and 50 years	18.90 (23)
	Between 51 and 70 years	57.40 (70)
	Over 70 years	22.10 (27)
Educational level	No studies	6.60 (8)
	Primary	38.50 (47)
	Secondary	35.20 (43)
	University	19.70 (24)
Marital status	Single	23 (28)
	Married	72.10 (88)
	Widowed	4.09 (6)
Employment status	Active	36.90 (45)
	Inactive due to COVID	18.90 (23)
	Inactive due to other causes	12.30 (15)
	Retired	32 (39)
Clinical Characteristics		**Percentages % (Frequencies)**
Charlson	Absence of comorbidity	26.3 (32)
	Medium comorbidity	22.1 (27)
	High comorbidity	51.6 (63)

Mortality prediction	12% Mortality	9.8 (12)
	26% Mortality	37.7 (46)
	52% Mortality	32.8 (40)
	85% Mortality	19.7 (24)
Sequelae	Yes	82 (100)
	No	18 (22)
Myalgias	Yes	71.3 (87)
	No	28.7 (35)
Chronic headache	Yes	13.1 (16)
	No	86.9 (106)
Emotional disorders	Yes	48.4 (59)
	No	51.6 (63)
Respiratory disorders	Yes	45.9 (56)
	No	54.1 (66)
Coagulation disorders	Yes	10.7 (13)
	No	89.3 (109)
Skin and mucosal changes	Yes	10.7 (13)
	No	89.3 (109)
Note: Results expressed in percentages (frequencies)		

Table 1: Sociodemographic and Clinical Characteristics.

The SF-36 questionnaire for the evaluation of the quality of life perceived by the patients one year after discharge presented a reliability of (α=0.919). The first column of Table 2 presents the univariate results of each of its dimensions. In general, all the dimensions obtain acceptable medians, and the "Adequate" category is the one with the highest percentages. The same table includes the results of evaluating the dimensions of the SF-36 in relation to the sociodemographic variables. Age as a global value and distributed by groups did not present any significant relationship. Women were more negatively affected in the dimensions of "Physical function", "Physical role", "Vitality" and "Pain". The level of studies showed a negative and significant correlation; those with a lower level of education scored more in inadequate function, affecting practically all the dimensions of quality of life. The Chi squared test showed significant differences in the distribution of the variable "Marital status" [8.633; (p=0.013)] and "Emotional well-being" [8.043; (p=0.018)] in both dimensions. The "married" group presented better physical and emotional behavior.

