The Effects of COVID-19 On The Quality of Life Among a Sample of The General Lebanese Population

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Abstract

Background: Infectious illness outbreaks, such as COVID-19, have a devastating impact on physical health and social and psychological well-being. Therefore, the objective of this study was to assess the quality of life (QOL) after the COVID-19 outbreak in a sample of the Lebanese population and compare sociodemographic factors associated with QOL among COVID-19 patients and healthy controls.

Methods: A cross-sectional study conducted between January and March 2021 during the lockdown imposed by the Lebanese Government enrolled 2349 Lebanese adults. The major dependent variable was the 12-item Short Form Survey (SF-12), often used as a QOL measure for assessing the impact of health on an individual's everyday life.

Results: In participants with non-positive PCR, linear regression showed that higher income (Beta=2.224) is associated with a higher QOL score. Whereas higher household crowding index (Beta=-0.537), older age (Beta=-0.109), being married (Beta=-1.308), having hypertension (Beta=-2.479), and other chronic diseases (Beta=-3.704) were associated with a lower QOL score.

In participants with positive PCR, linear regression showed that the female gender (Beta=2.416) and a higher income (Beta=4.856) were associated with a higher QOL score. Whereas shortness of breath (beta=-2.607), sore throat (Beta=-5.654), sneezing (Beta=-3.761), and having a chronic disease other than hypertension (Beta=-3.181) were associated with a lower QOL score.

Conclusion: Overall, factors such as age, male gender, married status, crowded household, low monthly income, high BMI, the presence of chronic disease, and severe COVID-19 symptoms were related to lower QOL after the covid-19 pandemic.

Background

The novel coronavirus, which first appeared in Wuhan, China, towards the end of 2019, rapidly spread across countries and was declared a pandemic on March 11, 2020 (1). Coronavirus disease 2019 (COVID-19) infections caused hospitalization and death for millions of people worldwide and are among the most common causes of referral of the elderly to hospitals (2). By May 26, 2021, COVID-19 had infected over 167 million and killed over 3 million individuals (3), its rapid spread putting a heavy burden on health systems globally (4). Containment attempts are ongoing; but, given the numerous uncertainties surrounding the disease transmissibility and virulence, their efficiency is unknown. In Lebanon, since the declaration of the first case of COVID-19 on February 21, 2020, different life components have been severely or partially interrupted (5). The disease has affected the whole population, not just those infected or exposed (5). In addition to COVID-19, the Lebanese have been facing a steep socioeconomic crisis. Thus, a multifaceted approach was required from the Lebanese government to limit the infection and get through the crucial phase (5). Consequently, the Lebanese government has imposed strict measures such as a national curfew and closing the borders (land, airport, and seaport), schools, universities, bars, gyms,

malls, and restaurants. The lockdown was successful in lowering cases and, so far, in controlling and containing the infection (6).

Infectious illness outbreaks, such as COVID-19, have a devastating impact on people's physical health and social and psychological well-being, in addition to severe economic implications (7). The World Health Organization (WHO) defines the quality of life (QOL) as "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns" (8). Mental health experts have raised concerns about the impact of the COVID-19 pandemic on the psychological functioning, well-being, and QOL of communities (9), particularly the psychological effects of pervasive quarantine and preventive measures to reduce COVID-19 spread (9). People's everyday activities have dramatically changed by strict adherence to preventive measures such as wearing facemasks, regular handwashing, sanitizing surfaces, and, most importantly, keeping social distance and isolation of infected persons (10). Individuals who have been quarantined are more likely to experience a wide range of unpleasant emotions, including fear, anger, guilt, and a sense of loss of control (10). Also, most social and professional engagements that required travel or gatherings were canceled, disrupting people's everyday activities and overall functioning and well-being (11).

COVID-19 patients appear to be negatively affected by the disease in terms of physical and mental health and health-related QOL (12–14). Although most of them have a favorable evolution, some have worse outcomes, progressing to acute respiratory distress syndrome and needing intensive care therapy (15). Patients who survive may be at risk for poor health-related QOL and chronic symptoms following discharge (15). Also, COVID-19 can considerably influence the mental health and QOL of recovered patients and their families who might experience post-traumatic stress disorder, depression, anxiety, and sleeplessness (12, 16, 17). A recent study from Italy among 143 COVID-19 patients found that symptoms persisted and QOL was low 60 days following the occurrence of symptoms (18).

