

Impact of COVID-19 severity on health-related quality of life among Saudi adult patients

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SUMMARY

COVID-19 patients may experience varying degrees of symptom severity, significantly impacting the health-related quality of life. As a result, the current study examines the impact of symptom severity on health-related quality of life among Saudi adult COVID-19 patients. In this cross-sectional study 310 adult COVID-19 patients were recruited through a snowball technique in Saudi Arabia. We used a questionnaire (SF-12 RAND tool questionnaire) that included three parts: sociodemographic factors, perception of degree severity of COVID-19 symptoms, and health-related quality of life (HRQoL). Out of 310 COVID-19 adult patients, 200 (64.5%) were female, 110 (35.5%) were between 30-49 years old. The mean scores of the HRQoL, physical components summary (PCS), and men-

tal components summary (MCS) were 58.11±17.02, 71.32±23.72, and 44.91±17.94, respectively. Patients with very severe symptoms had the lowest HRQoL mean rank (120.39, $P=0.023$). There was a strong positive correlation between HRQoL and PCS (0.852) and HRQoL and MCS (0.730). However, PCS and MCS had a weak positive correlation (0.292). The severity of COVID-19 symptoms had a significant impact on HRQoL. Thus, it is essential to enhance the uptake of vaccines to decrease the risk of infections and avoid impact on quality of life.

Keywords: SARS-CoV-2, HRQoL, post-COVID-19 syndrome, persistent COVID-19 symptoms, long-term outcome, physical health, mental health, SF-12 HRQoL.

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■ INTRODUCTION

COVID-19 patients had been previously reported to have long-term psychological, cognitive, and impaired physical functions, and this condition is sometimes referred to as post-intensive care syndrome (PICS) [1]. The syndrome is defined as the development of or worsening of any physical, cognitive, or mental impairments following COVID-19 infection or need for intensive care similar to other acute illnesses [2]. Moreover, PICS may also include pulmonary dysfunction, neuropsychiatric disorders, and long-term cardiac effects [3]. Symptoms of COVID-19 may also exacerbate physical function and quality of life [4, 5]. According to the World Health Organization (WHO), quality of life can be defined as "an individuals' perception of their position in life in the context of the culture and value systems in which they live and concerning their goals, expectations, standards, and concerns" [6]. Health-related quality of life (HRQoL) reflects a person's perceived well-being in physical and mental activities [7]. Several studies from various countries found that COVID-19 appears to have a negative impact on the physical, psychological, social-economic, and overall health-related quality of life (HRQoL) [8-15].

Furthermore, studies showed that COVID-19 patients declined 51-62% in HRQoL after 3-6 months [16-19]. In addition, it is crucial to quantify the effect of COVID-19 on the quality of life. Unfortunately, no studies have been conducted in Saudi Arabia addressing HRQoL among COVID-19 patients to the best of our knowledge. During the COVID-19 pandemic, two studies were undertaken that assessed the effect of the COVID-19 pandemic on HRQoL among the Saudi population [20, 21]. Therefore, we evaluate the severity of symptoms on health-related quality of life among Saudi adult COVID-19 patients.

■ PATIENTS AND METHODS

Study design

A cross-sectional snowball online study of COVID-19 adult Saudi patients was conducted. Completion and submission of the online survey implying consent to participate in this study was declared to respondents at the commencement of the study. Data collection took place between 9 September and 28 September 2021. COVID-19 patients were

invited to complete an online questionnaire administered via Google Forms. Potential participants were recruited via WhatsApp and were asked each to forward it to their family and friends.

Survey questionnaire

The survey sought participants' demographic characteristics (gender, age, marital status, education level, employment status, monthly income). The 2nd section was related to the severity of the general COVID-19 symptoms (minor, moderate, severe, very severe). The last section was related to Health-Related Quality of Life (HRQoL), with 12 questions (six items about physical components summary (PCS) and six items about mental components summary (MCS)).