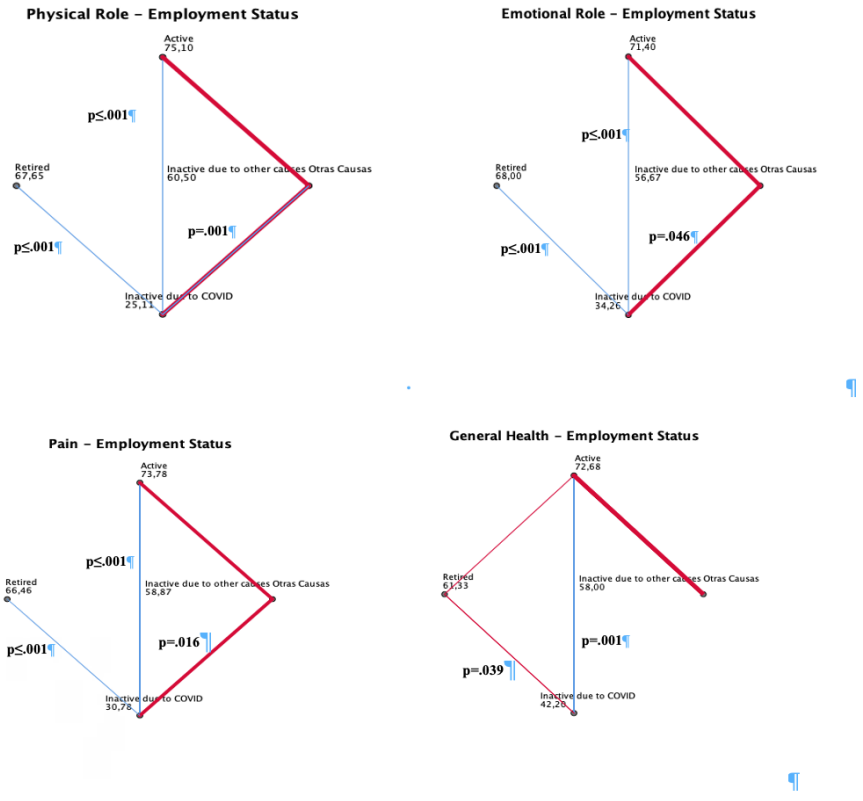
			Gender	**Educational Level**	**Marital Status**	**Employment Status**
	Categories	Me (RIC) % (Frequencies)	Value (*U*) Value (χ^2) (p-value)	Value (r) Value (*U*) (p-value)	Value (*H)* Value (χ^2) (p-value)	Value (*H*) Value (χ^2) (p-value)
Physical Functioning[a,b,d]		70 (85-40)	**1137.500 (0.003)**	**-0.190 (0.036)**	4.222 (0.121)	**25.477 (<0.001)**
Physical Functioning[c,b]	Adequate	69.7 (85)	**4.758 (0.029)**	**1202 (0.029)**	**8.633 (0.013)**	**21.182 (<0.001)**
	Inadequate	30.3 (37)				
Physical Role[a,b,d]		75 (100-25)	**2095 (0.017)**	**-0.187 (0.039)**	4.662 (0.097)	**36.646 (<0.001)**
Physical Role[c]	Adequate	87.2 (82)	**4.506 (0.034)**	**1271 (0.033)**	**6.338 (0.042)**	**34.540 (<0.001)**
	Inadequate	32.8 (40)				
Emotional Role[a,b,d]		66.67(100-0)	1864.500 (0.299)	-0.149 (0.101)	4.511 (0.105)	**20.447 (<0.001)**
Emotional Role[c]	Adequate	60.7 (74)	0.331 (0.565)	1445.500 (0.067)	**6.955 (0.031)**	**18.923 (<0.001)**
	Inadequate	39.3 (48)				
Vitality[a,b,d]		55 (75-40)	**2196.500 (0.005)**	-0.105 (0.225)	2820 (0.224)	2263 (0.74)
Vitality[c]	Adequate	64.8 (79)	0.768 (0.381)	1505.500 (0.273)	6.541 (0.088)	3.133 (0.372)
	Inadequate	35.2 (43)				
Emotional Well-being[a,b,d]		56 (84-44)	1977 (0.108)	**-0.204 (0.024)**	5.658 (0.059)	**11.957 (0.008)**
Emotional Well-being[c]	Adequate	64.8 (79)	0.768 (0.381)	**1274.500 (0.016)**	**8.043 (0.018)**	**11.297 (0.010)**
	Inadequate	35.2 (43)				
Social Functioning[a,b,d]		75 (100-50)	1829 (0.413)	**-0.271 (0.003)**	**6.107 (0.047)**	**18.963 (<0.001)**
Social Functioning[c]	Adequate	80.3 (98)	3.210 (0.073)	**728 (0.002)**	2.900 (0.235)	5.429 (0.143)
	Inadequate	19.7 (24)				

Pain[a,b,d]		57.5 (87.5-32.5)	**1239.500 (0.013)**	0.116 (0.202)	2.073 (0.355)	**23.901 (<0.001)**
Pain[c]	Altered	41 (59)	3.440 (0.064)	2054 (0.160)	1584 (0.453)	**16.014 (0.001)**
	Not altered	59 (72)				
General Health[a,b,d]		50 (75-38.75)	0.277 (0.559)	**-0.263 (0.003)**	1.476 (0.478)	**11.612 (0.009)**
General Health[c]	Adequate	53.3 (65)	1385 (0.093)	**1326.500 (0.004)**	1.690 (0.429)	**11.160 (0.011)**
	Inadequate	46.7 (57)				

Note: Median value (Me) and interquartile range (IQR= P_{75}-P_{25}). Spearman correlation coefficient (*r*)[a]; Mann-Whitney U test [b]; Chi-squared [c]; Kruskal-Wallis test[d]. P-value ≤ 0.05

Table 2: The SF-36 dimensions. Results based on sociodemographic variables.

Figure 1 shows the relationship between the dimensions of the SF36 and the employment situation after applying the Bonferroni correction. In all dimensions, patients who remained inactive due to COVID-19 one year after discharge from the ICU showed greater physical and emotional affectation, worse general health, and a higher level of pain.