The impact of diseases, disorders, or disabilities on the physical, mental, and social aspects of patient health is assessed using QOL measures that can be generic (used in a wide range of illnesses) or disease-specific (designed for a particular disease) (19). Although both generic and respiratory-specific QOL questionnaires have been validated and standardized, the question remains whether the instrument is adapted in patients with a new disease, such as COVID-19, where the pulmonary function might be impaired, and dyspnea is one of the most common patient complaints (20, 21). Despite the large number of people who have been infected with COVID-19 and have developed symptoms, the clinical course of the associated respiratory disease and impact on overall general health and function has not been elucidated completely. To date, few studies have demonstrated that COVID-19 has a detrimental influence on the overall quality of life (22–25). The assessment of QOL and the various related factors helps identify problems that can influence everyday lives during the COVID-19 pandemic.

Therefore, the objective of this study was to assess the QOL after the COVID-19 outbreak in a sample of the Lebanese population and compare sociodemographic factors associated with QOL among COVID-19

patients and healthy controls.

Methods

Study design and sampling

This cross-sectional study was conducted between January and March 2021 during the lockdown imposed by the Lebanese Government. It used an electronic questionnaire and the snowball sampling technique to recruit a geographically representative sample of 2369 Lebanese adults. The sample was then weighted for geographical dwelling region, gender, and education level, as per the Central Administration of Statistics figures to optimize sample representativeness.

Sample size calculation

The minimum sample size was calculated using the G-Power software, version 3.0.10. The calculated effect size was 0.0101, expecting a squared multiple correlation of 0.01 (R^2 deviation from 0) related to the Omnibus test of multiple regression. The minimum necessary sample was $n=2091$, considering an alpha error of 5%, a power of 80%, and allowing 20 predictors to be included in the model. The target sample size was multiplied by 1.1 to allow for possible missing values.

Questionnaire and variables

The questionnaire used was standardized in Arabic (the native language in Lebanon) and required 20 minutes to complete. The introductory section included explanations and the study objective; participants who answered the questionnaire gave informed consent to participate implicitly. The questions covered sociodemographic characteristics, health status, COVID-19 (symptoms, duration, hospital admission...), in addition to questions used for the scales' construction.

Major dependent variable

The 12-item Short Form Survey (SF-12) is a self-reported questionnaire, often used as a QOL measure for assessing the impact of health on an individual's everyday life (26), and validated in the general Lebanese population (27). The score is usually calculated online and spans from 0 to 100. For the purpose of this study and ease of work, all 12 items were rated on a 5-point Likert scale from 1 (always) to 5 (never). The total score, ranging from 13 to 56, was calculated by summing all the answers, with higher scores indicating higher QOL during the COVID-19 pandemic. The validity of the score calculated as such was confirmed in the current population and during the COVID-19 pandemic period, using appropriate statistical measures.

Independent variables

The independent variables were divided into three parts. Part 1 included sociodemographic characteristics such as age, gender, socioeconomic status through household income, marital status,

employment status, and education level. Age (in years) was later categorized into four quartiles: less than 24 years, 24 to 32 years, 32 to 41 years, and more than 41 years.

Part 2 covered personal medical history (diabetes, cardiovascular diseases, and cancer) and risk factors for chronic diseases (smoking, alcohol consumption, and hypertension).

Part 3 was related to COVID-19. In addition to questions about symptoms, it described the disease severity and status, computed through a categorical variable based on self-declared information: non-positive SARS-CoV-2 PCR result (includes those with a negative test result and those who never took the test), mild (positive PCR but no symptoms), moderate (positive PCR with symptoms but no hospitalization), and severe status (positive PCR with symptoms and hospitalization) disease.

Statistical analysis

Data were converted from Google to an Excel spreadsheet, then analyzed using SPSS version 25.0. A descriptive analysis was first conducted to evaluate sample characteristics.

Construct validity of the SF-12 scale was assessed in the current population using the rotated component matrix technique. The Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity were calculated to ensure the adequacy of the models. Factors with eigenvalues values higher than one were retained and the scree plot method (28) was used to determine the number of components to extract. Only items with a factor loading higher than 0.4 were considered (29). Moreover, the internal consistency of the scales was assessed using Cronbach's alpha.

For bivariate analysis, a p-value lower than 0.05 was considered significant. The sample being higher than 1000, parametric tests were used (30): means were compared with Student t-test and ANOVA, and percentages using the Chi-squared test. Pearson's correlation was applied to examine the association between continuous variables. For multivariate analysis, a MANCOVA was used to compare adjusted means for specific factors. Additionally, eight linear regressions were conducted, taking the QOL as the dependent variable and all variables that showed a $p < 0.1$ in the bivariate analysis as independent variables. In all cases, a p-value less than 0.05 was considered significant.

