Health-Related Quality of Life Among Patients Recovered From COVID-19

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Abstract

The Coronavirus disease 2019 (COVID-19) has impacted the lives and well-being of individuals worldwide, affecting both short-term and long-term quality of life. This study aimed to assess health-related quality of life (HRQoL) and associated factors among patients who have recovered from COVID-19. A cross-sectional survey was conducted at 2 hospitals in Ho Chi Minh City, Vietnam between January and March 2022. Data were obtained from patients who recovered from COVID-19 using a structured questionnaire which included the EuroQoL-5 Dimension-5 Level (EQ-5D-5L) scale to quantify problems in 5 health dimensions (mobility, self-care, usual activities, pain/discomfort, anxiety/depression) and the EuroQoL-Visual Analog Scale (EQ-VAS) to determine self-rated health status. Factors associated with HRQoL were determined using a generalized linear model (GLM). A total of 325 participants were included in the analysis. The overall mean score from the EQ-5D-5L and EQ-VAS was 0.86 (SD 0.21) and 78.6 (SD 19.9), respectively. Anxiety/Depression and Pain/Discomfort were the major problems experienced by the participants. Lower HRQoL scores were reported among those who were 60 years and older, female, had comorbidities, persistent symptoms, living alone and experiencing stress (all $P < .05$). This study showed that there was a significant reduction in HRQoL among individuals who recovered from COVID-19, compared with the general population. The findings suggest that more interventions need to be implemented to increase such individuals' quality of life, particularly for those who exhibit high-risk factors such as females, those with comorbidities, persistent symptoms, living alone and experiencing from stress.

Keywords

COVID-19, pandemic, quality of life, visual analog scale, Vietnam

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What do we already know about this topic?
The COVID-19 pandemic has caused profound physical and psychological changes in population worldwide. Therefore, the measurement of health-related quality of life (HRQoL) among patients who have recovered from COVID-19 is an important health care indicator; however, consideration (in the literature) of reduced HRQoL due to COVID-19 in the Vietnamese context are insufficient.

How does your research contribute to the Field?
These findings suggest that COVID-19 recovered patients should be assessed in clinical follow-ups, and should be encouraged to pursue psychological treatment. Furthermore, the health utility values contribute to assessing the quality-adjusted life years (QALY) for the purpose of estimating future cost-effectiveness analyses of particular COVID-19 treatment or prevention interventions.

What are your research's implications toward theory, practice or policy?
The results contribute to the evidence for the impact of COVID-19 on the quality of life of recovered patients. The improvement of HRQoL in such patients is one of the ultimate goals of healthcare practices together with the need to provide the optimal long-term patient care.

Introduction

The novel virus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the cause of Coronavirus disease 2019 (COVID-19) which was identified in China in December 2019.[1] Since its emergence, the virus has posed a crisis of historic proportions to global health and daily life, with more than 481 million people having been infected and causing over 6.1 million deaths globally, as of March 29th, 2022.[2] In Vietnam, the pandemic began in January 2020,

when the first case that originated from China was reported.[3] Numerous policy measures were implemented such as quarantining, lockdowns, contact tracing, closed businesses and schools, and so forth to mitigate the negative consequences of the disease.[4] Along with this came an increase in vaccination coverage rates, which is essential to arrest the significant morbidity and mortality.[5] However, reports of vaccine hesitance, followed by the emergence of different mutations and variants of SARS-CoV-2, created some serious global health concerns.[6] As a consequence, the number of confirmed cases continues to rapidly rise in many countries, causing crises in many aspects of life.[7]