Note: Dimensions of the SF36 according to the employment situation. Kruskal-Wallis' test with Bonferroni correction. P-value ≤ 0.05

Figure 1: Dimensions of the SF36 according to Employment status.

The analysis of the quality of life based on the clinical variables showed significant results for the Charlson value and for the prediction of mortality. Those patients who presented greater comorbidity and those who were part of the group with the highest mortality prediction presented worse physical functioning and worse physical role, although they did not show greater affectation in the dimensions that evaluated emotional well-being, vitality, or general health.

On the other hand, the presence of sequelae one year after discharge from the ICU affected 82% of the sample; specifically 100 patients indicated the presence of sequelae. Inadequate physical functioning was reported by 37% of affected patients [11,683; (p<0.001)]. A 50% of patients indicated the presence of pain [14,743; (p<0.001)] and 57% showed inadequate general health [23.537; (p<0.001)], see results in Table 3.

		Charlson	**Mortality prediction**	**Sequelae**
	Categories	Value (r) Value (*U*) (p-Value)	Value (*r)* Value (*U*) (p-Value)	Value (*U*) Value (χ^2) (p-Value)
Physical Functioning[a,b,d]		**-0.220 (0.015)**	**-0.233 (0.010)**	**1881.500 (<0.001)**
Physical Functioning[c,b]	Adequate Inadequate	1753 (0.271)	1815.500 (0.154)	**11.683 (<0.001)**
Physical Role[a,b,d]		**-0.185 (0.041)**	**-0.191 (0.031)**	**1686.500 (<0.001)**
Physical Role[c]	Adequate Inadequate	1744.500 (0.532)	1808 (0.335)	**13.093 (<0.001)**
Emotional Role[a,b,d]		-0.017 (0.855)	-0.050 (0.588)	**1803 (<0.001)**
Emotional Role[c]	Adequate Inadequate	1758 (0.918)	1854 (0.667)	**17.410 (<0.001)**
Vitality[a,b,d]		-0.077 (0.397)	-0.082 (0.369)	**1950 (<0.001)**
Vitality[c,]	Adequate Inadequate	1801.500 (0.545)	1802.500 (0.557)	**14.609 (<0.001)**
Emotional Well-being[a,b,d]		0.009 (0.921)	-0.042 (0.643)	**1982 (<0.001)**
Emotional Well-being[c]	Adequate Inadequate	1742.500 (0.796)	1874.500 (0.321)	**14.609 (<0.001)**
Social Functioning[a,b,d]		-0.157 (0.084)	-0.161 (0.077)	**1678.500 (<0.001)**
Social Functioning[c]	Adequate Inadequate	1406 (0.105)	1403 (0.124)	**6.573 (0.010)**
Pain[a,b,d]		0.002 (0.978)	-0.029 (0.754)	**1817 (<0.001)**
Pain[c]	Altered Not altered	1773 (0.878)	1637 (0.372)	**14.743 (<0.001)**

General Health[a,b,d]		0.051 (0.580)	-0.024 (0.796)	**1890.500 (<0.001)**
General Health[c]	Adequate	1939 (0.652)	1827 (0.893)	**23.537 (<0.001)**
	Inadequate			
Note: Spearman's correlation coefficient *r*)[a]; Mann-Whitney U test[b]; Chi-squared[c]. P-value≤0.05				

Table 3: Dimension-SF 36. Results based on clinical variables.

Subsequently, the type of sequelae that were influencing quality of life were analyzed. It was observed that headache and skin and mucous membrane disorders did not show a significant relationship with the dimensions of the SF-36; however, the presence of myalgia, respiratory and emotional disorders was significant, and coagulation disorders affected it to a lesser extent. It should be noted that 71.3% (87) of patients continued to present myalgia one year after discharge from the ICU and this had a negative impact on all dimensions of quality of life, mainly on the perception of general health, as 62.1% (n=54) patients indicated an inadequate level in relation to said dimension [28,696; (p<0.001)]. Emotional disorders followed the same pattern, with 48.4% (n=59) of the sample being affected [31,411; (p<0.001)]. In the same line, the respiratory alterations persisted, after one year, affecting 45.9% (56) of the participants and of these, 64.3% (36) of participants indicated an Inadequate "General Health" [12,829; (p<0.001)] (Table 4).