Results

Sample description

The sociodemographic characteristics of the participants are summarized in Table 1. The mean QOL score was 38.48 ± 7.44 (Median=38, Min=13.00, Max=56.00). The mean age of the participants was 32.97 ± 11.08 years, and the mean BMI was 25.99 ± 4.90 . More than half of the participants were females (51.4%), married (62.9%), non-smoker (63.6%), and had a low income (69.5%). Only 36.4% of the participants were smokers, and 21.2% had a university education level. Most participants had a negative PCR result for COVID-19 (83.4%), while 1.9% had mild disease, 12.9% had moderate disease, and 1.8% had severe disease.

Table 1
Sample characteristics

Factor	N (%)
Gender	
<i>Male</i>	1142 (48.6%)
<i>Female</i>	1207 (51.4%)
Marital status	
<i>Non-married</i>	870 (37.1%)
<i>Married</i>	1478 (62.9%)
Education level	
<i>Non-university level</i>	1851 (78.8%)
<i>University level</i>	498 (21.2%)
Income level	
<i>Low income</i>	1632 (69.5%)
<i>High income</i>	717 (30.5%)
Smoking status	
<i>Non-smoker</i>	1493 (63.6%)
<i>Smoker</i>	856 (36.4%)
Suffer from chronic disease	
<i>No</i>	1814 (77.2%)
<i>Yes</i>	534 (22.8%)
Are you willing to take the COVID-19 vaccine	
<i>No</i>	1022 (44.1%)
<i>Yes</i>	1297 (55.9%)
COVID-19 status	
<i>Negative</i>	1958 (83.4%)
<i>Mild (no symptoms)</i>	44 (1.9%)
<i>Moderate (symptoms without hospitalization)</i>	304 (12.9%)
<i>Severe (required hospitalization)</i>	43 (1.8%)
	Mean (SD)

Factor	N (%)
Age (years)	32.97 (11.08)
BMI	25.99 (4.90)
Quality of life score	38.48 (7.44)

COVID-19 quality of life scale construction

A factor analysis using the rotated component matrix technique was used to test the validity of the QOL scale and ensure the model's adequacy. All items of the scale could be extracted from the list, and none was removed because none of the items over-correlated with each other ($r > 0.9$), or had a low loading on factors (< 0.3) or a low communality (< 0.3). The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.784, and Bartlett's test of sphericity was significant ($p < 0.001$). QOL scale items produced four factors that had an eigenvalue over 1; the first factor explained 31.44% of the total variance, while the second explained 11.75%, the third 10.34%, and the fourth 9.20%, making a total of 62.73% of the data variance. The total reliability of Cronbach's alpha was 0.784 (Table 2).

Factor 1 covered negative psychophysical effects: "Feeling depressed"; "Performed less due to psychological problems"; "Feeling exhausted"; "Health status obstacle in family relations"; "Difficulty performing tasks as usual". Cronbach's alpha was 0.760.

Factor 2 explained disease physical limits: "Did you perform less due to your disease"; "Were you limited in performing specific tasks"; "You think your health status is"; "Pain limits to perform house duties". Cronbach's alpha was 0.667.

Factor 3 included physical effort limits: "Effort limited to moderate physical activity"; "Effort to climb multilevel stairs". Cronbach's alpha was 0.609,

Factor 4 involved positive psychological effects and consisted of one item: "Feeling relaxed".

Table 2. Rotated component matrix of the quality of life scale (12 items)

Factor	Item	Factor 1	Factor 2	Factor 3	Factor 4	H2 communalities
Feeling depressed	11	0.813				0.683
Performed less due to psychological problems	6	0.674				0.652
Feeling exhausted	10	0.667				0.594
Health status obstacle in family relations	12	0.624				0.553
Difficulty performing tasks as usual	7	0.543				0.577
Did you perform less due to your disease	4		0.776			0.622
Were you limited in performing specific tasks	5		0.691			0.650
You think your health status is	1		0.611			0.563
Pain limits to perform house duties	8		0.521			0.506
Effort limited to moderate physical activity	2			0.894		0.793
Effort to climb multilevel stairs	3			0.720		0.627
Feeling relaxed	9				0.839	0.709
Percentage variance explained		31.443%	11.749%	10.342%	9.204%	
Cronbach alpha= 0.784						
Kaiser-Meyer-Olkin (KMO)= 0.788						
Bartlett's test of sphericity $p < 0.001$						

Bivariate analysis

In participants with non-positive PCR, non-married status, higher education level, higher income, and absence of chronic diseases were associated with higher QOL scores. Whereas lower QOL scores were associated with older age, higher household crowding index, and higher BMI.