The pilot pre-test questionnaire was administered on September 7 and 8, 2021. At this stage, 23 people agreed to take the questionnaire to test its validity and reliability and ensure that it is easy to understand. Unfortunately, Cronbach's coefficient, used to test the questionnaire's internal consistency, was more significant than (0.7). Therefore, the pilot study responses were not included in the final results.

Health-Related Quality of Life

Health-related quality of life was assessed using the RAND-12 item Short Form Health Survey (SF12) scale. We used the translated version to the Arabic language from a Saudi study that used the HRQoL RAND-12 tool [22]. These include physical function (PF), physical role (RP), physical pain (BP), general health (GH), vitality (VT), social function (SF), role emotion (RE), and mental health (MH). The rating score for each concept ranges from (0 to 100), and the higher the score, the higher the quality. In addition, SF12 eight health concepts can be divided into two categories: physical component summaries (PCS) and mental component summaries (MCS), and inadequate HRQoL is defined as an overall HRQoL, PCS, or MCS score of less than 50.

Statistical analysis

The descriptive results of the study were presented using numerical statistics (with percentages) for all sociodemographic individuals. A Kruskal Wallis nonparametric test was applied to compare the difference in utility observed in two or more groups statistically. In addition, Spearman corre-

lation coefficient analysis examined the relation between HRQoL, PCS, and MCS. Finally, linear regression was used to test the effect of COVID-19 Symptom's level on HRQoL. Significance levels were considered with p-values ≤ 0.05 . All the statistical analysis has been done using the software IBM® SPSS® version 23 for Windows (IBM Corp, Armonk, USA).

RESULTS

Sociodemographic characteristics

Of the 350 COVID-19 patients invited, 310 agreed to participate in the study (response rate: 88.57%). Of these, 200 (64.5%) were female, 110 (35.5%) were 30-49 years old, the majority were married (N=230, 74.2%), and 194 (62.6%) had bachelor's degrees. About half of the respondents (N = 138, 44.5%) earned more than US \$ 2000 per month (Table 1).

Perception of degree severity of COVID-19 symptoms among Saudi COVID-19 patients

Figure 1 shows the perception of COVID-19 patients regarding the degree of severity of COVID-19 symptoms, which demonstrate that moderate and minor symptoms were the most dominant (54.8% and 20%), respectively.

The overall mean score of HRQoL, PCS, MCS among Saudi COVID-19 patients

Table 2 shows that the overall mean score of health-related quality of life (HRQoL), physical

Table 1 - Sociodemographic characteristics, N=310.

Variables	N (%)	
<i>Gender</i>		
Male	110	(35.5)
Female	200	(64.5)
<i>Age</i>		
19-29	96	(31)
30-49	110	(35.5)
40-50	72	(23.2)
>50	32	(10.3)
<i>Marital status</i>		
Single	69	(22.3)
Married	230	(74.2)
Divorce/Widow	11	(3.5)
<i>Educational level</i>		
Under High School	5	(1.6)
High School	52	(16.8)
Diploma	41	(13.2)
Bachelor	194	(62.6)
Postgraduate	18	(5.8)
<i>Employment status</i>		
Student	31	(10.0)
Employee	144	(46.5)
Non-Employee	135	(43.5)
<i>Monthly income</i>		
Below 500 USD	91	(29.4)
500-999 USD	36	(11.6)
1000-2000 USD	45	(14.5)
More than 2000 USD	138	(44.5)