		Myalgias	**Emotional disorders**	**Respiratory alterations**	**Coagulation alterations**
	Categories	Value (*U*) Value (χ^2) (p-Value)	Value (*U*) Value (χ^2) (p-Value)	Value (*U*) Value (χ^2) (p-Value)	Value (*U*) Value (χ^2) (p-Value)
Physical Functioning[a,b,d]		**2437 (<0.001)**	**2988 (<0.001)**	**2674.500 (<0.001)**	**970.500 (0.029)**
Physical Functioning[c,b]	Adequate	**14.072 (<0.001)**	**22.767 (<0.001)**	**7.691 (0.006)**	**6.708 (0.010)**
	Inadequate				
Physical Role[a,b,d]		**2188.500 (<0.001)**	**2878.500 (<0.001)**	**2511.500 (<0.001)**	917.500 (0.064)
Physical Role[c]	Adequate	**19.951 (<0.001)**	**27.774 (<0.001)**	**8.741 (0.003)**	2.928 (0.087)
	Inadequate				
Emotional Role[a,b,d]		**2377 (<0.001)**	**2956 (<0.001)**	**2544 (<0.001)**	874 (0.152)
Emotional Role[c]	Adequate	**19.476 (<0.001)**	**43.512 (<0.001)**	**8.780 (0.003)**	3.003 (0.083)
	Inadequate				
Vitality[a,b,d]		**2342 (<0.001)**	**3081 (<0.001)**	**2658 (<0.001)**	831 (0.308)
Vitality[c,	Adequate	**15.301 (<0.001)**	**14.977 (<0.001)**	**12.408 (<0.001)**	2.206 (0.138)
	Inadequate				
Emotional Well-being[a,b,d]		**2318 (<0.001)**	**3285 (<0.001)**	**2417.500 (0.003)**	910.500 (0.093)
Emotional Well-being[c]	Adequate	**12.122 (<0.001)**	**33.248 (<0.001)**	**7.628 (0.006)**	2.206 (0.138)
	Inadequate				
Social Functioning[a,b,d]		**2275.500 (<0.001)**	**2883 (<0.001)**	**2489 (0.001)**	**970 (0.027)**

Social Functioning[c]	Adequate Inadequate	**6.051 (0.014)**	**14.633 (<0.001)**	**5.188 (0.023)**	1.134 (0.287)
Pain[a,b,d]		**2598.500 (<0.001)**	**2793.500 (<0.001)**	**2773 (<0.001)**	**944 (0.049)**
Pain[c]	Altered Not altered	**21.318 (<0.001)**	**22.302 (<0.001)**	**19.813 (<0.001)**	0.995 (0.318)
General Health[a,b,d]		**2405.500 (<0.001)**	**3021.500 (<0.001)**	**2558.500 (<0.001)**	**966 (0.032)**
General Health[c]	Adequate Inadequate	**28.696 (<0.001)**	**31.411 (<0.001)**	**12.829 (<0.001)**	1.283 (0.257)
Note: Mann-Whitney's U test[b]; Chi-squared test[c]. P-value ≤ 0.05					

Table 4: Dimension SF 36. Results according to sequelae.

Moreover, emotional disorders, anxiety, and depression, measured by the Goldberg scale, whose reliability resulted in a Cronbach's alpha (α=0.843), were analyzed to see whether they were related to quality of life, and the results indicated that both emotional situations significantly affected all dimensions of the SF-36.

In total, 63.1% (77) of participants presented anxiety, with inadequate general health in 67.5% (52) of the cases [3195; (p<0.001)]. A total of 48.4% (59) of participants presented depression; and of these, 71.2% (42) indicated inadequate general health [3018; (p<0.001)]. These results are presented in Table 5.