In participants with positive PCR, higher QOL scores were associated with the female gender, higher education level, higher income, absence of chronic diseases, smoker status, no COVID-19 symptoms, no hospital admission, and mild COVID-19 disease. Higher household crowding index, higher BMI, and longer duration of hospital stay and symptoms were associated with lower QOL scores.

Table 3
Bivariate analysis taking the quality of life scale in the stratified sample

	In participants with SARS-CoV-2 non-positive PCR result		In participants with SARS-CoV-2 positive PCR result	
	Mean (SD)	P value	Mean (SD)	P value
Gender				
<i>Male</i>	38.99 (7.10)	0.739	33.49 (6.91)	<0.001
<i>Female</i>	39.11 (7.46)		37.99 (7.52)	
Marital status				
<i>Non-married</i>	40.04 (7.49)	<0.001	35.57 (7.06)	0.736
<i>Married</i>	38.47 (7.10)		35.84 (7.84)	
Education level				
<i>Non-university level</i>	38.63 (7.25)	<0.001	35.33 (7.16)	0.054
<i>University level</i>	40.65 (7.21)		37.13 (8.67)	
Income level				
<i>Low income</i>	38.33 (7.44)	<0.001	33.36 (6.50)	<0.001
<i>High income</i>	40.81 (6.57)		39.55 (7.59)	
Suffer from chronic disease				
<i>No</i>	40.09 (7.03)	<0.001	37.13 (7.33)	<0.001
<i>Yes</i>	35.51 (7.01)		30.05 (5.59)	
Type of chronic disease				
<i>No disease</i>	39.51 (7.16)	<0.001	36.45 (7.76)	<0.001
<i>Hypertension</i>	36.85 (6.95)		30.01 (2.16)	
<i>Other disease</i>	35.84 (8.30)		33.41 (4.40)	
Smoking status				
<i>Non-smoker</i>	39.31 (7.36)	0.054	34.64 (7.71)	<0.001
<i>Smoker</i>	38.62 (7.15)		37.74 (6.85)	
Did you suffer from COVID-19 symptoms				
<i>No</i>			37.51 (5.39)	0.101

	In participants with SARS-CoV-2 non-positive PCR result		In participants with SARS-CoV-2 positive PCR result	
Yes			35.50 (7.77)	
COVID-19 symptoms				
No symptoms			36.83 (4.73) 0.019	
Fever			33.99 (9.03)	
General pain			36.15 (6.83)	
Muscle pain			36.49 (6.30)	
Lost smell			40.08 (6.04)	
Hospital admission due to COVID-19				
No			36.33 (7.81) <0.001	
Yes			31.26 (2.20)	
Cured from COVID-19				
No			32.82 (5.93) <0.001	
Yes			36.52 (7.74)	
Still suffering from COVID-19 symptoms				
No			38.20 (7.20) <0.001	
Yes			32.70 (6.86)	
COVID-19 status				
Mild disease			37.51 (5.39) <0.001	
Moderate disease			36.15 (8.11)	
Severe disease			31.26 (2.20)	
	r	P value	r	P value
Age (years)	-0.141	<0.001	-0.052	0.329
Household crowding index	-0.173	<0.001	-0.119	0.023
BMI	-0.127	<0.001	-0.129	0.014
Duration smoking (years)	-0.023	0.343	0.219	<0.001

	In participants with SARS-CoV-2 non-positive PCR result	In participants with SARS-CoV-2 positive PCR result
Duration of hospitalization (days)	-0.185	<0.001
Duration of COVID-19 symptoms	-0.411	<0.001

Multivariable analysis

In participants with non-positive PCR, linear regression 1 showed that higher income (Beta=2.224) is associated with a higher QOL score. Whereas higher household crowding index (Beta=-0.537), older age (Beta=-0.109), being married (Beta=-1.308), having hypertension (Beta=-2.479), and other chronic diseases (Beta=-3.704) were associated with a lower QOL score.

In participants with positive PCR, linear regression 2 showed that higher income (Beta=5.113), female gender (Beta=4.479), and smoker status (Beta=2.094) were associated with a higher QOL score, while higher BMI (Beta=-0.233) and having a chronic disease other than hypertension (Beta=-5.186) were associated with a lower QOL score.

Linear regression 3, taking COVID-19 conditions as independent variables, showed that a prolonged hospital stay (Beta=-0.841), longer duration of COVID-19 symptoms (Beta=-0.260), and persisting COVID-19 symptoms (Beta=-2.869) were associated with a lower QOL score.