Even though the majority of COVID-19 patients experience mild-to-moderate respiratory disease and recover without any specific treatment, other medical complications, or sequelae, can persist for weeks to months after initial recovery.[8] It was calculated that approximately 80% of all study participants developed at least one long-term symptom.[9] Persistent symptoms may develop during or following the acute infection and can last for more than 4 weeks, commonly referred to as post-COVID conditions.[10] As a result, COVID-19 survivors may experience impaired health, lifestyle changes, reduced ability to work, and altered physical and psychological behavior.[11-13] Impacts of illness may lead to reduced health-related quality of life (HRQoL) in both the short-term and the long-term.[8] The impact of COVID-19 on HRQoL varies from country to country as a result of socioeconomic factors, the treatment modalities offered (and their outcomes), and variations in the disease's severity and epidemiology.[14] Several studies indicate that the HRQoL of patients and general populations have been significantly affected by the role of the physical and emotional dimensions, vitality, and social functioning, with some of the effects persisting for more than 3 months or even up to 2 years after discharge in some cases.[15-17] Moreover, patients with underlying comorbidities show a high risk of a decrease in HRQoL.[18]

The COVID-19 pandemic has caused profound physical and psychological changes in the populations of countries worldwide. The measurement of HRQoL in COVID-19 recovered patients is an important health care indicator for assessing the impact of the illness, including on self-perceived well-being to enhance healthcare and treatment; however, studies reporting the physical and psychological conditions of COVID-19 patients after recovery are rare in the context of the Vietnamese population. Therefore, this study was undertaken to investigate the HRQoL and associated factors among COVID-19 recovered patients in Vietnam and to design interventions to increase their quality of life in relation to the long-term effects of COVID-19.

Methods

Study Design, Settings, and Participants

A descriptive cross-sectional survey was conducted among adults who were diagnosed with COVID-19 confirmed via rapid antigen tests (RAT) or real-time reverse transcription-polymerase chain reaction (RT-PCR), and subsequently recovered by reporting either a negative COVID-19 RAT or RT-PCR test. Participants were conveniently invited to participate in the study when they attended a check-up at 2 hospitals in Ho Chi Minh City, Vietnam, between January and March 2022. Eligibility criteria for the study included being 18 years or older and consent to participate in the survey. Exclusion criteria included participants who had a history of any psychotic disorders and any conditions such as impaired consciousness or dementia or offered responses that were ambiguous in this regard.

Sample Size Determination and Sampling Technique

The sample size was determined using a single population formula with an assumption type I error of 0.05 at a confidence level of 95%, $P = .674$ (67.4% of the population in Vietnam is considered to have good health status) and the final sample size was 338.[19]

A paper-and-pencil self-administered questionnaire was provided to nurses to invite patients to participate in the study. The participants were informed of the aims and scope of the study. Written informed consent was obtained from all participants before the study. Participation was voluntary and all information remained anonymous. Respondents had the option to withdraw from the study at any time without any consequences. All the questionnaires assessed HRQoL and required full responses.

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Measures and Instruments

HRQoL Measurement

The EuroQol-5 Dimension 5-Level (EQ-5D-5L) scale is a self-reported generic instrument for HRQoL and is the most common measurement for specifically addressing the health status of a participant. It consists of the following 5 dimensions: mobility, self-care, usual activities, pain and discomfort, anxiety and depression. Within each dimension, the respondents were asked to describe their perceived current health status according to 5 levels of severity (no problems, slight problems, moderate problems, severe problems, and extreme problems). The EQ-5D-5L value set was developed in Vietnam and was confirmed by the EuroQol group, based on the health preferences of the adult population and an index value (utility value) that is evaluated through standard valuation technology with a score ranging from −0.5115 to 1.[20] Furthermore, the questionnaire also contains the EuroQol-Visual Analog Scale (EQ-VAS), which assesses the self-evaluated health status of the participants ranging from 0 indicating the worst imaginable health to 100 indicating the best possible health.[14,21]

Independent Variables

Sociodemographic characteristics included age ($<$60; $\geq$60 years), sex (male, female), education level (primary school, secondary school, high school, college/university, or higher), occupation (employed, self-employed, housewife, retired), marital status (married, single, widowed/divorced), self-assessment of socioeconomic status (low, middle, or high), living condition (alone, with family/others), self-assessment of relationships with family members (closeness, alienation), and self-assessment support from family or relative (yes, no).

Health status was verified based on medical records including comorbidities (yes, no), type of comorbidities (diabetes mellitus, heart disease, hypertension, respiratory disease, kidney disease), and persistent symptoms (fatigue, sleep disturbances, muscle aches, headache, cough, loss of smell or taste, dyspnea, hair loss).