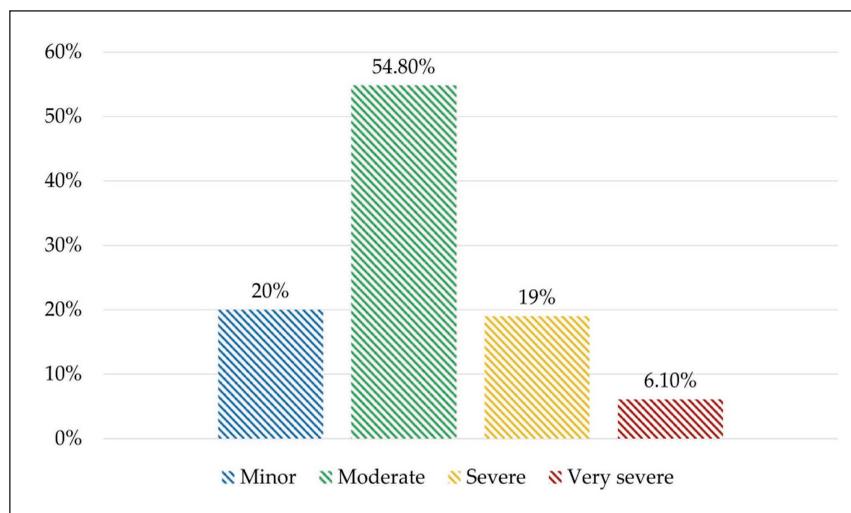


Figure 1 - Perception of degree severity of COVID-19 symptoms among Saudi COVID-19 patients.

Table 2 - The overall mean score of HRQoL, PCS, and MCS among Saudi COVID-19 patients, N=310

	Mean ± SD	95% Confidence Interval for Mean	
		Lower	Upper
HRQoL	58.11±17.02	56.21	60.02
PCS	71.32±23.72	42.90	46.91
MCS	44.91±17.94	68.67	73.97

*HRQoL: health-related quality of life, PCS: physical component summary, and MCS: mental component summary.

component summary (PCS), and mental component summary (MCS) among Saudi COVID-19 patients were (58.11±17.02, 71.32±23.72, and 44.91±17.94), respectively.

The overall mean score of Health-Related Quality of Life (HRQoL) related severity of symptoms among Saudi COVID-19 patients

Figure 2 shows an inverse relationship between the symptoms among COVID-19 patients and the HRQoL score. In addition, the overall mean score

of health-related quality of life (HRQoL) related severity of symptoms (minor, moderate, severe, very severe) among Saudi COVID-19 patients were 63.61, 57.55, 56.36, 50.70, respectively.

Differences between HRQoL and degree of severity of COVID-19 symptoms

Table 3 shows a significant difference between overall HRQoL and the degree of severity of COVID-19 symptoms (0.023). However, no significant differences were observed between MCS or PCS and COVID-19 symptoms.

Table 4 shows that the severity of COVID-19 symptoms has an inverse relationship with the degree of average HRQoL. The odds ratios of HRQoL for moderate, severe, and very severe symptoms were -6.059, -7.251, and -12.905, respectively.

Mean rank differences between HRQoL, PCS, and MCS and Gender

Table 5 shows a significant difference between HRQoL and PCS and gender (P<0.001). However,

Figure 2 - The overall mean score of health-related quality of life (HRQoL) related severity of symptoms among Saudi COVID-19 patients.

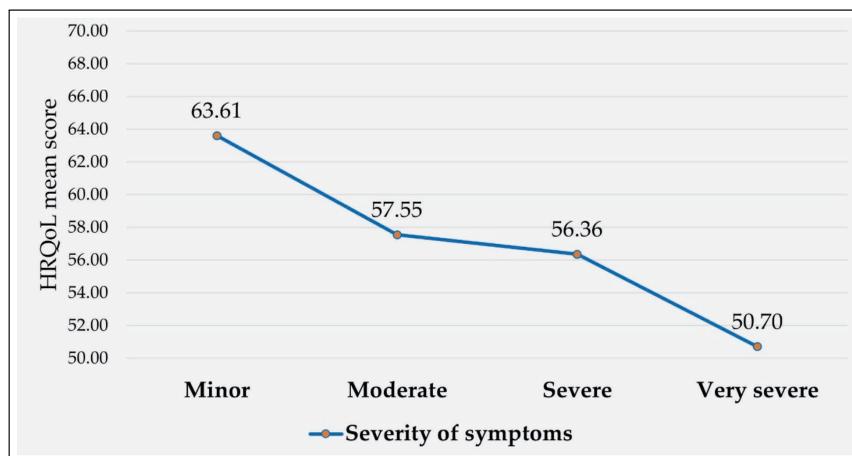


Table 3 - Mean rank differences between HRQoL and COVID-19 symptoms.