		Goldberg Anxiety	**Goldberg Depression**
	Categories	Value (r) Value (*U*) (p-Value)	Value (r) Value (*U*) (p-Value)
Physical Functioning[a,b,d]		**-0.493 (<0.001)**	**-0540 (<0.001)**
Physical Functioning[c,b]	Adequate Inadequate	**20.292 (<0.001)**	**18.403 (<0.001)**
Physical Role[a,b,d]		**-0.430 (<0.001)**	**-0.487 (<0.001)**
Physical Role[c]	Adequate Inadequate	**5 (<0.001)**	**1.5 (<0.001)**
Emotional Role[a,b,d]		**-0.582 (<0.001)**	**-0.531 (<0.001)**
Emotional Role[c]	Adequate Inadequate	**5 (<0.001)**	**1.5 (<0.001)**
Vitality[a,b,d]		**-0.668 (<0.001)**	**-0.672 (<0.001)**
Vitality[c,]	Adequate Inadequate	**2847 (<0.001)**	**2791.500 (<0.001)**
Emotional Well-being[a,b,d]		**-0.594 (<0.001)**	-0.645 (<0.001)
Emotional Well-being[c]	Adequate Inadequate	**2624.500 (<0.001)**	**2846.500 (<0.001)**
Social Functioning[a,b,d]		**-0.537 (<0.001)**	**-0.548 (<0.001)**

Social Functioning[c]	Adequate Inadequate	**1778.500 (<0.001)**	**1804.500 (<0.001)**
Pain[a,b,d]		**-0.550 (<0.001)**	**-0.518 (<0.001)**
Pain[c]	Altered Not altered	**1017 (<0.001)**	**1008 (<0.001)**
General Health[a,b,d]		**-0.731 (<0.001)**	**-0.640 (<0.001)**
General Health[c]	Adequate Inadequate	**3195 (<0.001)**	**3018 (<0.001)**
Note: Spearman correlation coefficient (*r*)[a]; Mann-Whitney's U test[b]. P-value≤0.05			

Table 5: Dimension-SF 36. Results based on Emotional Disorders.

The results of the multivariate analyses performed using a multiple stepwise linear regression (95% CI) are presented in Table 6. The dependent variables are those that define each of the dimensions of the SF36, the predictor variables are those that have shown a significant relationship with quality of life.

Linear regression models				
	R^2 Adjusted	**Standardized Coefficients Beta**	**Standard Error**	**F (*p*)**
DV: Physical functioning IV: Sequelae, Mortality prediction, Goldberg depression	.418	.258 -.181 -.437	20.045	29.956 (<.001)
DV: Role Physical IV: Sequelae, Mortality prediction, Goldberg depression	.306	.200 -.140 -.432	34.725	18.771 (<.001)
DV: Role Emotional IV: Sequelae, Goldberg depression, Goldberg anxiety, Marital status	.427	.206 -.209 -.355 .104	31.423	23.510 (<.001)
DV: Vitality IV: Sequelae, Goldberg depression, Goldberg anxiety	.559	.268 -.366 -.279	15.134	52.127 (<.001)
DV: Emotional Well-being IV: Sequelae, Goldberg depression, Goldberg anxiety	.511	.316 -.326 -.242	15.746	43.161 (<.001)
DV: Social Functioning IV: Goldberg depression	.347	-.594	22.953	65.265 (<.001)
DV: Pain IV: Sequelae, Goldberg depression, Goldberg anxiety	.387	.219 -.312 -.219	22.802	26.443 (<.001)

DV: General Health IV: Sequelae, Goldberg depression, Goldberg anxiety	.569	.200 -.191 -.499	15.336	54.251 (<.001)

Note: Regression Model Analyses. Confidence Interval 95%, p-value ≤ .05. Abbreviations: DV (Dependent Variable) IV (Independent Variable)

Table 6: Multivariate analyses.

Discussion

In relation to the sociodemographic characteristics, the mean age of the analyzed sample was 58.92 ± 12 years, a situation that coincides with the results presented by Taboada, et al., and by Qian, et al. [21,22]. Most of the sample were men, as in other studies [23]. Initially, being older and being a woman was associated with clinical predictors such as severity of the disease, the need for invasive mechanical ventilation, and the presence of comorbidities with a greater possibility of developing Long-COVID [24]. However, in our study, only women showed a significant relationship with worse quality of life 12 months after discharge from the ICU. In relation to age, the systematic review by Notarte, et al. [25] also found no relationship between older age and the persistence of symptoms (OR 0.86, 95% CI 0.73 to 1.03, p=0.17) and the study by Arjun, et al. [26] indicated no relationship for sex (OR 1.29, 95% CI 0.89 to 2.25, p=0.36).