Stress was evaluated using the Perceived Stress Scale (PSS), a reliable instrument for screening emotions and thoughts over the last month. The scale consists of 10 questions with a 5-point rating scale for answering, with scores ranging from 0 (never) to 4 (very often). A total score of $\geq$13 was recorded as having a level of stress.[22]

Statistical Analysis

Data analysis was performed using Stata version 14. Descriptive statistics were presented as median and interquartile range (IQR) or frequencies and percentages. The EQ-5D-5L utility scores and EQ-VAS were tested for normality using the Shapiro-Wilk test revealing a non-normal distribution; therefore, data analysis employed a non-parametric statistical method. The correlation between HRQoL and associated factors was analyzed using the Mann-Whitney *U* test (2 groups) and Kruskal-Wallis one-way ANOVA analysis of variance (multiple groups). Each variable with a bivariate correlation of $P < .2$ was included in the generalized linear model (GLM), which could manage skewness and heteroscedasticity. Because the EQ-5D-5L score may contain negative values, we computed EQ-5D-5L disutility (1-utility score) because of the model's prerequisite. A P-value of $<.05$ was considered statistically significant for all associated factors.

Ethics Approval

Participants were informed about the aims and scope of the study and signed informed consent before their participation. All procedures in this study were approved by the Ethics Committee of the University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam (number: 108/UMP-BOARD).

Results

Characteristics of Participants

Among the 338 patients who were invited to participate in this study, a total of 325 met the eligibility criteria and were included in the final analysis. A large majority of the patients were aged under 60 years (84.0%), had a middle or high socioeconomic status (88.0%), lived with family/others, reported closeness relationships with others/family members (94.1% and 92.6%, respectively), and received support from family/relatives (94.2%). Almost two-thirds of respondents were female (61.8%) and married (62.5%), while over a quarter had received education at the level of secondary school and were self-employed (30.7% and 27.4%, respectively). Nearly one-third (32.6%) of patients had at least 1 comorbidity, with the highest rates reported including diabetes mellitus (11.1%), heart disease (9.8%), and hypertension (8.0%). Regarding persistent symptoms, the majority of patients felt fatigued (40.0%), had sleep disturbances (34.3%), muscle aches (30.0%), and headaches (27.1%). Approximately one-fifth of patients experienced degree of stress (23.4%) (Table 1).

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Table 2 shows the rate of the EQ-5D-5L domains and EQ-VAS score according to the frequency of each item response. The issue with the highest percentage reported by patients was anxiety/depression (46.5%), followed by

Table 1. Characteristics of Participants (N = 325).

Characteristics	N (%)
Age (years)	
<60	273 (84.0)
≥60	52 (16.0)
Sex	
Male	124 (38.2)
Female	201 (61.8)
Education level	
Primary	77 (23.7)
Secondary	100 (30.7)
High school	96 (29.5)
College/university or higher	52 (16.1)
Occupation	
Employed	136 (41.9)
Self-employed (seller)	89 (27.4)
Housewives	66 (20.3)
Retired	34 (10.4)
Marital status	
Married	203 (62.5)
Single/widowed/divorced	122 (37.5)
Socioeconomic status	
Low	39 (12.0)
Middle or high	286 (88.0)
Comorbidities (yes)	106 (32.6)
Type of comorbidities (n = 106)	
Diabetes mellitus	36 (11.1)
Heart disease	32 (9.8)
Hypertension	26 (8.0)
Respiratory disease	15 (4.6)
Kidney disease	8 (2.5)
Persistent symptoms (yes)	154 (47.4)
Type of persistent symptoms	
Fatigue	130 (40.0)
Sleep disturbances	111 (34.3)
Muscle aches	98 (30.0)
Headache	88 (27.1)
Cough	56 (17.1)
Loss of smell or taste	19 (5.7)
Dyspnea	14 (4.3)
Hair loss	14 (4.3)
Living situation	
Alone	19 (5.9)
With family or others	306 (94.1)
Relationships with others/family members	
Closeness	301 (92.6)
Alienation	24 (7.4)
Support from family or relative (yes)	306 (94.2)
Stress (yes)	76 (23.4)

Table 2. The EQ-5D-5L Score and EQ-VAS Score (N = 325).