Linear regression 4, taking COVID-19 conditions and sociodemographic characteristics as independent variables, showed that higher income (Beta=5.427) and smoker status (Beta=2.354) were associated with a higher QOL score, while a prolonged hospital stay (Beta=-0.490), longer duration of COVID-19 symptoms (Beta=-0.268), and persisting COVID-19 symptoms (Beta=-2.531) were associated with a lower QOL score.

Linear regression 5 showed that moderate COVID-19 status (Beta=-1.365) and severe COVID-19 status (Beta=-6.251) were associated with a lower QOL score.

Linear regression 6, taking the COVID-19 status and sociodemographic factors as independent variables, showed that female gender (Beta=4.497) was associated with a higher QOL score, while higher BMI (Beta=-0.211) and severe COVID-19 status (Beta=-4.921) were associated with a lower QOL score.

Linear regression 7 showed that fever (Beta=-2.525), shortness of breath (Beta=-3.262), sore throat (beta=-5.654), and persisting COVID-19 symptoms (Beta=-5.024) were associated with a lower QOL score.

Linear regression 8, taking sociodemographic factors and COVID-19 symptoms as independent variables, showed that the female gender (Beta=2.416) and a higher income (Beta=4.856) were associated with a higher QOL score. Whereas shortness of breath (beta=-2.607), sore throat (Beta=-5.654), sneezing

(Beta=-3.761), and having a chronic disease other than hypertension (Beta=-3.181) were associated with a lower QOL score.

Table 4
Multivariable analysis in participants with non-positive SARS-CoV-2 PCR result

Linear regression 1 taking the QOL scale as the dependent variable				
Factor	Unstandardized beta	Standardized beta	95% CI	P value
Household crowding index	-0.537	-0.124	-0.737; -0.337	<0.001
Age	-0.109	-0.163	-0.140; -0.079	<0.001
High income vs. low*	2.224	0.140	1.486; 2.962	<0.001
Married vs. single*	-1.308	-0.087	-1.986; -0.630	<0.001
Chronic disease (hypertension vs. no disease*)	-2.479	-0.100	-3.609; -1.349	<0.001
Chronic disease (other diseases vs. no disease*)	-3.704	-0.118	-5.135; -2.274	<0.001
Variables entered: marital status; education level; income level; smoking status; age; household crowding index; BMI; type of chronic disease				
Multivariable analysis in participants with positive SARS-CoV-2 PCR result				
Linear regression 2 taking the sociodemographic factors as independent variables				
Factor	Unstandardized beta	Standardized beta	95% CI	P value
High income vs. low*	5.113	0.327	3.637; 6.590	<0.001
Female vs. male*	4.479	0.293	3.051; 5.906	<0.001
Smoker vs. non-smoker*	2.094	0.131	0.593; 3.596	0.006
Chronic disease (other diseases vs. no disease*)	-5.186	-0.132	-8.755; -1.617	0.005
BMI	-0.233	-0.127	-0.401; -0.066	0.006
Variables entered: education level; income level; age; household crowding index; smoking status; BMI; type of chronic disease; gender				
Linear regression 3 taking COVID-19 conditions as independent variables				
Factor	Unstandardized beta	Standardized beta	95% CI	P value

Linear regression 1 taking the QOL scale as the dependent variable				
Hospitalization duration	-0.841	-0.233	-1.168; -0.513	<0.001
Symptoms duration	-0.260	-0.306	-0.362; -0.158	<0.001
Still suffering from COVID-19 symptoms vs. no*	-2.869	-0.189	-4.695; 0.043	0.002
Variables entered: hospital duration; symptoms duration; still suffering from symptoms				
Linear regression 4 taking COVID-19 conditions and sociodemographic factors as independent variables				
Factor	Unstandardized beta	Standardized beta	95% CI	P value
High income vs. low*	5.427	0.350	4.126; 6.727	<0.001
Smoker vs. non-smoker*	2.354	0.149	1.040; 3.668	<0.001
Hospitalization duration	-0.490	-0.136	-0.795; -0.186	0.002
Symptoms duration	-0.268	-0.315	-0.361; -0.175	<0.001
Still suffering from COVID-19 symptoms vs. no*	-2.531	-0.167	-4.165; -0.897	0.002
Variables entered: hospital duration; symptoms duration; still suffering from symptoms; income level; smoking status; gender				
Linear regression 5 taking COVID-19 status as the independent variable				
Factor	Unstandardized beta	Standardized beta	95% CI	P value
Moderate COVID-19 state vs. mild*	-1.365	-0.077	-3.742; 1.012	0.260
Severe COVID-19 state vs. mild*	-6.251	-0.266	-9.285; -3.116	<0.001
Variables entered: COVID-19 status severe; COVID-19 status moderate				
Linear regression 6 taking COVID-19 status and sociodemographic factors as independent variables				
Factor	Unstandardized beta	Standardized beta	95% CI	P value
Female vs. male	4.497	0.294	2.974; 6.020	<0.001