Variables ^a	Symptoms Levels (Mean Rank)				(χ ²) P
	Minor N=62	Moderate N=170	Severe N=59	Very severe N=19	
HRQoL	183.11	152.24	147.18	120.39	(9.534) 0.023*
PCS	177.77	154.64	144.81	123.68	(7.200) 0.066
MCS	179.56	150.99	153.97	122.16	(7.551) 0.056

^a Kruskal Wallis Test, χ²: Chi-square test, *: Significant at 0.05 level, P = P-value.

Table 4 - Impact of COVID-19 Symptom's level on HRQoL.

COVID-19 Symptom's level	Odd Ratio ^a	P	95% Confidence Interval	
			Lower	Upper
(Constant)	63.607	<0.001	59.407	67.806
Low (Reference)	1	-	-	-
Moderate	-6.059	.016*	-10.965	-1.153
Severe	-7.251	.018*	-13.265	-1.237
Very severe	-12.905	.004*	-21.576	-4.234

^a Linear Regression, *: Significant at 0.05 level, P = P-value.

Table 5 - Mean rank differences between HRQoL and gender.

Variables ^a	Male N=110	Female N=200	(U) P
HRQoL	179.90	142.08	(8316.5) <0.001*
PCS	187.25	138.04	(7507.5) <0.001*
MCS	160.10	152.97	(10494) 0.503

^a U: Mann-Whitney U, *: Significant at 0.001 level, P = P-value.

no significant differences between MCS and gender (P=0.503).

Correlations between HRQoL, PCS, and MCS

Table 6 shows a strong positive correlation between HRQoL and PCS (0.852) and HRQoL and MCS (0.730). However, PCS and MCS have a weak positive correlation (0.292).

DISCUSSION

The COVID-19 pandemic had a significant impact on the quality of life of individuals infected with SARS-CoV-2 worldwide [23]. Since the first case of COVID-19 was reported on 2nd March 2020, in

the city of Qatif in Saudi Arabia, the Saudi Ministry of Health (MOH) has implemented strict measures to contain the disease, raise awareness, and take proactive steps to mitigate the risks of SARS-CoV-2 spread [24-26]. For example, mass gatherings have been canceled, schools closed, Hajj pilgrimage has been restricted, curfews have been imposed, and localities have been locked down due to increased transmission [26, 27]. Health-related quality of life (HRQoL) is an essential component of public health monitoring and physical and mental health [22]. Often survivors of COVID-19 may develop post-COVID-19 syndrome affecting physical, cognitive, or mental functions [1, 2, 5, 28]. Due to the ongoing pandemic and the measures of closure and compulsory quarantine, many people have been exposed to great psychological stress and various aspects of people's lives and psychological disorders [20]. The majority of the research on HRQoL of COVID-19 patients had focused on hospitalized patients. Nevertheless, in this study, we investigated the HRQoL of individuals who had had a range of symptoms across the spectrum of SARS-CoV-2 infection. We found a negative correlation between increasing severity and HRQoL.

Table 6 - Correlations between HRQoL, PCS, and MCS.

			HRQoL	PCS	MCS
Spearman's rho	HRQoL	Correlation Coefficient	1.000	.852**	.730**
		Sig. (2-tailed)		.000	.000
	PCS	Correlation Coefficient	.852**	1.000	.292**
		Sig. (2-tailed)	.000		.000
	MCS	Correlation Coefficient	.730**	.292**	1.000
		Sig. (2-tailed)	.000	.000	

** : Correlation is significant at the 0.001 level (2-tailed).

In our study, the mean scores of the HRQoL, physical components summary (PCS), and mental components summary (MCS) were 58.11 ± 17.02 , 71.32 ± 23.72 , and 44.91 ± 17.94 , respectively. The low score, especially in the MCS component, is consistent with previous studies [16–19]. Because females made up the majority of the population in our study, there might be a bias due to gender differences. One study showed that females have higher rates of depression and loneliness and lower rates of resilience than men [29]. In this study, a significant difference between HRQoL and PCS and gender ($P < 0.001$) and no significant differences between MCS and gender. One study showed that the female gender was a risk factor for a low MCS [30].