Regarding the quality of life, more than half of the respondents indicated adequate physical functioning, emotional role, social functioning, and general health; however, when asked about the presence of sequelae, one year after ICU discharge, 82% of those surveyed indicated persistence of sequelae. We are well above what other authors indicate, such as the case of the study carried out by Peter [27] et al., who in a cohort of 11,536 patients observed a prevalence of sequelae of 63.7% (62.8 to 64.6) at 12 months; in that study, neurocognitive alterations were the most prevalent. However, in our case, it was myalgia (71.3%) followed by alterations at an emotional level (48.4%) and respiratory alterations (45.9%).

In the analysis of the quality-of-life dimensions based on the employment situation, we observed that those patients who remained inactive due to persistent COVID - 18.9% (23)- showed worse physical functioning, less emotional well-being, and worse general health. These results are better than those presented in post intensive care syndrome (PICS) in which only 56% to 60% of patients returned to work one year after the critical illness [28]. Piva et al., confirm in their study that one year after ICU discharge, the development of patients severely affected by SARS-CoV-2 is very similar to that of other critically ill patients with acute respiratory distress syndrome (ARDS) [29]. Both COVID-19 and ARDS causative situations require a rigorous physical and neuropsychological evaluation; as well as an evaluation of the job post that allows it to be adapted to the characteristics of patients who have recovered from a serious illness [30].

The multivariate analyses generated in this study present models with robust results and indicate that the presence of sequelae, a high mortality prediction, and depression combine to show a worse quality of life, affecting physical functioning and role, as well as vitality. We found a combination of purely physical factors "sequelae and mortality prediction" associated with emotional disorders as reported in the literature [27,31,32]. Regarding physical functioning, it was inadequate in 30.30% (37) of cases and of these cases, 22.95% (28) showed depression. In the case of physical role, it was inadequate for 32.8% (40) of cases, with 25.40% (31) of these patients presenting depression. The vitality dimension was affected in 35.2% (43) of patients, with 29.51% (36) of this presenting depression. These results are like those found by Schneider et al., whose study showed that 24.7% of the patients with impaired quality of life also presented symptoms of depression [33].

Regarding the emotional role and well-being dimensions, the multivariate analysis generated a model in which the emotional component of quality of life was affected by the presence of sequelae along with depression and anxiety. The emotional role was also affected by marital status; with the "single" category presenting a worse emotional role, although it only affected 1.82% (17) of the sample. In this sense, the results of Kudoh, et al., [34] and Peng, et al., [35] conclude that being married seems to be a protective factor for well-being and resilience in the face of stressful situations such as a prolonged period of recovery after having suffered a serious illness.

We observed that the "Social function" dimension was only affected by emotional disorders, in this case, depression. As indicated by Saltzman, et al. [36] and Ladds, et al. [37], tools are needed that can help improve social support after highly stressful situations and perhaps in this way minimize depression and improve social functioning. On the other hand, the presence of

sequelae, mainly myalgia, together with high levels of anxiety and depression explain a worse perception of pain.

Finally, the "General Health" dimension was affected in 46.7% (57) of the respondents, with the negative influence of the joint presence of sequelae, anxiety, and depression. Persistent COVID affects various health areas, and lasts over time, therefore it is necessary to implement programs aimed at both physical and psychosocial rehabilitation [38,39].

Limitations

The main limitation of the study is that the data were collected through an online questionnaire and the data obtained through self-administered questionnaires are subject to the subjectivity of the interviewee, although this happens in many other studies.

Conclusions

Myalgia, emotional disorders, and respiratory disorders were the most prevalent sequelae one year after ICU discharge. The models generated indicate that all the dimensions of quality of life, assessed using the SF-36 questionnaire, continued to be affected 12 months after the acute illness. Said affectation was motivated by the presence of sequelae along with negative emotional symptoms such as anxiety and depression. Physical functioning and role were negatively associated with a high mortality prediction; The "married" marital status is defined as a protective factor in relation to emotional well-being.

No significant relationship was found with age or any other clinical variable. The female gender was more affected in relation to the dimensions that evaluated physical functioning but did not show significance when generating the models.

Impact and Clinical Applicability

The so-called post-COVID syndrome affects health insidiously and continuously over time; how to prevent this syndrome and treat it comprehensively is currently a health problem added to the pandemic itself.

Knowing the quality of life, as well as the sequelae and observing how this influence the lives of patients who survived the acute phase of the disease, could be useful for generating future profiles. Being able to have information that allows profiles to be generated is of great interest in the clinical setting, since these profiles could guide the early identification of long-COVID syndrome.

Competing Interests

The authors declare that they have no competing interests.

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