Linear regression 1 taking the QOL scale as the dependent variable				
BMI	-0.211	-0.115	-0.404; -0.018	0.032
Severe COVID-19 state vs. mild*	-4.921	-0.209	-8.287; -1.555	0.004
Variables entered: COVID-19 status severe; COVID-19 status moderate; gender; BMI; age				
Linear regression 7 taking COVID-19 symptoms as independent variables				
Factor	Unstandardized beta	Standardized beta	95% CI	P value
Fever vs. no*	-2.525	-0.165	-4.185; -0.864	0.003
Shortness of breath vs. no*	-3.262	-0.212	-5.086; -1.439	<0.001
Sore throat vs. no*	-5.654	-0.373	-7.281; -4.027	<0.001
Still suffer from COVID-19 symptoms vs. no*	-5.024	-0.331	-6.673; -3.375	<0.001
Variables entered: fever; general pain; muscle pain; lost smell; lost taste; shortness of breath; diarrhea; sneezing; sore throat; headache; still suffer from COVID-19 symptoms				
Linear regression 8 taking sociodemographic factors and COVID-19 symptoms as independent variables				
Factor	Unstandardized beta	Standardized beta	95% CI	P value
Female vs. male*	2.416	0.159	0.987; 3.846	0.001
High income vs. low*	4.856	0.312	3.433; 6.279	<0.001
Shortness of breath vs. no*	-2.607	-0.169	-4.406; -0.809	0.005
Sore throat vs. no*	-2.986	-0.196	-4.671; -1.301	0.001
Sneezing vs. no*	-3.761	-0.213	-5.485; -2.036	<0.001
Suffer from chronic disease vs. no*	-3.181	-0.167	-5.096; -1.266	0.001
Variables entered: fever; general pain; muscle pain; lost smell; lost taste; shortness of breath; diarrhea; sneezing; sore throat; headache; gender; income; smoking status; BMI; chronic disease;				
*reference value				

Adjusted quality of life values among non-positive PCR participants

Figure 1 shows the association of the COVID-19 QOL scale with income level, marital status, and chronic disease status in participants with non-positive PCR. Significantly higher means were shown for higher income, being married, and the absence of chronic diseases.

Adjusted quality of life values among COVID-19 positive participants

Figure 2 shows QOL scores according to gender, income level, and chronic disease status in participants with positive PCR results. Significantly higher means were shown for female gender, higher income, and the absence of chronic disease. Furthermore, Figure 3 shows values according to COVID-19 symptoms (fever, shortness of breath, sore throat, and sneezing). Significantly higher means were shown for participants with no symptoms.

Discussion

This study assessed the quality of life post-COVID-19 and the related factors among a sample from the general Lebanese population infected or not with COVID-19. The results showed that demographic backgrounds, medical conditions, and COVID-19 symptoms and severity were related to poor QOL among a sample of the Lebanese population. Most previous studies have focused on the QOL of COVID-19 patients in hospitals (23–25, 31), while just a few have evaluated QOL post-COVID-19 (32, 33). Garrat et al. found that, compared to the general population, social functioning, general health, and aspects of mental health were affected after COVID-19 onset among 458 non-hospitalized COVID-19 patients (32). Furthermore, among 279 hospitalized COVID-19 patients the QOL was altered after discharge with a slight difference in pain in the ICU group, but no statistically significant difference in the ward groups (33). COVID-19 has resulted in a considerable loss of human life throughout the world, and it poses an unprecedented threat to public health, food systems, and the workplace. This unexpected pandemic and subsequent lockdown dramatically affected QOL due to the suspension of social activities, closure of public spaces and stores, loss of employment, and reduced income.

In this study, we could validate the use of the previously validated SF-12 to assess the quality of life during the COVID-19 pandemic. The factor analysis showed that items converged into four factors. The scale internal consistency was found to be very satisfactory (Cronbach's alpha: 0.784). In light of these results, the scale can be considered efficient in both research and clinical practice.