In one study, we found a negative correlation between the severity of the disease and the HRQoL score and an inverse relationship between disease severity and HRQoL score, more severe symptoms were associated with lower HRQoL score. Physical symptoms were common among COVID-19 patients after hospital discharge [10]. HRQoL was significantly associated with age, gender, and physical symptoms, and patients without physical symptoms after discharge had significantly higher HRQoL scores than those with physical symptoms [10]. In a meta-analysis, 58% reported poor quality of life post-COVID-19 patients [28]. Persistent symptoms associated with post-acute COVID-19 syndrome (PACS) seem to impact physical and cognitive function, health-related quality of life, and participation in society [5].

The severity of symptoms and the average overall HRQoL score were inversely associated in the current study. HRQoL decreased from 63.61 to 50.70 as the severity of the symptoms increased. According to our results, moderate and minor symptoms were the most dominant (54.8% and 20%), respectively, regarding the severity of COVID-19 symptoms among COVID-19 patients. In China, during the first month of follow-up among COVID-19 patients, HRQoL was low [30]. In a meta-analysis, the impact of COVID-19 on HRQoL was significant in acute disease and long COVID-19 patients [23]. Higher impact on HRQoL was associated with increasing severity of the disease among patients from low-income countries [23]. In addition, we found a positive correlation between HRQoL and PCS (0.852) and between HRQoL and MCS (0.730). However, PCS and

MCS have a weak positive correlation (0.292). In one study, there was a significant difference in the HRQoL and PCS scores between active and inactive male patients [31]. Another study from China showed a significant correlation between physical activity and HRQoL and that promoting physical activity is essential to enhance HRQoL [32]. The mental component of the HRQoL is also crucial for the total score. Previous studies showed a reduction in mental health during the COVID-19 pandemic [33–36]. The study emphasizes the importance of further research into HRQoL in the acute and subacute stages of the disease. With Long COVID-19 and post-acute sequelae SARS-CoV-2 infection (PASC) gaining attention, the study may need to be repeated 6 and 12 weeks after the acute phase to see how many of these patients have lingering symptoms and thus poor HRQoL [28].

Limitations and recommendations

The findings of this study should be interpreted considering the study's limitations. First, study participants were invited by researchers. Second, the study was limited to adults over 19 years. Third, most research participants were female, accounting for 64.5% of all research participants. Fourth, the survey was conducted online rather than face-to-face, which may have affected participants' responses. Finally, no scale was used to assess disease severity; instead, patients' perceptions were used. Therefore, we recommend conducting a more extensive study on hospital and clinic data. Furthermore, we recommend using the Generalized Anxiety Disorder 7 scale (GAD-7), the depression module of the Patient Health Questionnaire (PHQ-9), and Sleep quality as measured with the Insomnia Severity Index (ISI) to examine the mental health condition of COVID-19 patients in addition to the currently SF-12 used scores.

■ CONCLUSIONS

The severity of symptoms of the COVID-19 patients is significantly diverse in HRQoL. However, these patients lost about 42% of their HRQoL. In addition, the mental component summary (MCS) was low among Saudi COVID-19 patients. These findings provide the first signs of the need for ongoing healthcare for COVID-19 patients, especially in mental health.

Conflicts of interest

The authors declare no potential conflict of interest.

Availability of data and material

The datasets created and analyzed in the current study are not open to the public for participant confidentiality but are available from relevant authors upon reasonable request.

Ethical approval

This investigation did not require ethical approval. No personal data, such as name, phone number, address, etc., were collected because the data was collected anonymously by an online survey. Informed consent was obtained from all participants involved in the study. In addition, the investigation was conducted confidentially and voluntarily. The individual or group's identity is not recorded, and all data is protected.

Consent for publication

The published version of the manuscript has been read and approved by all authors.

Authors contributions

All the authors contributed to the concept, acquisition, and analysis of data, drafting of the article, and critical revision of important intellectual content.

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