Domain	N (%)
Mobility	
No problem	260 (80.0)
Having any problems	65 (20.0)
Self-care	
No problem	304 (93.5)
Having any problems	21 (6.5)
Usual activities	
No problem	271 (83.4)
Having any problems	54 (16.6)
Pain/discomfort	
No problem	178 (54.8)
Having any problems	147 (45.2)
Anxiety/depression	
No problem	174 (53.5)
Having any problems	151 (46.5)
All domains	
No problem	132 (40.6)
At least 1 problem	193 (59.4)
EQ-5D-5L (mean ± SD)	0.86 ± 0.21
EQ-5D-5L (median, IQR)	0.93 (0.78-1.00)
EQ VAS (mean ± SD)	78.6 ± 19.9
EQ VAS (median, IQR)	85 (60-95)
EQ-VAS score at 100 points[a]	76 (23.4)

[a]Participants assess their health on EQ-VAS tool was 100 (best health imaginable).

EQ-5D-5L index score was 0.86 (SD 0.21), while the overall mean for EQ VAS was 78.6 (SD 19.9).

Comparison of Values of EQ-5D-5L and EQ-VAS Scores Across Participant Demographics

In general, the median EQ-5D-5L scores were significantly lower for participants who were aged ≥60 years, female, had comorbidities and persistent symptoms, living alone, and had more stress than for those who were <60 years, male, without comorbidities and persistent symptoms, living with family or others, and had no stress (all $P < .001$). In addition, the factors associated with the median EQ-VAS scores were consistent with the results of EQ-5D-5L index score (all $P < .001$) (Table 3).

Multivariable Regression Analysis

In the reduced multivariable generalized linear models, EQ-5D-5L scores were found to be lower among participants who were 60 years and older, female, had comorbidities, persistent symptoms, living alone, and had stress than others (all $P < .05$). Meanwhile, participants who were female, had comorbidity, persistent symptoms, living alone, and had any level of stress were found to have lower health status according to the EQ-VAS (all $P < .05$) (Table 4).

pain/discomfort (45.2%). Approximately one-fifth of participants had mobility problems (20%) and 16.6% had problems with their usual activity. The self-care dimension had the lowest rate, with 6.5% of respondents reporting problems at any level (6.5%). The overall mean of the

Table 3. Comparison of Values of the EQ-5D-5L and EQ-VAS Tool Across Participant Demographic (N = 325).

Characteristics	EQ-5D-5L scores			EQ-VAS scores		
	Median	IQR	P value	Median	IQR	P value
Age (years)						
<60	0.936	0.852-1.000	.000	90	70-100	.000
≥60	0.783	0.626-0.849		50	50-70	
Sex						
Male	1.000	0.852-1.000	.000	95	80-100	.000
Female	0.869	0.734-1.000		80	50-95	
Education level						
Primary school	0.936	0.794-1.000	.325	90	70-100	.307
Secondary school	0.916	0.783-1.000		80	50-95	
High school and higher	0.899	0.795-1.000		85	50-95	
College/university or higher	0.936	0.806-1.000		85	65-100	
Occupation						
Employed	0.936	0.847-1.000	.724	85	70-95	.588
Self-employed (seller)	0.887	0.783-1.000		85	50-100	
Housewives	0.936	0.783-1.000		80	50-95	
Retired	0.926	0.848-1.000		80	50-95	
Marital status						
Married	0.936	0.806-1.000	.539	85	60-95	.960
Single/widowed/divorced	0.916	0.783-1.000		80	60-100	
Socioeconomic status						
Low	0.936	0.783-1.000	.633	80	60-95	.538
Middle or high	0.923	0.783-1.000		85	60-95	
Comorbidities						
Yes	0.783	0.659-0.852	.000	50	50-70	.000
No	1.000	0.916-1.000		95	80-100	
Persistent symptoms						
Yes	0.794	0.9362-1.000	.000	60	50-80	.000
No	1.000	0.676-0.936		95	85-100	
Living situation						
Alone	0.676	0.205-0.783	.000	50	40-55	.000
With family or others	0.936	0.845-1.000		85	70-95	
Relationships with others/family members						
Closeness	0.931	0.794-1.000	.483	85	70-95	.368
Alienation	0.902	0.758-1.000		72.5	50-97.5	
Support from family or relatives						
Yes	0.931	0.794-1.000	.581	85	60-95	.587
No	0.916	0.734-1.000		85	60-100	
Stress						
Yes	0.734	0.628-0.847	.000	50	50-70	.000
No	1.000	0.852-1.000		90	79-100	