Our results revealed that having a chronic disease was related to poor QOL in both groups (infected or not with COVID-19), in line with other findings showing that the COVID-19 pandemic had a mostly negative impact on QOL and the well-being of those with chronic medical problems (13, 25, 34). According to the literature, people with chronic diseases, including diabetes, hypertension, heart disease, and other chronic

illnesses, have a reduced QOL (35–38). A study among 1,139 participants from China during the COVID-19 pandemic showed that respondents with three chronic diseases and above reported lower QOL than other respondents (13). Furthermore, patients with chronic illnesses had worse emotional/mental than physical health QOL during the COVID-19 pandemic (34).

It is widely recognized that most chronic illnesses can affect overall health by reducing the capacity to live well, limiting functional status, productivity, and quality of life, and substantially contributing to health care expenses (39). During the COVID-19 pandemic, patients with chronic illness faced more challenges managing their daily activities, nutrition, and exercise as they must be monitored regularly (40). Dealing with their condition was difficult, especially given the shortage of resources and access to health facilities and health care experts (40). Also, individuals with chronic diseases are at higher risk for catching the virus, being hospitalized, and developing severe respiratory symptoms, which adds to their concern (34) and could negatively affect their quality of life (41).

When looking into the demographic factors, a lower income, a crowded household, the male gender, married status, and older age were associated with lower QOL scores. In the context of the COVID-19 pandemic and lockdown, these results seem reasonable. Across countries, economic hardships due to COVID-19 are likely to have a detrimental impact on the QOL. Similarly, previous studies have found that individuals with lower income levels had worse QOL ratings (25, 42–44). Many people have lost their job and were at risk of falling into extreme poverty, which could lead to limited access to quality health care. Also, our results showed that participants who lived in a crowded house have a poor QOL, in line with other findings (45). Living in overcrowded homes may cause tensions, exacerbated by a higher probability of catching illnesses, thus generating unfavorable consequences among inhabitants. Hence, people with reduced income and those living in overcrowded households have a higher financial strain that could unfavorably affect their overall health. This aspect is exacerbated in Lebanon due to the unprecedented economic crisis.

Our results also demonstrated that older age was associated with lower QOL. Few studies suggested that elderly persons are more likely than younger individuals to experience reduced quality of life during the pandemic (12, 13). Contrarily, a study among 494 adults from Germany and Poland found that the QOL of older participants during the pandemic was better than that of younger comparison groups (46). The QOL could depend on the cultural characteristics, economic, and financial stability of a country. In a country like Lebanon with low resources and an unstable political structure, measures to protect the elderly are severely inadequate, affecting their QOL (47). Moreover, older people are more prone to the mental stress of a probable infection and reduced cognitive and physical functions that could decrease their QOL (48).

Also, being married was associated with higher QOL in our results. Evidence suggests that married people have higher mental health than those who have never been married or have been married before (49). In India, married individuals had a 40% reduced likelihood of anxiety than unmarried individuals during COVID-19 (50). Relationships, marriage, birth, and divorce rates can all be affected in such challenging

times (51). Previous findings reveal that the effect of marriage on QOL depends on the quality of the marital relationship and that single persons have better mental health than those who are unhappily married (52).

In our study, the male gender was related to lower QOL among participants with COVID-19, while gender did not affect QOL among non-positive participants. According to previous research, men and women are subject to various cultural norms and societal influences that could influence their QOL (53). In Lebanon, the female gender was associated with higher stress at the beginning of the pandemic (54); it seems that this difference tends to reverse with time, particularly among previous COVID-19 patients, given that COVID-19 severity is associated with the male gender. In COVID-19, men are more likely to get a more severe illness than women and could have persistent symptoms that could affect their quality of life (55). Indeed, the male gender had lower QOL during the COVID-19 pandemic in Saudi Arabia (25). A higher incidence of most illnesses in men may also be linked to a lower life expectancy and worse QOL than women (55). Furthermore, men who are the primary earners for their families were more likely to experience stress and anxiety resulting from poor health or job loss during the pandemic, particularly in the Lebanese setting.

Also, our study have found an association between higher BMI and worse QOL, similar to other studies (56). A cohort study done among 504 COVID-19 patients have found that BMI was related to impaired physical quality function (56). It is well known that BMI is associated with reduced life expectancy and lower quality of life, even in the absence of disease (57).

Our results showed that physical symptoms and more severe COVID-19 were associated with lower QOL, similar to previous findings (22, 56, 58, 59). Most patients who needed hospitalization for COVID-19 still had persisting symptoms, especially tiredness and dyspnea, after being discharged (33). A cohort study of 1,733 COVID-19 patients found that in most patients, some symptoms persisted after six months of onset, especially tiredness or muscle weakness, sleep problems, and anxiety or depression (60). These symptoms were more detected in severe disease, in addition to lung diffusion abnormalities (60). Unusual symptoms, such as headache, stomach discomfort, and chest pain, could persist months after recovery, particularly in severe/critical patients (56). Furthermore, due to the impact of COVID-19 on everyday life and work, a significant proportion of patients may continue to experience psychological issues after being discharged from the hospital (58), also related to the long period of isolation, fear of illness, and extreme uncertainty experienced during COVID-19, causing significant psychological and mood disturbances, including insomnia, irritability, and anger, in addition to physical impairment (56). Consequently, it is likely that the persistence of symptoms influences overall health, physical and emotional well-being, social functioning, and quality of life (58).

Limitations

This study has several limitations. Its cross-sectional design makes it difficult to make causal inferences. The number of COVID-19 patients with severe disease is limited; a larger sample is needed to clarify the

effect on QOL, using a prospective design for optimal results. The snowball sampling technique used to collect the data is nonrandom, which could generate a selection bias. Also, the use of an online survey has excluded people who were not on social media, resulting in less generalizable results. The self-reported questionnaire used might have led to information bias or data misreporting. Comparisons between pre-pandemic and post-pandemic QOL were not possible since we did not evaluate the quality of life before the pandemic. The time to recovery was not considered when assessing the QOL of COVID-19 patients; long-term follow-up can give more insight into changes in physical and mental health. Concerning the quality of life scale, we could not perform a confirmatory analysis to consolidate our results, nor a convergent validity analysis to compare our results with other related scales. Furthermore, comprehensive evaluation tools such as the Quality of Life Enjoyment and Satisfaction Questionnaire, Hamilton Anxiety Scale, and Hamilton Depression Scale should be used to investigate the physical and mental health of COVID-19 patients, as they may improve the accuracy of quality of life assessment. Finally, multiple confounding factors that could affect the physiological and psychological QOL have not been all collected; therefore, the multivariate analysis could not be adjusted over all the potential confounding factors, and residual confounding is possible. Nevertheless, our results were consistent with other findings, and we could demonstrate a dose-effect relationship with COVID-19 severity, duration of symptoms, and related quality of life. Thus, we have no reason to think that optimizing the methods would change the substance of our findings.

Conclusion

Overall, factors such as age, male gender, married status, crowded household, low monthly income, high BMI, the presence of chronic disease, and severe COVID-19 symptoms were related to lower QOL after the covid-19 pandemic. Our findings also confirmed the harmful impact of the COVID-19 on survivors' quality of life. Future prospective studies on a larger sample are needed to replicate the effects of the COVID-19 pandemic on the quality of life and confirm our findings.

Abbreviations

QOL: quality of life

COVID-19: Corona virus disease 2019

PCR: polymerase chain reaction

SF-112: 12-item Short Form Survey

SARS-CoV-2: severe acute respiratory syndrome of the corona virus 2

BMI: body mass index

Declarations

Ethics approval and consent to participate

The Zahraa Hospital Ethics Committee approved the study protocol (Reference number 9/2020), given that it was observational and respected the anonymity of participants.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Competing interests

The authors have nothing to disclose.

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None.

Authors' contribution

PS designed the study. PS, CH, and SBM drafted the manuscript. PS and SBM carried out the analysis and interpreted the results. RT, HS2, AS, MH, HH, and NBC participated in drafting the questionnaire and were involved in the data collection process. PS and HS1 assisted in drafting and reviewing the manuscript. PS supervised the course of the article. HS1 critically reviewed and edited the manuscript. All the authors reviewed and approved the final version of the manuscript.

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Figures

Figure 1

Adjusted means for income level ($p=0.012$), marital status ($p=0.006$), and chronic disease status ($p=0.016$) in participants with non-positive PCR result for SARS-CoV-2 where covariates are evaluated at the following values: age = 32.97 and household crowding index = 1.48.

Figure 2

Adjusted means for gender ($p<0.001$), income level ($p<0.001$), and chronic disease status ($p<0.001$) in participants with positive PCR result for SARS-CoV-2 where covariates are evaluated at the following values: age = 34.54 and BMI=26.02.

Figure 3

Adjusted means for COVID-19 symptoms (fever ($p=0.004$); shortness of breath ($p<0.001$); sore throat ($p<0.001$); sneezing ($p<0.001$)) in participants with positive PCR result for SARS-CoV-2 where covariates are evaluated at the following values: age = 34.54 and BMI=26.02.