Discussion

The pandemic has caused significant physical and behavioral health issues among the general population, but especially among individuals where covered from COVID-19. The maintenance or improvement of HRQoL in COVID-19 recovered patients is one of the main goals of healthcare practices. However, little is known about the impact of the pandemic on patients after recovery from COVID-19. As a result, this study examined the HRQoL of COVID-19 recovered patients in Vietnam and associated factors to apply treatment interventions and design prevention protocols and systems for use in future situations.

General study findings revealed that the value of the EQ-5D-5L index was 0.86 (SD 0.21). The initial findings were lower than those of the study conducted by Barani et al of COVID-19 patients in India, which found that the utility value of EQ-5D-5L among COVID-19 patients was 0.925 (SD 0.150) 1 month after recovery.[23] Our findings were also lower than those of studies by Nguyen et al[19] and

Table 4. Multivariable Regression Analysis for Factors Associated With the Values of EQ-5D-5L and EQ-VAS Among Participants (N = 325).

Characteristics	EQ-5D-5L			EQ-VAS		
	Coef	P value	95% CI	Coef	P value	95% CI
Age (ref: <60 year)	.319	.004	0.099-0.539	−.065	.137	−0.151-0.021
Sex (ref male)	.589	<.001	0.393-0.785	−.109	<.001	−0.145-−0.073
Comorbidity (ref no)	.465	.001	0.201-0.729	−.193	<.001	−0.284-−0.103
Persistent symptoms (ref no)	1.035	<.001	0.671-1.399	−.104	.002	−0.169-−0.039
Living situation (ref: with family/others)	.807	<.001	0.486-1.127	−.198	<.001	−0.301-−0.095
Stress (ref no)	.425	<.001	0.219-0.629	−.108	.004	−0.181-−0.039

Coef = coefficient; CI = confidence interval; ref = reference category.

Mai et al[24] which assessed Vietnamese samples and revealed results of was 0.91 (SD 0.15) and 0.94 (SD 0.09), respectively. Moreover, our findings are significantly lower than the general population survey in the COVID-19 context in Vietnam, China, USA, and Switzerland.[25-28] This result suggests a considerable change in the HRQoL of COVID-19 patients after recovery. In addition, the overall mean EQ-VAS score was 78.6 (SD 19.9), which is also lower than the findings from studies of adults in China (EQ-VAS score was 85.52 (SD 19.37) and Vietnam (EQ-VAS score was 87.4, SD [14.3]).[19,26] Discrepancies in the variations in the HRQoL between studies might be due to differences in the value set used, which depends on the cultural and social characteristics of the population, and may also be due to the severity of illness where patients have recovered from COVID-19,with large negative minimum values leading to lower values. Only 40.6% of participants reported perfect health status. The findings were lower than the figure for the Vietnamese population (67.4%).[19] Meanwhile, the EQ-VAS score at 100 points was recorded at 23.4%, which was higher than that of the population.[19] Previous studies suggest that the EQ-VAS was an effective tool to adequately measure health status properly, as opposed to the EQ-5D-5L tool, because of the independence of any value set.[29,30] However, respondents self-reported their general health using the EQ-VAS. Therefore, it is essential to combine EQ-5D-5L and EQ-VAS effectively evaluate HRQoL in populations.

In addition, analysis of individual factors in the EQ-5D-5L questionnaire revealed that patients had major problems with anxiety/depression (46.5%) and pain/discomfort (45.2%) after recovery from COVID-19. This outcome is contrary to that of Nguyen et al[19] who found problems in usual activities and anxiety/depression (24.3% and 15.2%, respectively). This result may be explained by the fact that the pandemic exacerbated behavioral health issues such as anxiety and depression, especially in COVID-19 recovered patients who endured persistent symptoms after recovery.[31] Pain is considered a common symptom after acute COVID-19, which contributes to a decline in HRQoL as well as an increased rate of anxiety and depression.[32] Further, mental health issues such as anxiety, depression, or stress can also lead to chronic pain.[33] These problems show a bi-directional relationship and have been associated with a lower HRQoL.[34,35] Therefore, the level of pain and mental health issues are a great concern, and screening of patients for these symptoms after recovery could promote their quality of life and provide the best long-term patient care.

In our study, individuals aged 60 years and older with comorbidities and persistent symptoms, showed significantly lower EQ-5D-5L and EQ-VAS scores than others. These results were also similar to prior findings on populations in Vietnam, Hong Kong, Palestine, Ethiopia, and China.[18,25,26,36,37] This is explained by the fact that older adult patients have been found to have higher morbidity and mortality rates than other population.[38] In addition, respondents with underlying diseases showed statistically significant and more severe symptoms and higher hospitalization rates than participants without comorbidities. Moreover, previous studies have reported a wide array of persistent symptoms after COVID-19 hospitalizations, as well as outpatient recovery, which have a significant effect on quality of life.[39] Hence, the combined effect of COVID-19 and chronic disease resulted in the lowest quality of life among participants. Interestingly, males had higher utility scores than females. This result may be explained by the fact that females suffer from anxiety/depression disorders and chronic conditions at a greater rate than males.[25,40,41] Therefore, the results of this study suggest the importance of improved care of older adults females as well as those living with chronic diseases during the pandemic.

One of the salient findings of our study was that patients who reported being stressed had significantly lower EQ-5D-5L and EQ-VAS scores than others. This is consistent with earlier observations which showed that approximately two-thirds of patients had a high risk of stress disorder linked to COVID-19, and participants who suffer from mental health issues are more likely to have lower HRQoL scores than those subjects.[42,43] Moreover, individuals living alone showed a lower HRQoL score than their counterparts. A possible explanation for this relates to the burden of the pandemic, in which it was compulsory for infected patients to

isolate themselves from family and friends in order to limit transmission of the virus, which contributed to significant mental health problems due to lack of social interactions and decreased social support.[44] Further investigation of this matter is needed to promote the necessary steps to prevent further decline in the psychological well-being of those affected, as well as enhancing social support for patients who have recovered from COVID-19.

Limitation

This study had certain limitations. First, because this is a cross-sectional study, it is not possible to conclude a cause-and-effect relationship between the outcome and exposure to COVID-19. Moreover, we could not compare the HRQoL of patients before COVID-19 infection because of the lack of a comparison group; thus, longitudinal studies should be conducted in individuals without COVID-19, considering the time since COVID-19 diagnosis. Second, the findings cannot generalizable because all participants were included at their convenience and because the small sample size in the study.

Conclusion

This study showed that there was a significant reduction in HRQoL among COVID-19 recovered patients in Vietnam compared with the general population. Patients reported major problems with anxiety/depression and pain/discomfort. It is therefore recommended that interventions to enhance quality of life among COVID-19 recovered patients be designed and implemented to provide comprehensive assessment, particularly for those who exhibit high-risk factors such as older adults and females, as well as those with comorbidities and persistent symptoms, living alone, and experiencing stress.

Author Contributions

GH and BTN conceived and designed this study. GH, BTN, HTNN wrote the draft manuscript. PLA, TDT participated in the modification of the manuscript. HTNN, NTL managed the data collection. HTNN analyzed the data. PLA and TDT contributed to revisions to the manuscript. All authors reviewed and approved the final version.

Data Availability Statement

Data relating to this study is available from the first author upon request.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethics Approval

Participants were informed about the aims and scope of the study and then were signed the informed consent before their participation. All procedures of this study were approved by the Ethics Committee at the University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam (number: 108/UMP-BOARD).

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Supplemental Material

Supplemental material for this article is available online.

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